PERGAMON

International Journal of Heat and Mass Transfer 43 (2000) 1273–1371

International Journal of HEAT and MASS TRANSFER

www.elsevier.com/locate/ijhmt

Heat transfer — a review of 1996 literature

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PII: S0017-9310(99)00067-8

1. Introduction

The present review is designed to encompass the English language heat transfer papers published in 1996. The papers have been categorized into a number of sub-fields. While being exhaustive, some selection is necessary. Besides reviewing the journal articles of 1996, we also briefly mention important conferences and meetings on heat transfer and related fields, major awards and also books on heat transfer published during the year.

A Meeting on Molecular and Microscale Heat Transfer in Materials Processing and Other Applications was held in Yokohama, Japan on February 2–7. Topics covered included the following: molecular dynamics approach to heat conduction, microscale heat transfer in thin film formation and plasma processing, and measurement of temperature and thermophysical properties using atomic and molecular scale phenomena. The Turbulent Heat Transfer Conference was held on March 10–15 in San Diego, USA. The 3rd International Heat and Mass Transfer Forum was organized in Minsk, Belarus on May 20–24. The 2nd European Thermal-Sciences and 14th Italian Union of

Thermo-Fluid-Dynamics (UIT) National Heat Transfer Conference was held on May 29–31 in Rome, Italy; sessions were held on experimental work and a variety of new experimental techniques. The 41st Gas Turbine and Aeroengine Congress, User's Symposium and Exhibition "ASME Turbo Expo'96-Land, Sea and Air" was organized by ASME Internationalís International Gas Turbine Institute (IGTI) in Birmingham, England on June 10–13. Topics covered, among others, were film cooling of gas turbine blades, internal heat transfer, including the effects of rib roughness, rotation and secondary flows, and external heat transfer to blades. The 31st AIAA Thermophysics Conference held on June 18–20 in New Orleans, USA had sessions on surface catalysis, ablation, direct simulation, Monte Carlo methods and nonintrusive diagnostics. A Meeting on Advanced Computational Methods in Heat Transfer was held on July 8–10 in Udine, Italy. Subjects of discussion included convection–diffusion problems, fire and combustion simulation, computational aspects of thermal problems in porous media, metal casting and forging and combined heat and mass transfer. The 31st National Heat Transfer Conference was held in Houston, USA on August 3–6. The proceedings each day consisted of technical sessions, keynote lectures and short courses. Of particular interest were the sessions on extending air cooling limits for thermal management of electronics, interfacial phenomena and thermophysics in microgravity, combustion and fire, solution methods for radiative heat transfer in participating media and thermal management of commercial and military electronics.

The International Symposium on Transient Convective Heat Transfer organized by the International Centre for Heat and Mass Transfer (ICHMT) in Cesme, Turkey on August 19–23 included papers on boundary layers, internal forced convection, mixed and free convection, heat exchangers and thermal equipment and conjugate heat transfer. At the 14th European Conference on Thermophysical Properties on September 16–19 in Villeurbanne, France, sessions covered measurement methods for thermal conductivity, diffusivity and effusivity, optical and radiative properties, permeability, phase equilibrium and surface tension for a wide range of materials including metals and alloys, ceramics, polymers and composites, superconductors and insulators. At the 4th International Symposium on Heat Transfer on October 7–11 in Beijing, China, among topics covered were micro heat transfer in space and time, multiphase flow and heat transfer, heat and mass transfer in porous media and biological and cryogenic heat transfer.

At the International Mechanical Engineering Congress and Exposition (formerly known as the Winter Annual Meeting of the ASME) held on November 17–22 in Atlanta, USA, technical sessions covered experimental studies in multiphase flow, turbulent heat transfer, heat transfer in microgravity systems, jets and sprays, and cryogenic heat transfer in the energy industry. The International Conference on Heat Transfer with Change of Phase "HEAT '96" was held in Kielce, Poland on December 8–10. Topics covered included pool boiling, condensation, melting and solidification and sublimation. The sixth Australasian Heat and Mass Transfer Conference held on December 9–12 at the University of New South Wales, Sydney, Australia included sessions held on contact conductance, heat transfer in fires, heat and mass transfer in drying, experimental methods and environmental heat and mass transfer.

Awards presented in 1996 included the (1995) Max Jakob Award to Professor Arthur E. Bergles for his outstanding contributions in the areas of enhanced heat transfer, two-phase flow and boiling heat transfer and internal laminar flows, the (1995) Donald Q. Kern Award of the AIChE to Dr. George Bankoff and the 1996 Heat Transfer Memorial Awards to Professor Boris Rubinsky (Art of Heat Transfer), Professor Ping Cheng (Science) and Professor Leroy 'Skip' Fletcher (General). The Luikov Award instituted by the ICHMT was given to Dr. Geoffrey Hewitt.

Several books on heat transfer, related to both fundamentals and applications, were published during the year:

Advanced Computational Methods in Heat Transfer IV
L. C. Wrobel, C. A. Brebbia, A. J. Nowak
Publisher: Computational Mechanics

Advances in Heat Transfer : Transport Phenomena in Materials Processing (Vol. 28)
James P. Hartnett
Publisher: Academic Press

Advances in Numerical Heat Transfer, Vol. 1
W. J. Minkowycz, E. M. Sparrow (Eds.)
Publisher: Hemisphere

Chemical Engineering : Fluid Flow, Heat Transfer and Mass Transfer Vol. 1 (5th ed.)
J. M. Coulson, J. F. Richardson, J. R. Blackhurst and J. H. Harker
Publisher: Butterworth–Heinemann

Computational Heat Transfer Vol. 1
A. A. Samarskii, P. N. Vabishchevich
Publisher: Wiley

Computational Heat Transfer: The Finite Difference Methodology Vol. 2
A. A. Samarskii, P. N. Vabishchevich
Publisher: Wiley

Convective Flow Boiling: Proceedings of Convective Flow Boiling, an International Conference Held at the Banff Center for Conferences, Banff, Alberta
John C. Chen (Ed.), Yasunobu Fujita, Franz Mayinger

Publisher: Taylor & Francis
The Finite Element Method in Heat Transfer Analysis
R. W. Lewis, K. Morgan (Eds.)
Publisher: Wiley
The Finite Element Method in Heat Transfer Analysis
R. W. Lewis (Ed.)
Publisher: Wiley
Flow and Heat Transfer in Rotating-Disc Systems: Rotating Cavities (Vol. 2)
J. M. Owen, R. H. Rogers
Publisher: Wiley
Fundamentals of Heat and Mass Transfer (4th ed.) and Interactive Heat Transfer Set
David P. DeWitt, Frank P. Incropera
Publisher: Wiley
Gas-Turbine Regenerators
Douglas Stephen Beck, David Gordon Wilson and Douglass Beck
Publisher: Chapman & Hall
Heat and Mass Transfer in Severe Nuclear Reactor Accidents
J. T. Rogers (Ed.)
Publisher: Begell House
Heat Transfer
C. Suryanarayana
Publisher: PWS
Heat Transfer: A Self-Instructional Problem Workbook
Joseph P. Reynolds, Ihab H. Farag
Publisher: ETS
Heat Transfer in Condensation
R. Vidil (Ed.)
Publisher: Elsevier
Heat Transfer Technologies and Practices For Effective Energy Management
G. Sam Samdani (Ed.)
Publisher: McGraw-Hill
Heat and Mass Transfer Under Plasma Conditions: Proceedings of International Symposium on Heat and Mass Transfer Under Plasma Conditions
Publisher: Begell House
Introduction to Heat Transfer (3rd ed.) and Interactive Heat Transfer Set
David P. DeWitt, Frank P. Incropera
Publisher: Wiley
Introduction to Thermodynamics and Heat Transfer (McGraw-Hill Series in Mechanical Engineering)
Yunus A. Cengel
Publisher: McGraw-Hill
Latent Heat Transfer: An Introduction to Fundamentals (Oxford Engineering Science Series, No. 43)
G. S. H. Lock
Publisher: Oxford University Press
Macro-To Microscale Heat Transfer: The Lagging Behavior (Series in Chemical and Mechanical Engineering)
D. Y. Tzou
Publisher: Taylor & Francis
Principles of Heat Transfer (5th ed.)
Frank Kreith, Mark S. Bohn
Publisher: PWS
Principles of Heat Transfer in Porous Media (2nd ed.)
M. Kaviany
Publisher: Springer-Verlag
Process, Enhanced, and Multiphase Heat Transfer: A Festschrift for A.E. Bergles
A. E. Bergles (Ed.)
Publisher: Begell House
Radiation Heat Transfer in Disperse Systems
L. A. Dombrovsky
Publisher: Begell House
Radiative Heat Transfer I: Proceedings of the First International Symposium on Radiation Transfer, Kusadasi, Turkiye, August 13–18, 1995
M. Pinar Menguc (Ed.)
Publisher: Begell House
Transport Phenomena in Materials Processing
Sindo Kou
Publisher: Wiley
Two-Phase Flow and Heat Transfer (Oxford Chemistry Primers, 42)
P. B. Whalley
Publisher: Oxford University Press

2. Conduction

Various papers encompassing Conduction Heat Transfer are reviewed in this section. The relevant papers are subcategorized into the following topics: contact conduction/contact resistance; layered, composite or heterogeneous media and other effects; thermal waves, laser and pulse heating effects and/or applications; heat conduction in fins, tubes, solids and different geometries; mathematical models, analytic/numerical, and experimental studies; thermo-mechanical issues; inverse problems; conduction–convection and flow effects; solidification and change of phase, microelectronic heat transfer; materials processing and process modeling; specialized and miscellaneous studies and applications.

2.1. Contact conduction/contact resistance

The papers in this subcategory deal with errors in the analysis of a lumped parameter assumption and heat flow in surfaces which accounts for thermal contact resistance [1A]; issues involving thermal contact conductance in diamond-like films and refractory ceramic coatings [2A,3A]; a closed form solution of junction to substrate thermal resistance in semi-conductor chips [4A]; and models for elastoplastic contact conductance for isotropic confirming rough surfaces and contact conductance of tool steel [5A,6A]. The effects of interface resistance on the heat transfer in cold rolling of steel appears by [7A].

2.2. Composite and heterogeneous media

Issues encompassing effective thermal conductivity in composite media are addressed in [8A,9A,11A,12A,17A]. Other papers dealing with thermal aspects in this subcategory include: a model for insitu tow placement of thermoplastic composites [10A], issues regarding the thermoelastic field in composites with inhomogeneities [13A], design of a tungsten/copper graded composite for high heat flux components [14A], optimization of multi-layer high temperature insulation [18A], thermal stress analysis and pultrusion of cypoxy matrix composites [15A,16A], and interface properties of nanocomposites employing nonlinear optics [19A].

2.3. Thermal waves, laser and pulse heating applications

A paper on laser annealing of silicon appears by [20A], [21A] and [22A] discuss hyperbolic propagation of thermal phenomenon in an infinite solid medium and a cylindrical solid carrying a stead-periodic electric field, respectively. Recent progress in laser surface treatment as pertaining to laser wavelength issues appear in [23A]. [24A,25A] discuss thermal inertia of materials and velocity of thermal waves generated by femtosecond laser pulses in thick gold films, respectively. [26A–31A] describe analytic solutions and issues for a variety of situations for problems influenced by non-Fourier heat conduction. The so-termed first and second-law efficiencies for laser drilling of stainless steel appears by [32A], and [33A] describes heat conduction in a semi-infinite solid due to a time-dependent laser source.

2.4. Heat conduction in fins, tubes, solids and different geometries

[34A] describe optimum design of radiating and convective-radiating fins, and the study of heat removal from tubes with external longitudinal fins appears by [35A]. Other related studies involving fin/tube geometries and solids appear in [36A–53A].

2.5. Mathematical models, simulations and/or experimental results

Numerous papers appear in this category dealing with closed form solutions, analytic approximation, numerical simulations and experimental studies on a variety of applications including heat conduction. Those dealing with providing analytic/approximate solutions appear due to [54A], [67A], [73A], [78A], and [79A]. Those dealing with numerical simulations and applications involving control volume methods, finite element, boundary element and the like appear for different applications in [55A–66A,68A–72A,74A–77A,80A,81A,83A–91A,94A–100A]. Other related experimental and/or comparative studies appear due to [82A], [92A], and [93A].

2.6. Thermo-elastic and thermo-mechanical problems

[101A] describes a thermoelasto-hydrodynamic analysis of fixed geometry thrust bearings. The interaction of a crack and a circular elastic inclusion under uniform heat flow appears by [102A]. A numerical investigation of a finite multi-grid solver for thermo-elastic stress analysis in anisotropic materials appears [103A] and that of three-dimensional thermoelastic contact between two plates with bolted joints appears by [104A]. [108A] discuss Biot's number and thermal stress fields in liquid quenches for ceramics. [109A] discuss thermo-mechanical issues during diffusion binding of metal drum rotor disks under electromagnetic heating. Other relevant papers involving thermal stresses for an infinite plate containing a penny-shaped crack, thermally induced bending vibrations, axissymmetric thermal stresses in steady state and in transient behavior in composite brake disks, in functionally graded materials, and control of deformation in laminated plates and appears due to [105A–107A,110A–112A].

2.7. Inverse problems and applications

The comparison of some inverse heat conduction methods using experimental data appears by [113A]. A semi-numerical method for solving inverse heat conduction problems is studied by [114A] and [115A] discusses a second-order finite difference approximation for inversely determining thermal conductivity.

2.8. Flow/convection effects and change of phase

The papers appearing in this subcategory deal with the influence of flow and /or convection effects on heat conduction with and/or without considerations involving change of phase. [117A] describe a modified effective capacitance method for solidification modeling.

[118A,119A] study heat transfer effects in spheres and [120A] discuss heat transfer between a spherical droplet particle and a two-phase fluid. An investigation of the relations between the results in heat conduction problems appears by [121A]. Other related studies involving heat transfer influenced by convective heat transfer appear due to [116A,122A–131A].

2.9. Microelectronic heat transfer

In this subcategory, [132A] investigated thermal modeling in integrated power circuits; [133A] describes thermal conduction in nonhomogeneous CVD diamond layers in electronic microstructures; [134A] conduct a comparison of the cooling performance of staggered and in-line arrays of a polymer insulator; [135A] describe electrical and thermal performance of a polymer insulator; and [136A] conduct a study on board and system level effects on plastic package thermal performance.

2.10. Miscellaneous studies and special applications

A variety of specialized applications and other miscellaneous studies also appear in the heat conduction category. These are identified in papers [137A–171A].

3. Boundary layers and external flows

The papers on boundary layers and external flows for 1996 have been categorized as follows: flow influenced externally, flows with special geometric effects, compressible and high-speed flows, analysis and modeling techniques, unsteady flow effects, flows with film and interfacial effects, flows with special fluid types and property effects, and flows with combustion or reaction.

3.1. External effects

Papers which focus on external effects document the influence of elevated freestream turbulence on heat transfer [9B,7B] or of the unsteadiness due to the presence of an adjacent rod [8B,3B] or a vibrating wall surface [6B]. One with an elevated freestream turbulence was also strongly thermally stratified [4B]. Another paper in this category investigated the effects of extra rates of strain on turbulent transport [5B] while one noted the gravitational effect on heat transfer from horizontal surfaces [1B]. The final paper in this category [2B] determined the current density limit within electrodeposition cells.

3.2. Geometric effects

Several papers focused on geometrical effects on heat transfer in the stagnation region of a blunt object [16B,12B,17B,14B]. Several were on the heat transfer from cylinders in cross flow [10B,21B,26B,27B, 13B,15B]. One [13B] extended this study to include spheres and another [15B] investigated tubular reactor geometries. One study documented heat transfer in the endwall-boundary layer region downstream of a streamlined strut [25B] while another computed the flow transition over a turbine airfoil [28B]. There were several papers which documented the improvement in heat transfer one can find with augmentation devices; one spoke of augmentation in general [11B], one investigated a chevron-type heat exchanger surface [20B] while several looked at trenches, dimples and protuberances [24B,18B]. Rather special geometries were, asymmetric-ribbed surfaces [19B], a damper of a water heater [22B], and a stretching sheet [23B].

3.3. Compressibility and high-speed flow effects

The most common subtopic of papers on compressibility investigated shock-boundary layer interaction effects. Papers on this category included a review of the topic [39B], several on modeling [30B,38B,33B, 41B], one on measurements [32B], one which documented the effects of upstream influences [36B], and another which focused on expansion corner effects [43B]. There were several fundamental studies on compressible flow effects which included one on electron and vibration kinetics [31B], another on boundary layer transition [35B], and another which presented a nonequilibrium algebraic model for turbulent density fluctuations [42B]. Two papers which were specific to a geometry included one with a blunt core [34B] and another with a transverse jet [37B]. One paper discussed the boundary layer with an impulsively-started wedge [29B] and another discussed hot-wire measurements in hypersonic flows [40B].

3.4. Analysis and modeling

There was considerable activity in the modeling category. Papers on model development included a review of papers on numerical heat transfer [59B], the introduction of a new dimensionless number for forced convection heat transfer [46B], a mechanistic model of heat transfer from a wall to a fluid [50B], an evaluation of temperature effects in laminar boundary layer stability [49B], molecular modeling of shear flow [57B], and modeling of the turbulent transport of heat [44B,60B,61B]. Modeling was tested against a retarded boundary layer [53B], general advection–diffusion problems [58B], a planar Couette flow [48B], turbine cascade flows [45B], and electronic modules [52B]. Other applications included separated and impinging flows [51B], thermally stratified flows [56B,47B], thermally mixed flows [55B], and atmospheric boundary layers [54B].

3.5. Unsteady effects

Unsteadiness was the theme for papers which investigated an impulsively started plate [63B], a step in cooling [62B], oscillating flow [65B], and boundary layer transition [67B, 68B]. Application papers included a study of thermal flow sensor dynamics [66B], and others on the unsteadiness of a three-dimensional wake [64B] or the junction of a cylinder and a boundary layer [69B].

3.6. Films and interfacial effects

Flows in this category included several on falling films; one with a gravity-driven laminar film [75B], another with water and lithium bromide [72B], one with roll waves [74B], and one in a falling film reactor [71B]. Other geometries included a two-phase, gas–liquid flow [73B] and an evaporating spray [70B].

3.7. Effects of fluid type or fluid properties

In this category, the Colburn analogy was evaluated for nonNewtonian liquids [87B], and heat transfer boundary layer solutions were found for a power-law fluid [81B]. One analysis of a flat plate boundary layer was done for a micropolar fluid [82B] while another investigated experimentally a microfluid system [85B]. Two papers dealt with superfluid helium [84B,77B], one in a boundary layer and another in a channel. A Dittus–Boelter type expression for heat transfer in fluids at supercritical pressures was suggested which had a new method for finding the equivalent specific heat [80B] and expressions were presented for heat transfer in a rarefied gas [78B]. Two computational papers were presented for particle-laden flows [76B,86B], one recommended a particular treatment of the carrier gas and another presented a new technique for dealing with particle-induced disturbances. Finally, a study was applied to the mass transfer resistance in the pervaporation process [83B] and another specifically dealt with heat transfer in food products [79B].

3.8. Flows with combustion and reaction

Several papers in this category dealt with combustion processes, one showed heat loss effects on turbulent flame propagation [88B], another looked at heat transfer in a reverse flow combustor [91B], a third [95B] discussed diffusion flames under microgravity conditions, another investigated combustion wave propagating through a heterogeneous powder mixture [94B], and one reviewed flame impingement heat transfer correlations for industrial heating and melting [89B]. Two papers dealt with condensation and deposition; one presented a hydrodynamic principle for CVD reactors which allow homogeneous deposition of layers [93B] and another shows measurements of convection flows in physical vapor deposition [92B]. A numerical model was presented for analyzing hot-spot formation and growth to detonation in condensed-phase energetic materials [90B].

4. Channel flows

Channel flows were divided into the following subcategories: straight-walled ducts; irregular geometries; finned and profiled ducts; ducts experiencing secondary motion; pulsatile or oscillatory flow; two-phase flow in ducts [also see separate section on two-phase flow]; nonNewtonian flow; and miscellaneous duct flows.

4.1. Straight-walled ducts

Heat transfer in straight-walled ducts continues to be an active area of research. General correlations for turbulent flow and heat transfer in ducts were examined in a number of studies [20C,29C,30C]. The Graetz problem was considered for liquid metals [32C] and in rarified gas flows [2C]. Mixed forced and natural convection was examined by several authors. Unstable mixed convection was studied in bottom heated horizontal [17C] and inclined [18C] ducts; external boundary conditions were also addressed [13C]. Mixed convection in vertical tubes was studied [9C–12C]. Laminar heat transfer was investigated between parallel plates [26C] and in a vertical heated channel [21C]. Entrance effects were considered in He II flow [16C], in annular ducts under mixed convection [22C], in gas-cooled beam windows [28C], and for laminar forced convection [1C]. A finite volume method of lines was used to study turbulent forced convection in circular tubes [3C]; the numerical method SIMPLE-C was used to study mixed convection between parallel plates [4C]. Three-dimensional transient calculations were made for flow far downstream in a horizontal duct heated from below [5C]; entropy calculations were made for flow through a duct as a function of length [6C]. A numerical simulation of mixed convection was conducted [7C] as well as one in zero gravity for water near its critical point [14C,15C]. The upstream migration of heat was examined in a horizontal parallel plate duct [8C]. Heat transfer analysis was undertaken using the axial moment method [31C] and through inverse analysis [19C,23C]. Flow and heat transfer in capillary tubes were studied for CFC-12 and HFC-134A [33C]; forced convection of FC-77 was also examined [25C]. Analytical velocity and temperature distributions were investigated for laminar flow for H2 boundary conditions [27C]. Combined buoyancy effects were addressed in horizontal rectangular ducts [34C] as well as low Mach number compressible flows [24C].

4.2. Irregular geometries

Although the straight-walled duct is attractive as a testing ground for fundamental experimental work and computational methods, many practical situations fall into the category of irregular geometries. Heat transfer in a bayonet tube was studied for laminar flow [44C], during laminar-turbulent transition [43C], and for Prandtl number effects [42C]. Combined convection flow in a vertical eccentric annulus was studied over a range of parameters, including Grashof, Prandtl and Reynolds number [40C]. Flow diffusion and the accompanying heat transfer were investigated in an axisymmetric annular duct [48C] and in a pipe-expansion flow [39C]. Forced convection was also studied in microchannels; in one study water flow was examined [45C] and in another binary mixtures were considered [46C]. A numerical investigation of turbulent forced convection in rectangular and trapezoidal ducts was undertaken to assess the appropriateness of various turbulence models [47C]. A hexagonal lattice of circular tubes was examined using the manipulation system REDUCE [38C]. A finite element solution for forced convection heat transfer in plate-type monolith structures was done [37C]. Flow in a double-sine shaped duct for fully developed laminar flow was simulated using a Galerkin integral method [36C]; laminar mixed convection in a vertical elliptic duct was investigated using a control volume based numerical scheme [49C]. A simplified model for real gas expansion between two reservoirs was developed [35C] and the thermal development of radiatively active pipe flow was studied with nonaxisymmetric heat loss [41C].

4.3. Finned and profiled ducts

Heat transfer augmentation is often achieved using protuberances of one type or another; the accompanying pressure drop penalty must also be addressed. Electronic packaging presents a practical environment where surface profiling is present and needs to be understood. Forced convective air cooling of electronic components was examined [58C]; the heat transfer and associated pressure drop was also addressed [63C]. A comprehensive review of enhanced tubes was found in the literature [70C]. Thermally active and inactive perforated ribs were studied in a low-aspect ratio channel [62C] as well as in a 2D/3D rib-roughened annulus [75C]. The heat transfer and pressure drop in tubes with short turbulators was studied [64C]; an internally finned equilateral triangular duct was investigated experimentally [52C]. Analysis and performance comparisons of integrally enhanced tubes was conducted [71C] as was the laminar flow and heat transfer in internally finned tubes [73C]. The impact of artificial roughness on turbulent heat transfer coefficients was studied in the entrance region of a circular duct [66C]. Complementary experimental [74C] and numerical [56C] studies of heat transfer in corrugated passages were conducted. The disturbances and heat transfer effects caused by vortex generators were examined in a numerical and experimental study [51C]; a vortex generator placed above a rib was also studied [67C]. The role of multiple obstructions on conjugate forced heat transfer in tubes was addressed [72C]; general correlations for pressure drop and heat transfer in enhanced tubes with turbulent flow were found in the literature [69C]. Laminar flow in a circular duct with circumferential tubes was analyzed [68C] as well as one with inserted longitudinal strips [60C]. Local heat transfer coefficients were determined for flow over a ribbed surface [59C]; a converging passage with discrete ribs was also studied [61C]. The effect of size of a wire-screen matrix on a regenerator was examined in a cryocooler [53C]; the effect of tube-tape clearance in a horizontal isothermal tube was investigated experimentally [50C]. Single-phase heat transfer in microfin tubes was addressed [77C]. Numerical predictions of heat transfer augmentation in tubes with two-dimensional square ribs were presented [76C]. The impact of single roughness elements was investigated with a surface-mounted heated block [54C,55C]; the disturbing effect of fluid injection was also studied [57C]. The turbulent velocity and temperature characteristics in a heated rod bundle were documented [65C]. An experimental study was conducted to determine the heat transfer response to relative humidity in source arrays [78C].

4.4. Duct flows with secondary motion

The most common flow studied in the literature during 1996 involving secondary motion was that in curved or helically coiled pipes. Effects of Dean vortex pairs on heat transfer were studied [86C] as well as the well-known relaminarization phenomenon [89C]. The secondary motion in helically coiled pipes was studied in air–water flows [90C], for finite pitch [79C] and for substantial pitch [91C]. Second moment closures were examined to handle the complicated three-dimensional motion in a U-shaped tube [81C]. The analogies between turbulent flow in curved pipes and orthogonally rotating pipes were provided [82C]; the effect of Rossby number was investigated in rotating curved pipes [83C]. The secondary motion imposed by vortex flow was studied in a horizontal rectangular duct [87C]. Heat and mass transfer was examined in a serpentine channel with right-angle turns [80C] as well as in a curved pipe with a coaxial core [88C]. Streaming motion was studied in tube refrigerators [85C] and in transformer oil [84C].

4.5. Oscillatory and pulsatile flow

A numerical study of turbulent forced convection in a periodically ribbed channel with oscillatory flow was achieved using a sinusoidally varying pressure gradient [93C]. The reciprocating flow and heat transfer in a circular pipe was studied in both instantaneous and cycle-averaged quantities [100C]. The oscillatory flow in baffled tubes was reviewed in the literature [97C]; flow mixing, heat transfer and mass transfer issues were considered. The forced turbulent convection between parallel plates experiencing sinusoidal inlet temperature variations was studied [92C], as well as the viscous dissipation and heat transfer in pulsatile flow of a yield-stress fluid [94C]; also see non-Newtonian fluids below. The effects of pulsation on internal heat transfer in a circular tube were addressed in an experimental study [95C]. A simplified analysis of the liquid oscillatory motion in circular pipes is provided based on experimental results [99C]. Discrepancies between mathematical and physical understanding of confined oscillatory flow was addressed using new parameters [96C]. The effect of small transverse accelerations on Bridgeman growth was also considered [98C].

4.6. Two-component duct flows

Flows involving more than one phase or material are listed here and in a separate section in this review on two-phase flows; duct flows will be emphasized in this section. Air–water countercurrent flow was studied in a complementary theoretical and experimental study [105C]; air–water flow in a helically coiled pipe was investigated in terms of the Lockhart–Martinelli parameter [116C]. Heat transfer and friction data of R-22 and R-407C in a smooth tube for different evaporation pressures were presented [114C]. Phase distribution and heat transfer measurements were carried out in an n-heptane-water mixture flowing upward in a vertical tube [110C]; condensation heat transfer in a smooth horizontal tube with R-32 and R32/125 mixtures was studied experimentally [104C]. Fluid-to-particle heat transfer coefficients were evaluated in an aseptic processing holding tube simulator [102C]; dimensionless correlations in the tube simulator were also explored [101C]. A wave front perturbation method was employed to examine two-phase flow in a horizontal channel [115C], and water-felspar flow through a vertical annuli was studied experimentally [113C]. The heat transfer and pressure drop for air–water mixtures was investigated experimentally in an isoflux vertical annulus [108C]. Gas–particle thermal interactions were examined in the presence of a surface [111C] and in the Tokamak type reactor [107C]. Modeling of volcanic eruptions was done in a finite rigid channel, using pressure driven flow [112C]. Heat transfer during gas hydrate formation in gas-liquid slug flow was modeled [106C]; the thermal performance of a phase-change material during cooling was mathematically modeled [109C]. A remote temperature sensor was used to evaluate the convective heat transfer between a fluid and particle in a continuous tube flow [103C].

4.7. NonNewtonian duct flow

The heat and mass transfer occurring during solidification of waxy crude oils was studied [126C]. Shear-rate dependent thermal conductive of certain nonNewtonian fluids leads to heat transfer enhancement; analytical results were presented [125C]. The viscoelastic behavior of a fluid represented by the Criminale–Ericksen–Filbey constitutive equations was studied under laminar conditions in a rectangular duct [122C]. A finite element method was used to investigate a highly viscous nonNewtonian power-law fluid in a vertical tube [124C]. The thermal convection for Herschel–Bulkley fluids was studied numerically and experimentally in an annular duct [123C]. The viscoelasticity of a surfactant and its ability to affect drag and heat transfer were examined [121C]. Aqueous carboxymethylcellulose solutions were studied under laminar flow conditions in a square duct [120C]. The fluid mechanics and heat transfer of rheologically complex fluids were investigated during a chaotic mixing process [119C]. Power-law fluids inside ducts with catalytic reactions were studied; Sherwood number results are presented [118C]. It was shown that the Nusselt number distribution along the wall of an equilateral triangular duct depended appreciably on the power law index [117C]; the fully developed flow of a power-law fluid was modeled using finite element analysis in a rectangular duct [127C].

4.8. Miscellaneous duct flow

A variety of studies could be characterized by their unique geometry, fluid type or application; this diverse group of papers will be summarized here. Turbulent scalar transport was modeled using second-moment closure; various Prandtl numbers were investigated [141C]. An experimental heat transfer study, done in a metal hydride thermal energy conversion system, examined the interactions between two coupled reactors [134C]. The challenges posed during the disposal of heat-emitting waste was studied; argillaceous rocks were used as a test medium [132C]. The annular gas flow in a gas-lift well was presented through a mechanistic model [131C]. The cooling of aircraft skin made necessary by high-powered electronics was investigated; the analysis showed that skin cooling was a viable solution for heat dissipation from aircraft [129C]. An analytical model was presented to capture the dynamics of circulating fluid temperatures in drilling operations [133C]. Transient experiments were conducted to study the coupled natural convection in circulation loops [130C]. The governing equations describing the axial temperature variations in three-channel split-flow heat exchangers were presented and analyzed [135C]. The cool-down process of a demountable liquid nitrogen transfer line was studied experimentally; multilayer-insulated lines were addressed [136C]. The transient behavior of He II heated along the center of a pipe is treated numerically [138C]. Three turbulent models were compared for the application to tilting-pad journal bearings [128C]. The delay hot/cold water problem in fluid-pipe systems was examined [140C]. Generalized rib-tube correlations are used to optimize the roughness used for large evaporators and condensers [139C]. Heat transfer enhancement in an air compressor aftercooler was studied experimentally; the mechanism of heat transfer augmentation of a transversely corrugated tube was discussed [137C].

5. Flow with separated regions

Heat transfer in velocity fields dominated by flow separation are discussed in this section of the review. The most common configuration examined includes the broad class of flows past single cylinders or bluff obstructions. The extension of a cylinder from a plane wall was studied numerically; Nusselt number and drag results were presented [24D]. The heat transfer rates at the base of five basic geometries (cylinder, cube, diamond, pyramid and hemisphere) were compared; the effect of a single roughness element was also considered [6D]. The nonequilibrium airflow over a hemisphere was computed to examine hypersonic flow conditions [12D]. The impact of a splitter plane on a circular cylinder was studied under laminar flow conditions [18D]; heat transfer augmentation and Strouhal number were investigated. Tandem arrangements of bluff bodies were treated for prisms [7D] and rectangular cylinders [22D]. The optimal spacing between cylinders in cross flow was studied using complementary analytical, numerical and experimental techniques [21D]. A numerical investigation considered the mixed convection past in-line cylinder bundles [13D]; results compared well with existing literature. Flow past a slender body at incidence and the associated heat transfer were examined analytically [25D]. The incipient separation of a turbulent hypersonic boundary layer was also studied at Mach 5 [3D]; nose-tip surface heat transfer mechanisms were studied under hypersonic flow conditions [11D]. An improved $k-\varepsilon$ model for low-Reynolds number flows was presented [20D] and compared to existing experimental and DNS data. The corner recirculating zone in a backward facing step was studied numerically [14D]; the effect of transverse curvature in a axisymmetric backward facing step was also considered [16D]. Forward facing steps were investigated under laminar natural convection flow [1D] and buoyancy opposed flow [2D]. Analytical expressions for the laminar flow in a circular step bearing and the associated temperature distribution under adiabatic conditions were presented [4D]. The unique flow in a double-circuit vortex tube was studied experimentally; applications of the work were also presented [19D]. One paper dealt with the laminar heat and fluid flow in a array of subchannels placed in a uniform stream [5D]. A modeling study was found which examined the characteristics of heat and mass transfer experienced in a deep-frying slab, cylindrical and spherical food products [8D]; a complementary study considered the drying of solid objects [9D]. A fast false implicit transient scheme was develop to predict the two-dimensional steady-state solutions of buoyancy-assisted laminar internal flows [10D]; a backward facing step was considered as a test geometry. Convective heat transfer from a cylinder experiencing surface reactions was examined [17D]. The time-dependent electromagnet heat transfer equations were solved to study hyperthermic treatment [15D]. Step-wise pulse current/heat through horizontally immersed thin wires in helium II was also studied [23D].

6. Heat transfer in porous media

6.1. Property determinations

Several studies have reported attempts to better characterize a porous medium undergoing heat and mass transfer. The possibility of describing the structural characteristics of porous media via an information entropy parameter has been developed [15DP]. The accurate description of the flow field in a porous medium was investigated via the use of a generalized velocity to which all other transport velocities are referenced [5DP] and via a domain decomposition method [10DP]. A theory for flow and heat transport in deformable porous materials has been developed by [7DP,8DP].

The influence of the initial concentration of solute and super-cooling on permeability of a porous medium saturated with a partially solidified aqueous solution was determined via transient methods [12DP] The relative permeability of relations for vapor and liquids for capillary porous media were deduced from a combination of numerical and experimental studies and found to be based on the capillary pressure which can be measured. [2DP]. The permeability and dispersivities of solute and heat for a period porous medium were determined computationally using a theoretical construct that accounts for the mobility ratio of gas and liquid in unsaturated systems [1DP].

Thermal conductivity at high temperatures in porous Ni/yttrium-stabilized zirconia cermets was determined via flash laser heating and application of the effective medium theory [6DP]. The laser flash method was also used to very predictions of effective conductivity based on a simulation of the microstructure [11DP]. Some very fundamental experiments on transient heat transfer indicated that neither a wave or pure diffusion model can adequately explain the observed temperature and thermal penetration depths as a function of time [14DP]. The dependency of thermal conductivity on gas pressure and temperature was investigated in materials with porosity greater than 30% [9DP]. A procedure for determining the moisture diffusivity using moisture concentration profiles was developed and quantified [13DP]. A primary source of uncertainty in reported values was inhomogeneity of the matrix.

Modeling based on Luikov's heat, mass and pressure transfer system in a capillary porous body was used to estimate thermal and moisture conductivity [4DP]. The effects of surface segregation kinetics and pore size on effective thermal conductivity of porous ceramics was modeled to predict the dependence of the thermal conductivity on the material thermal history [3DP].

6.2. Fluidized beds

Basic and applied studies of fluidized beds, as a special category of porous medium, continue at a goodly rate. Applied studies this past year tend to emphasize the performance and the of the bed within a given range of operating parameters. More fundamental studies have investigated better characterization of heat /mass transfer and hydrodynamics within the bed, and scale up from laboratory experiments.

A two-fluid model of bed hydrodynamics was developed for the dense phase system [23DP]. The hydrodynamics of fast fluidization has been extensively reviewed, and a scaleable mechanistic model of heat transfer for which the primary parameter is the bed suspension density is found useful [18DP]. Conductivity and salt tracer measurements have been used to provide local holdup and circulation patters of the liquid and solid phases [26DP], and gamma-ray transmission measurements were used to map the maximum void fraction in a heat-generating system [33DP]. Experiments have been run and compared with models of pulsed beds used in drying and for heat transfer [24DP], and a model for unsteady heat transfer in an air cooled bed was developed [20DP]. The influence of wall roughness on bed hydrodynamics was studied experimentally [42DP]. An analytical model to determine particle-to-surface temperature distributions using available point wise average heat transfer measurements was developed and validated [22DP]. The Zadbodsky correlation for heat transfer in a bubbling bed has been modified for a recirculating bed [39DP,40DP]. Flow visualization of flowing particles around imbedded tubes was conducted via X-ray video films to determine the relation between particle behavior and local heat-transfer coefficients [37DP], and measurements were presented for a heated probe in a magnetofluidized bed [35DP].

A simple model has been developed for bed heat transfer dependent on input parameters, including mass flow of particles and flue gases [25DP]. A modified cluster renewal model has been developed for heat transfer in pressurized beds [17DP]. Heat transfer to several types of immersed surfaces was investigated experimentally [27DP–30DP,36DP]. Coupled heat and mass transfer were experimentally investigated to determine effects of bed height, gas velocity, initial moisture content, and air temperature [21DP].

In several special studies, a hybrid neural model of the dewatering process has been developed [41DP], temperature and composition was predicted in a jetting fluid bed gassifier [19DP], and a mechanical fluidized vacuum furnace was developed [16DP]. Thermal entrance effects for heat transfer in up-flowing gas–particle suspension was studied experimentally [38DP].

Fluid bed combustors were investigated to determine the sintering tendency of ash produced [32DP] and factors affecting the devolatization of coal [34DP]. A systems model of the use of a fluid bed combustor in concert with a gas turbine for repowering a steam plant was studied to determine an optimal system configuration [31DP].

6.3. Free convection

The stability of conduction regime in saturated porous layers was investigated for the case of a porous layer lying under a fluid layers [56DP,54DP]. Stability criteria have been developed for the translucent layer with radiative heat transfer [62DP] and for layers in which the body force alternates in direction [65DP]. All of these studies are variations of the more familiar Rayleigh–Benard problem extended to porous layers.

Research on free convection in a fully saturated porous media continues to be of interest from the fundamental perspective. A number of new problem types have begun to appear in the literature, and most of the them are driven by specific technological applications. The general enclosure problem, including rectangular cavities, annuli, and slots has been investigated for steady state heat transfer under either the traditional Darcy–Boussinesq approximations or formulations that take into account nonlinear viscous effects [47DP–51DP,60DP]. Enclosures of complex geometry have also been considered in this context [59DP]. The special case of an enclosure partly filled with a porous medium and single phase fluid was investigated [61DP, 58DP]. Double diffusive convection in an enclosure has been addressed, also numerically, via an extended Darcy formulation. Transient convection in enclosures driven by either time-dependent thermal boundary conditions or vibrational excitation have also been reported [43DP,55DP,57DP].

Heat transfer from surfaces and bodies imbedded in a saturated porous medium has been studied for uniform and nonuniform thermal boundary conditions. The flat plate problem has been addressed for steady [63DP,64DP] and transient [45DP,46DP,52DP] thermal boundary conditions. Special cases as variations of the standard Darcy formulation included convection in nonNewton fluids [67DP], on a slowly rotating imbedded cylinder [68DP], and in a viscous, electrically conducting and heat generating fluid [66DP]. An interesting model for the enhancement of heat transfer rates from an array of discrete heat sources was presented [53DP], and the effect of porous coating materials on heat transfer from a surface was investigated experimentally [44DP].

6.4. Coupled heat and mass transfer

Fundamental studies of coupled heat and mass transfer in porous media has occupied a significant fraction of the literature during the past year. For many of the articles selected for this review, categorization is not easy given the similarities that exist in the formulation of the governing equations for a wide range of applications. Further, modern computational techniques and the power of modern computers have helped blur the distinctions that have are usually made among research activities in this field. For example, fundamental studies of drying processes and three-phase transport in packed beds are beginning to take on a commonality that hitherto has not been seen. In addition to the traditional motivations to better understand rate processes at a basic level in packed beds and drying, transport in soil related to sub-surface remediation, and the prediction of pollutant movement have received attention.

The use of the concept of "matrix replenishment" in relation to matrix diffusion has been introduced for the complex problem of contaminant transport in non-isothermal fractured porous media [70DP]. A special apparatus has been developed to study time-dependent heat and moisture transfer in fibrous insulation under heat conduction with water vapor adsorption/desorption, condensation and frosting [79DP]. Time-dependent transport has been analyzed with porosity changes due to dissolution of the solid matrix. [72DP]. Coupled heat and mass transfer has been studied with an emphasis on the effect of matrix structure [81DP]. Convective burning as a precursor to detonation of granular beds was studied experimentally for the special case of low porosity beds; a primary finding was that low velocity convection and compaction are major factors for low porosity beds [69DP].

The effects of initial moisture distribution on transient heat flow through wet porous material was with variable thermophysical properties was studied experimentally and numerically [86DP,87DP]. A boundary layer analysis of combined heat and mass transfer by natural convection from a concentrated source in a saturated medium for both line and point sources was reported [76DP]. An approximate solution for oscillatory flow past a porous plate was presented for variable suction and species transport [80DP].

An advanced formulation of multi-component, multi-phase transport in capillary porous media has been developed and applied to the simulation of the transport of organic compounds in a subsurface environment [83DP,71DP]. This work has produced a mathematical model of multi-component, multi-phase transport that is economical in terms of computational time. A mathematically interesting analysis of liquid, vapor and gas flow has been developed which allows three values of saturation for a given flux of mass, energy and gas [85DP]. An exact solution of coupled heat and mass transfer with moisture desorption under temperature gradients in a vacuum environment was also obtained [78DP].

For the problem of thermo-hydro-mechanical analysis of coupled heat, water and gas flow in a deformable porous medium, a parallel Newton–Raphson algorithm has been developed that is solved using networked workstation-level computers [84DP], and a hybrid finite difference and finite element solution has been tested against experiments on partially saturated soil and clays [75DP]. A two-dimensional finite element solution was developed for heat and mass transfer in irrigated soils and validated against field measurements [77DP]. The special case of cylindrical heat sources in a saturated elastic saturated medium has been presented [82DP]. A microbial landfill ecosystem has been modeled as a porous medium to determine the transport of heat and mass [73DP,74DP].

6.5. Drying processes

Studies of drying processes have expanded somewhat to include both high and low heat flux applications. A comprehensive review of steam drying has been presented by [98DP].

One study focuses on modeling the drying and eventual spalling of a concrete wall exposed to fire [88DP], and others presented a model for combined drying and pyrolysis of hygroscopic material, such as wood [93DP,91DP]. For the early stages of drying in initially saturated concrete, it was found experimentally that diffusion control sets in when the moisture content decreased below 80% of initial saturation [95DP].

Convective drying has been studied via modeling and experimentation. An empirical relation between Nusselt and Sherwood numbers and the Reynolds and Gukmann numbers developed for single, short porous cylinders [96DP]. A one-dimensional analysis for temperature and moisture variations was developed and verified for brick and mortar [94DP]. Convective drying in the presence of solar thermal radiation was modeled and studied experimentally [92DP]. Two-dimensional effects on the drying of plates in forced convection were determined experimentally [90DP].

The drying of food materials has been approached by a combination of experimental and theoretical studies. An experimentally validated model uses Luikov's equations for capillary porous media and applies it to constant pressure in during of hydrated composite starch [99DP]. An experimental study of drying of dense pasta suggests that diffusion dominates mass transfer during the entire process [97DP]. A model of drying due to micro-wave heating of granular hygroscopic solid was found to be sensitive to initial moisture content, size and heat transfer coefficient [89DP].

6.6. Multiphase flow and heat transfer

An experimental study was reported for transient regime heat transfer with liquid-vapor phase change in forced flow and compared to a model that predicts the boundaries the two phase and vapor zones [107DP]. The influence of sorption isotherms on the transport of liquid and vapor was studied using a mass transfer coefficient and a specific evaporating surface [109DP]. Laboratory experiments were conducted on constant pressure steam injection and transient condensing flow in an air-saturated medium; the propagation of the steam front appears to be proportional to the square root of time [100DP].

Liquid film evaporation in heated gas flow in a contact apparatus was investigated experimentally, and flooding criteria were reported [101DP]. Condensation processes under random fluctuation of ambient temperatures as conducted to develop a probability density of the moisture content [103DP]. The dryout of a bed of volumetrically heated particles cooled by a two-phase flow with evaporation was investigated to predict dryout limits for shallow and deep beds [104DP,105DP].

Three-phase flow in a catalytic reactor was modeled for co-current flow of liquid and gas to determine liquid–solid and gas–liquid mass transfer coefficients [108DP]. Two major hydrodynamic regimes were identified for heat transfer in co-current gas–liquid flow in a packed bed reactor [106DP,102DP].

6.7. Forced/mixed convection in stationary beds

Forced convection — Most of the literature on forced and mixed convection in stationary (packed) beds has dealt with experimental and theoretical studies that have broadened the knowledge base by either extending or sharpening correlations for transport transfer coefficients. Several studies have also been aimed at refining fully analytical and semi-empirical transport models. A comprehensive review of the subject has been published [126DP]. A few studies have focused on developing flow, heat transfer and flow stability [128DP,148DP,129DP], and flow past an imbedded object [143DP]. The analysis of the flow of a free surface and of two fluids in a porous channel was also presented [118DP]. The special case of forced convection from a porous block mounted from a heated wall in laminar flow was computed using a one-equation model for energy and Van Driest's wall function [123DP].

The fundamental problem of predicting heat transfer from a single phase fluid to a stationery packed bed has been formulated as a system of equations that pertain to the fluid and solid phases [113DP, 121DP,134DP,136DP,122DP]. Solution methods vary but all of them bear a close relation to the problem of predicting effective values of the transport coefficients. Other very fundamental studies include solutions for heat transfer in a saturated porous channel, or slot, with isothermal or isoflux boundaries [140DP,111DP, 131DP,130DP] and characterization of heat transfer and pressure loss [119DP]. Wall heat transfer coefficients for a packed bed with tube-to-particle diameter ratio of approximately two were computed for low Reynolds number flow and found to be in good agreement with measurements [120DP]. An empirical correlation for average Nusselt number in a pipe packed with rigid spheres has been developed for the Darcy, Forcheimer, and turbulent regimes of flow [147DP]. The reduction of the wall effect on heat transfer in a packed was demonstrated using a liner sheet comprising convex hemispheres [141DP].

The effect of a variation of the structure of the porous matrix on forced convection received special attention through both experimental and analytical/numerical investigations [142DP,126DP,145DP,127DP, 137DP]. Nonsaturated media has also been treated numerically [144DP]. A turbulence model for flow through porous media using a volume a averaging technique, effective eddy diffusivity, and the 0-equation model was developed [138DP].

The control and time-dependent behavior of packed beds under periodic and pulsed flow conditions were also modeled [139DP,112DP]. The response of a packed bed for a step input was determined via a three-dimensional perturbation method [135DP]. The high Peclet number limit for heat and mass transfer in a packed bed was also investigated [132DP]. Stagnation point flow of a chemically reactive fluid in a catalytic bed was analyzed for both transient and steady flows [115DP]. The dilution of a catalyst bead was studied via small-scale and scaled-up laboratory units to improve heat transfer and improve the overall effectiveness of the bed [146DP].

Mixed convection — Studies of mixed convection on stationary porous beds have begun to appear as applications for high porosity materials have developed. Heat transfer from horizontal and vertical walls is being investigated to determine the effects of nonDarcian phenomena on heat transfer coefficients [133DP,124DP,116DP,117DP]. Heat transfer for non-Newtonian fluids is also of interest [125DP]. Developing flow and heat transfer in channels partially filled with porous media has been solved using a hybrid scheme for convection and diffusion [114DP]. Mixed convection heat transfer coefficients on an imbedded cylinder were computed for nonDarcy flow [110DP].

7. Experimental techniques and instrumentation

Many experimental results are cited in other categories of this review. The purpose of this section is to identify papers that focus on new or improved experimental measurement techniques or devices that are useful in experimental studies of heat transfer. The publications referenced here deal explicitly with some aspect of heat transfer measurement or include a general review of techniques that are applicable to heat transfer measurements.

7.1. Heat flux measurements

A review of methods applied to combustion was presented [1E]. The directional sensitivity of a wall-mounted hot film gauge with respect to yaw angle was determined [3E]. A new type of thin foil radiometer was described [4E] that measures the net radiative flux on a surface. The application of a water-cooled calorimeter to the measurements taken in a pool fire were described [6E]. Methods to measure heat transfer coefficients were also presented [2E,5E].

7.2. Temperature measurements

Thin film thermocouples developed for warm turbine testing were discussed [14E]. Transient temperature measurement sensors were described [16E,19E]. Liquid crystals have been applied to transient temperature measurements in hypersonic flows [7E] and near cavities on a flat plate [10E]. Accelerations up to 16,000 *g* were found to have a negligible effect on liquid crystal performance [20E]. Noncontact temperature techniques and sensors include holographic interferometry [17E], infrared radiometers [12E,13E], a scanning thermal microscope [15E], and others [8E,9E]. Temperature measurements have been made on various tissues [11E,21E]. The temperature of fiber tips used in scanning microscopy were measured to understand the process of tip heating [18E].

7.3. Velocity measurements

Studies of hot wire anemometers include a discussion of the different metrological problems encountered in turbulent flows [22E], the development of a pulse heated anemometer [24E], the use of four-wire probes in vorticity measurements [25E] and the angular response of an x-wire probe at low velocities less than 1.4 m/s [26E]. Zhang et al. [27E] discuss three intermittency measurement methods applied to transitional boundary layer flows. An impervious heated cylinder has been used as a ground water velocimeter [23E].

7.4. Thermophysical property measurements

Various methods were developed to measure properties in solids including thermal conductivity [31E], thermal conductivity and heat capacity [28E], and thermal diffusivity [29E]. A transient hot-wire method was described that can determine thermal conductivity and thermal diffusivity of liquid simultaneously [30E].

7.5. Miscellaneous methods

The use of two-point laser Rayleigh spectroscopy to determine space and time-resolved structures of turbulent diffusion flames was discussed [33E]. Reviews of low cost sensors [34E] and magnetic resonance imaging applications [32E] were presented.

8. Natural convection — internal flows

Natural, or free convection, continues to evolve as a subject for both basic and applied research. The fundamental literature this year has shown growth in the direction of systems in which buoyancy exists in concert with external forcing conditions and/or nonuniform thermal boundary conditions. However, very fundamental studies of heat transfer in layers, cavities, and channels yet dominate published research. There is a growing interest in describing buoyancy dominated flows in systems with forcing conditions applied either at the boundary or volumetrically. The development of new industrial processes, such as in materials manufacture, and in space processing motivate this research.

The literature on heat transfer phenomena associated with fires also continues to grow. Increasingly, studies of fire and its related transport phenomena are aimed at quantifying mechanisms of inanition and spread in both pools and enclosed spaces. The general directions of the research on fires and related natural convective phenomena has produced a literature that can be conveniently categorized. Major areas of research focus are: (1) Modeling and experimentation to determine and describe transport phenomena; (2) experimentation and large-scale testing to support model development; (3) validation of production codes and their internal transport models; and (4) verification of production codes.

8.1. Plane layers

Rayleigh–Benard convection was investigated numerically and experimentally for a system comprising two immiscible liquids for a range of buoyancy ratios and thermal boundary conditions [6F,4F,2F]. Fundamental aspects of environmental flows were also investigated for high Prandtl number fluids, including the dynamics of thermal release and the effects of temperature-dependent viscosity [5F,7F]. An interesting experimental study of steady state heat transfer in air layers heated from above reports heat transfer relations and flow field information for two aspect ratios and inclinations [1F]. A fundamental experimental study of penetrative flow due in a stable double layer system due to an immersed isothermal wall shows that penetrative flows result from the interaction of oppositely directed flows that meet and mix at the interface [3F].

8.2. Cavities

While most studies reported for cavities of moderate aspect ratios were numerical in nature, some important experiments were published. Nusselt numbers at very high Rayleigh number were measured by Chavanne et al. [12F], with the *Nu*-vs.-*Ra* relation showing a departure from the 2/7-ths power law above $Ra \sim 1\mathrm{E}+10$. Two detailed studies of the structure and evolution of transient convection via flow visualization in square and rectangular cavities with heating from the side walls were reported [14F,19F]. The structure of the two-dimensional flow fields for various aspect ratios and heating from either the side walls or the bottom yet draws attention, with computational schemes and details of the flow being simultaneous foci of reported studies [26F,16F,25F,8F]. The three-dimensional flow in a cubical cavity heated from below was computed [19F] to reveal the existence of four stable structures for $Ra < 1\mathrm{E}+04$, and flow transitions for two- and three-dimensional perturbations were also determined numerically [13F,15F]. For a cylindrical cavity [17F], a series of roll and open roll flows dominate for Rayleigh numbers moderately elevated above the critical value for the onset of motion.

Cavities with complex thermal boundary conditions are also receiving systematic treatment. Convection driven by partically heated boundaries reveals flow and temperature fields with oscillatory and periodic behavior [20F,21F,27F]. Experimental data for temperature and flow fields in a long box driven by nonuniform heating and cooling on the horizontal boundaries were reported [24F] Some interesting results for inclined cavities were also reported for both application to solar energy engineering and end-driven flows [18F,23F].

Some interest has also been shown in the special case where buoyancy forces are produced via volumetric heat release within the convecting fluid. Two experimental studies of connection with nuclear rector technology and post-accident heat removal have been reported for a volumetrically heated segment of a sphere that is cooled externally from the curved surface [9F,10F]. On a more fundamental level, the effects of a sinusoidally varying heat source in a square cavity were investigated numerically [11F]. The stability of a uniformly heated fluid layer continued to receive some attention but added complexity due to convective and other types of boundary conditions [22F].

8.3. Conjugate problems

Natural convection in which the system boundaries couple thermally to the fluid continue to receive attention, though not the extent that one would expect. Conjugate convection between two fluids separated by a horizontal wall was investigated both numerically and analytically [31F]; the related problem for channel flows with discrete heating was reported by [28F]. Buoyant conjugate heat transfer in horizontal planar themosyphons was thoroughly analyzed by [29F,30F].

8.4. Vertical channels and slots

Fundamental work on vertical channels and slots this past included several studies that provide measurements of velocity and temperature fields for important engineering applications and for validation benchmarks for theoretical studies. Such experiments have been reported for a tall cavity with air as the working fluid [32F]. A mass transfer analog has also been investigated [39F].

For very high Prandtl number fluids in a differentially heated slot with aspect ratio 15, [35F,36F] report temperature and velocity fields in good agreement with recent experimental results. With air as the working fluid in either a slot or channel, several finite difference studies report velocity and temperature fields [33F,37F,38F]. For a slot with discrete heating, a fully analytical solution for the velocity and temperature fields is able to reveal the energy content of the dominate modes of flow [34F].

8.5. Annular flows

Vertical and horizontal annuli were the objects of several studies. Numerical work was reported for constant flux heating on the inner wall for a tall but finite annulus [46F] and for the horizontal annulus with water at the working fluid [45F]. Systems with eccentric cylinders and a noncircular outer wall were also considered via numerical analysis [44F,41F]. Experimental and numerical results for heat transfer were presented for a vertical annual with an adiabatic upper boundary [43F]. An interesting analytical study of flow stability in a tall vertical annulus was reported for a range of Prandtl numbers and disturbance modes [40F]. A numerical investigation of convection between concentric and vertically eccentric spheres with mixed boundary conditions showed that heat transfer coefficients and flow fields mainly depend on the Raleigh number and the eccentricity [42F].

8.6. Complex geometries

A variety of applications has motivated experimental and numerical work on buoyancy driven flow in complex enclosures. A combined numerical and experimental modeling technique has been suggested for imperfectly mixed fluids in a ventilated space [49F]. Flow patterns and temperature fields in partitioned enclosures were investigated for very large Rayleigh numbers using three- and four-equation models for turbulent transport [51F]. Cavity flows driven by heated parallel plates within the enclosures were numerically determined [52F]. Experiments and analysis for a horizontal open annulus were reported [50F], and experiments were conducted on horizontal enclosed rod bundle [47F]. A parametric study for flow and heat transfer in L-shaped corners with asymmetric heating was reported [48F]. The enclosure with conducting multiple partitions received attention, and some progress was made toward a generalized representation of the problem [54F]. Buoyancy driven flow and heat transfer from helicoidal pipes was investigated experimentally, with the key finding being that local and average Nusselt numbers for the horizontal coil being larger than those for the vertical coil [55F]. An experimental and numerical investigation of coupled convection and diffusion in a U-tube reactor was able to accurately predict the mixing of reactants prior to the onset of global convection [53F]

8.7. Transient systems

An interesting feature of this year's literature has been the appearance of a variety of studies on buoyancy affected flows wherein buoyant forces are coupled to external forcing conditions. Such forcing conditions may be transients imposed at the boundaries of the system, vibrational effects, or oscillatory bulk flows. A primary category of research in this broad category includes experimental and numerical studies for cavities with time-varying thermal boundary conditions [57F,61F]. Instability in a differentially heated flat, inclined layer subject to high frequency vibration was studied analytical and numerically for small amplitude, two-dimensional disturbances for all combinations of temperature gradient and axis of vibration [58F]. Resonance in thermo-vibrational convection was observed via numerical studies [59F]. Convection with physically moving boundaries, so called lid-driven flows, was studied both experimentally and numerically [56F,62F]. As flow in this category leads easily to mixed convective situations, a related study is that in which oscillatory pressure gradients exist in a channel with bottom wall heating [60F].

8.8. Plumes and thermal discharges

Research on buoyant plumes of several types has been motivated both by technological and environmental problems. An experimental and theoretical study of a wall plume arising from a thermal source on an inclined surface has been reported along with a correlation for Nusselt number over a wide range of Prandtl numbers and angles of incline [64F]. On a larger scale, studies of simple heat islands, which are a special class of the urban heat island, were performed using small scale laboratory models [65F]. Some new data on self-preserving plumes were also reported [63F]. A verification of dilution in environmental thermal discharges using the US EPA's CORMIX2 and UM production codes was also reported [66F]. The two codes demonstrated some difference in overall predictions for selected case studies.

8.9. Double diffusive and thermocapillary convection

Double diffusive convection in enclosures continues to be investigated numerically and analytically. Various studies were reported that continue to describe heat transfer and flow structure [72F,70F]. General mass transfer relations are also proposed, and the influence of the interactions between density differences and thermal gradients are elucidated [67F,69F].

Thermocapillary effects on natural convection had drawn attention via both experimental and numerical studies. Oscillatory flows in cylindrical systems [71F] were investigated experimentally for both heat transfer and flow field. Transient flows in multi-fluid layers [74F] were investigated numerically, and oscillatory flows were found for large Rayleigh and Marangoni numbers. A numerical study of an evaporating axisymmetric droplet predicts that surface tension strengthens internal circulation and thereby shortens overall evaporation time [73F]. For a system comprising two superposed fluid layers under reduced gravity, thermocapillary forces are seen to play a role in the heat transport process under micro-gravity conditions [68F].

8.10. Fires

The validation and use of fluid dynamics and specialized heat transfer (CFD/CHT) codes have been the focus of several papers on tunnel and room fires [98F,99F,84F,82F,76F]. Separate heat transfer effects, e.g., radiative heat transfer, convective heat transfer, etc., and the propagation of the fire were of greatest concern. Zonal models of fires in rooms and buildings continue to occupy a goodly fraction of the work underway to accurately exercise production codes. CFD/CHT commercial codes were also used to assess the effectiveness of extinguishment of enclosed gas fires by a water spray [88F] Fundamental model development has been directed at dehydration and stress analysis [77F], coupled heat and mass transfer in woodland fires [86F], wood combustion [87F], and heat transfer in composite wall structures [97F]. All of this work involves a goodly number of approximations and generally the solution of the coupled equations for heat and mass transfer.

More fundamental model development work has also been done this past year. Typical studies are those involved in the design of steel-framed walls [85F], developing constitutive relations for steel at high temperature [93F], and overall thermo-structural analysis [78F].

Work on fire dynamics involved both numerical and experimental work. Poreh and Morgan [90F] have developed a homogeneous power law to describe the vertical variation of mass flux in the near field of turbulent flames and plumes. The ignition of a flammable pool was idealized as liquid layer with a focused heat flux on the upper surface; the problem is mathematically modeled as a nonlinear conduction problem [81F]. Buoyant flows related to fires in enclosed and partially enclosed spaces were investigated numerically for both laminar and turbulent flows [75F,91F,100F].

Large scale fires and their assessment were carried out on ignition, spread, and interactions with structures. Flame spread in composite materials were reported [89F,83F,95F], and the effects of ignition sources on heat release from upholstered furniture were measured [94F]. Assessment of large scales tests addressed stratification in fuel tanks [79F], fire resistance and endurance parameters [96F,80F]. A critical assessment was presented by [92F] on the use of the cone calorimeter in the analysis of fires.

9. Natural convection — external flows

9.1. Vertical plate

Studies on buoyancy driven convection heat transfer from a vertical plate include the influence of a transverse magnetic field under microgravity conditions [9FF], transient mass transfer in a steady laminar flow [10FF] and unsteady heat transfer over a continuous moving vertical sheet at constant surface temperature and constant surface heat flux boundary conditions [7FF]. Studies of convection of a nonNewtonian fluid on a wavy vertical plate has been analyzed including the influence of a magnetic field [1FF,16FF]. Conjugate natural convection from a vertical plate has been analyzed using a finite-difference scheme [11FF] and using numerical and asymptotic solutions [15FF]. Other studies of natural convection on a vertical plate include the use of an algebraic flux model to study turbulent heat transport [2FF] and a numerical model for studying heat transport with a phase change material [3FF]. Combined mass and heat transfer with multi component electrochemical systems [5FF] and with double diffusive convection [12FF] have been analyzed. A special case concerns convection from a draining film with thermocapillary instabilities [6FF]. Laser holographic interferometry was used to study convection from vertical rectangular fins [8FF] while a numerical solution established optimum fin spacing for heat sinks [13FF]. Protruding blocks on vertical surfaces have been studied experimentally [14FF] and numerically [4FF] to simulate heat flow from computer chips.

9.2. Inclined and horizontal surfaces

A boundary layer analysis provides heat transfer results for convection of a micropolar fluid on a horizontal plate [18FF]. Boundary layer flow with a variable viscosity fluid and free surfaces has been described [17FF]. An asymptotic analysis predicts thermal ignition of combustion gases [19FF] flowing along an inclined surface.

9.3. Spheres and cylinders

Several studies examine convection from spherical systems. Steady [23FF] and transient [24FF] laminar convection from spheres has been studied over a large range of Rayleigh and Prandtl numbers; potential flow, separation and a recirculation vortex are discussed. Cooling of spherically shaped melons was studied experimentally under time varying conditions [21FF]. A horizontal surface near a horizontal cylinder can change the convection flow pattern [25FF]. Experiments and analysis provide the effect of shape of horizontal elliptical cylinders on the mean heat transfer [20FF]. Numerical studies show the increase in heat transfer from a cylinder due to the presence of multiple low conductivity longitudinal baffles [22FF].

9.4. Mixed convection

A number of studies consider heat transfer with both buoyancy-driven and forced flows. A model provides good agreement with the experimental data for a vertical plate in which the forced and natural convection flows are either in the same or opposing directions [28FF] while a related study [32FF] converts the model to similar flows on circular discs. Experiments on a the face of an eight storey building provide data for mixed convection heat transfer to apply in the design of multi-storey building structures [29FF]. Similarity solutions are provided for mixed convection on a continuous flat plate with a fluid whose viscosity is dependent on temperature [27FF]. Other mixed convection studies include analyses for flow of a micropolar fluid in the axisymmetric stagnation region of a vertical cylinder [26FF,30FF] and for flow around a heated cylinder mounted between parallel plates [31FF].

9.5. Miscellaneous

Use of triangular elements in a finite element analysis provides rapid convergence of the numerical solution for several different geometries over a range of laminar flow Rayleigh numbers [38FF]. A boundary element method provides two-dimensional time-varying heat transfer data for oscillatory natural convection [39FF]. A model [33FF] predicts the influence of natural convection on measurement of the diffusion coefficient in concentrated liquid alloys. Convection studies include simulation models for the growth of single crystals of cadmium telluride [40FF]. Under microgravity conditions the influence of thermo-acoustic convection [41FF] and a model for dendritic growth [37FF] have been discussed. Natural convection effects on the temperature distribution in gravel embankments over summer and winter seasons [35FF], the heat transfer and flow in models for storage of reactor fuel assemblies [36FF], and the flow of aerosols released in postulated nuclear accidents [34FF] have been described.

10. Rotating surfaces

10.1. Rotating disks

Two numerical studies were performed on the flow between rotating disks. In the first [1G] the two disks rotate with different time dependent velocities. In the second [3G], mixed convection is studied with co-rotating and counter rotating disks with and without a shroud. The fluctuation of rotation power was measured for two counter rotating disks with and without a shroud [2G]. The sliding interface between a stationary pin and a singe disk was studied theoretically [5G]. A rotating cavity with axial throughflow was used to model a compressor drum cavity [4G].

10.2. Rotating channels

Several numerical [15G,12G,8G,6G] and experimental [14G] papers describe flow and heat transfer in channels rotating about an axis perpendicular to the channel axis. A description of a new research facility was also given [18G]. Additional studies considered curved channels [10G,20G] and channels with ribs [9G,19G]. Experiments were performed for flow in a pipe rotating about its axis [11G] and numerical solutions were obtained for flow in rectangular and elliptical ducts rotating about a parallel axis [16G]. The performance of an annular heat exchanger with the inner cylinder rotating [21G], rotating annuli [7G], and the flow in the annulus around a rotating cylinder [13G] were reported. Heat transfer to liquid helium in a high speed rotating field was investigated [17G].

10.3. Enclosures

Geometries considered in rotating enclosure flows include a rotating cylinder [29G] and an annulus [24G]. Studies of rotating liquid layers include development of criteria for the onset of Benard–Marangoni convection [28G] and the transition to turbulence for Rayleigh–Benard convection [25G]. Numerical and experimental studies were made on convection in a differentially heated cubic cavity rotating about its center [26G,27G]. Theoretical solutions have been obtained for flow in a spherical annulus [22G] and from a rotating cylinder contained in a rectangular enclosure [23G].

10.4. Cylinders, spheres, bodies of revolution

Heat transfer by forced [31G] and mixed [33G] convection from rotating cylinders has been predicted. Forced [34G] and mixed [30G] convection from rotating spheres has also been investigated. The effect of aspect ratio was determined for heat transfer from a rotating cup [32G].

10.5. Miscellaneous

A theoretical investigation was performed on the transient dynamics and heating of a droplet in a gas flow [37G,38G]. The effects of rotation on ice formation [35G] and on spacecraft boom deformation [36G] were studied.

11. Combined heat and mass transfer

The present section on combined heat and mass transfer covers a number of important cooling mechanisms. These include transpiration cooling, ablation, film cooling, jet impingement heat transfer, spray and mist cooling and drying systems.

11.1. Transpiration and ablation

A transpiration coolant passes through a porous surface to protect the surface from a hot gas stream flowing over it, while ablation occurs when a high heat flux to a solid surface produces loss of material by a number of processes including sublimation and chemical decomposition with the intent of absorbing the heat transferred from a high velocity and temperature flow to prevent damage of the structural surface underneath the ablating material. Two dimensional axisymmetric ablation problems have been analyzed using an unstructured grid to include the effective change of surface shape [3H]. Change of shape of an ablating solid and the transient temperature distribution inside it has been analyzed with a three-dimensional conduction model [4H]. The effect of mechanical erosion on an ablating carbon-base material has been examined [5H]. The ablation of a cellulosic cylinder degrading from high pressure contact against a hot, spinning disc has been analyzed [2H]. Transpiration cooling studies include an analytical model for air injection from a hemicylinder [6H], transpiration with turbulent flow over a two dimensional contoured nozzle [1H] and the use of a perforated plate with different hole sizes for the transpiring holes [7H].

11.2. Film cooling

With film cooling, fluid is injected at discrete locations along the surface into the boundary layer to prevent overheating of a wall from exposure to a high temperature fluid. Film cooling from a row of holes along a turbine blade has been studied in a cascade at different free stream turbulence levels [10H] while a three-dimensional code has been used to study the effect of spanwise pitch of shower-head holes at the leading edge of a turbine blade [8H]. Film cooling performance for injection through discrete holes in the endwall of a turbine blade is investigated [9H]. The effect of bulk flow pulsations on the injection [15H] and the film cooling performance [16H] have been studied with single-row film cooling along a surface. Film cooling in a duct has been examined for both subsonic and supersonic flow [13H]. Another analysis considers different angles of film cooling holes taking their flow from a duct at different velocity ratios [14H]. Film cooling with a supersonic flow at Mach 2.35 has been examined experimentally [12H]. Other film cooling studies include applications to protect electronic modules [11H] and injection into a flow over a rearward facing step [17H]. A computation shows some significant physical influences in a film-cooled high-speed nozzle flow [18H].

11.3. Submerged jets

The thin boundary layer in the stagnation region of an impinging jet provides high localized heat transfer while an array of jets can cool larger surfaces. Submerged jets are jets in which the fluid in the jet is similar to the fluid in the surroundings. Studies on heat transfer of impinging jets include measurements with differential thermocouple heat flux sensors [45H], the influence of the turbulent statistics in the stagnation region on heat transfer [40H], and the effect of shear layer dynamics on local and average heat transfer [38H]. The instabilities in a supersonic impinging jet [26H] and the effect of turbulence on heat transfer in stagnation flow [19H] have been reported. Jet impingement has been used to dry a moist, porous solid [25H] and to heat a phase change material [21H]. Jets impinging on a surface in a confined geometry have been studied including the influence of nozzle geometry [22H], and turbulence intensity [36H]. A k–ε turbulence model has been used to predict heat transfer to a fully developed turbulent axisymmetric jet within a semi-confined space [20H]. Liquid crystals have been used to study the heat transfer from a pair of impinging air jets [46H] while a numerical investigation provides information on heat transfer with rows of impinging jets [32H]. The effect of fluctuating velocity on impingement heat transfer with an excited circular jet [37H] and a self-oscillating jet [41H] have been reported. Use of a self-oscillating jet has also been examined for drying applications [43H]. Flow and heat transfer has been studied from an impinging torch using an interferometer and stroboscopic photography [29H]. Jet impingement has been used to prevent overheating of cutting tools in manufacturing [33H, 34H] and for continuous annealing in steel strip manufacturing [39H]. Particle image velocimetry and laser-induced fluorescence have been used to examine the flow and heat transfer of an excited plane impinging jet [42H] while supersonic impinging jets have been examined to show the influence of shock–vortex interaction [24H].

Laminar wall jets on plane and cylindrical surfaces have been studied, including the influence of suction and blowing on heat transfer [44H]. Experiments on a plane wall jet include the use of a thermochromic liquid crystal to measure temperature distribution [30H] and hot-wire anemometry to study the flow characteristics [31H]. A two dimensional analysis has extended the solution for a wall jet to show potential instabilities [35H]. Experiments have been reported on interaction of two turbulent curved wall jets [27H]. Other studies have been reported on the analysis of mass transfer to a wall jet with chemical reaction at the fluid–solid interface of [23H] and heat transfer to a buoyant ceiling jet [28H].

11.4. Liquid jets and sprays

Individual liquid jets and sprays from liquid jets are used in a variety of cooling applications. Studies on heat transfer to liquid impinging jets include the influence of nozzle diameter on local heat transfer [47H] and the cooling of an array of heated strips from an impinging fluorinert coolant [49H]. Numerical analysis is compared to an approximate solution for determining the heat transfer from a two-dimensional vertical liquid jet against a hot, horizontal plate [50H]. Applications of spray cooling to steel production [52H] and desalination systems [51H] have been reported. An air/liquid mist created in jet atomizer has been used to cool heated surfaces [48H].

11.5. Drying

Combined heat and mass transfer under drying conditions has been examined in a number of basic and applied systems. Models predict heating and drying with internal energy dissipation such as in microwave heating [54H], direct contact rotary drying [62H], particulate solid drying with a neural network model [56H] and drying of droplets containing dissolved biomass [59H]. Experiments on drying systems include the use of air and superheated steam as drying media [63H] and laboratory simulations of impulse drying with ceramic and steel plates [61H]. A number of applications to drying food have been modeled. These include sliding bed dryers for grain [60H], a model for drying wheat in a fixed bed [57H,58H], and drying systems for different foods [53H]. An analysis considers the drying potential of humid air [64H]. An optimization system for timber drying has been presented [55H].

11.6. Miscellaneous

Combined heat and mass transfer in wavy flowing films has been analyzed [77H] and studied in experimental systems [79H]. Studies of heat and mass transfer in tubes include evaporation effects of binary mixtures of refrigerants [69H] and mixtures of lubricating oil and refrigerants [68H]. Investigations describe heat and mass transfer with saline water flow in a cavity [76H] and the performance of a spined-tube absorber [71H]. Analyses have been performed for heat and mass transfer during nonisothermal gas absorption in a two-phase gas–liquid mixture [73H], for transport through inert liquids [72H], and for dehumidification of the air in lithium chloride solutions in a packed column [70H]. Combined heat and mass transfers through solid matrixes has been examined for a three layer building envelope and a single and multi-layer fabric systems [67H]. Heat and mass transfer analyses have considered flows in soils [78H], clay buffers [80H] and the adsorption of water on zeolite [74H]. Other studies include processes involving bulk refrigeration of fruits and vegetables [66H], modeling of single drops in liquid-liquid mixtures [75H] and hydrogen and thermal transport in laser beam welding [65H].

12. Change of phase — boiling

Thermal transport phenomena associated with liquid-to-vapor phase change are addressed in the publications reviewed in this section and classified into four major categories: droplet and film evaporation (19 papers), bubble characteristics and boiling incipience (17 papers), pool boiling (40) and flow boiling (47). In addition to these papers, dealing with evaporative and ebullient heat transfer, the interested reader will find these phenomena addressed in some of the papers included in the following sections: change of phase ñ condensation (JJ), heat transfer applications ñ heat pipes and heat exchangers (Q), and heat transfer applications ñ general (S).

12.1. Droplets and film evaporation

The 1996 archival literature presents several fundamental studies of evaporation from a single droplet, including the application of perturbation theory to the prediction of evaporation and combustion rates [6J], the modeling of flash evaporation from a droplet exposed to a high-speed air stream [7J], and the use of holographic techniques to obtain the radial distribution of evaporated diffusing vapor [18J]. The evaporation rates and onset of instability in the EHD-enhancement of droplet evaporation are discussed in [16J,17J] respectively.

The fluid mechanics of droplet impaction on flat walls underpins models of diesel combustion and spray cooling and is explored in [4J,15J] — describing the incorporation of droplet impingement models into numerical codes for combustion in an internal combustion engine, [3J] — addressing an anomalous region in the boiling curve for jet mist cooling, [11J] — focusing on the effect of droplet sensible heat on the cooling rates, [12J] — comparing computer predictions with anemometry data for droplet velocity and size in the wall spray, [5J] — comparing theoretical predictions with experimental data for spreading ratios and times of impinging droplets, [2J] — describing the influence of large surface roughness on droplet impact and spreading, and [14J] — presenting photographic data and fast response thermocouple measurements during droplet impact in low gravity.

Recent studies of evaporating liquid films have addressed important aspects encountered in actual engineering applications. The microscopic details of fluid flow and heat transfer near the contact line of a curved evaporating liquid film are, thus, examined in [8J], nonequilibrium evaporation of a heated film in microgravity in [9J], the effect of longitudinal fins on evaporation of falling films on horizontal tubes in [13J] as well as the enhancement associated with the use of thin glass rods to disturb the liquid film in [19J], and the changes caused by the presence of lubricant on the evaporative heat transfer performance of refrigerants R-134a and R-22 in [10J]. A procedure for selecting the optimum number of effects for evaporators used in chemical process plants is proposed in [1J].

12.2. Bubble characteristics and boiling incipience

[20J] uses a variational form of mechanical energy conservation, in both the liquid and the vapor, to derive the characteristics of a bubble growing at a nucleation site on a horizontal wall. [21J] develops a nonequilibrium relaxation model for one-dimensional flashing liquid flow. The effects of microgravity on the growth rates of hemispherical bubbles are studied and theoretically-bounded in [24J], the effects of elastic viscosity and diffusion resistance on the growth of vapor bubbles in a superheated polymer solution are the subject of [32J,25J]. In [31J] the growth of vapor bubbles within a porous medium was studied both experimentally and theoretically. A new dynamic instability, associated with the onset of boiling in a single-channel, high-pressure upflow was described in [35J].

Digitally-enhanced measurement techniques were used in several studies to examine the characteristics of bubbles encountered in vertical bubbly flow, including [34J] — in which an electroresistivity probe was used to obtain phase-resolved temperatures, as well as volume fraction, bubble frequency, and bubble velocity for air–water and air–multifluor flows [36J] — in which high-speed photography and digital image processing techniques were applied to the determination of bubble properties encountered in subcooled flow boiling, and [29J] — in which decentralized processing of multiple fiber-optic sensors was used to map the local void fraction and bubble properties for an air–water flow.

While the homogeneous nucleation kinetics near a small evaporating drop were investigated in [23J], [33J] describes the results of experiments involving laser-induced bubble formation in liquid nitrogen and [22J] the results for the onset of nucleate boiling and of critical heat flux for liquid nitrogen on substrates of differing roughness. The transition to boiling, as well as other transient phenomena, of He II in a vertical channel [28J], of liquid 3He and mixtures of 3He and 4He below 1 K [27J], and of liquid nitrogen and helium under rapidly increasing heat fluxes [30J] are also described. [26J] present evidence of suppression of the incipience hysteresis in highly-wetting liquids, through the use of micrographite fiber nucleation activators.

12.3. Pool boiling

Fundamental studies of pool boiling heat transfer, published during 1996, described the development of a new additive model for bubble-induced heat transfer [39J], experimental results for nucleate boiling of binary mixtures [51J,52J,59J], experimental data for pool boiling in microgravity [66J], boiling of HeII under steady and transient conditions [69J], and the influence of surface properties on transient pool boiling [46J]. Nontraditional experimental techniques were employed by several investigators to elucidate pool boiling behavior, including the use of temperature controlled surfaces to obtain precise boiling data [41J, 47J], use of liquid crystals thermography to map the variations in wall superheat [60J], and laser-Doppler anemometry to determine the contribution of each of four heat transfer mechanisms to ebullient thermal transport [38J].

The influence of heater geometry on pool boiling was examined in [48J] — which provides a review of the literature dealing with pool boiling from inclined and downward-facing smooth plates, in [55J] — which discusses the heat transfer mechanism for boiling on the outside of horizontal tube bundles, in [44J] — which presents the results for boiling on various combinations of tube diameters, surface roughness, and tube orientation, in [56J] — wherein the effect of plate orientation and surface treatment on pool boiling of He is explored, and in [75J] — which deals with boiling from a rotating disk.

The 1996 literature is rich in studies of pool boiling enhancement. A review of the many techniques developed to improve ebullient and convective thermal transport is offered in [40J]. Boiling heat transfer from porous metal and metal mesh surfaces is described in [45J,63J,71J]. The effect of an anionic surfactant on the pool boiling of water is examined in [37J]. Ebullient heat transfer from finned surfaces is the subject of [54J,61J], while boiling in vertical channels is examined in [72J]. The beneficial effect of electric fields on pool boiling from smooth plates is the subject of [43J,67J], while [65J,74J,73J] deal with the influence of an EHD field on pool boiling from a passively-enhanced surface.

The instabilities induced during the transition from nucleate to film boiling were studied analytically in [53J,42J]. Pool boiling CHF in liquid metals, including data and new correlations, was surveyed in [68J] and the onset of stable film boiling was the subject of [64J]. Film boiling on a downward-facing curved surface was explored in [49J], while the influence of dissolved gas on film boiling in water and of mass diffusion on film boiling in binary mixtures were investigated in [58J,62J], respectively. The role played by pool boiling in the grinding process is described in [76J,57J], in the preparation of grease in [50J], and in the cooling of electronics, through the use of a thermosyphon, in [70J].

12.4. Flow boiling

The growing interest in new refrigerants and ongoing research on the cooling of fusion reactors are largely responsible for sustaining the flow boiling literature during this past year. A new hypothesis of thermodynamic states was used to underpin an analytically-derived flow boiling curve [108J]. New experimental studies revealed that in annular flow the forced convection mechanism dominates over secondary nucleation in the liquid film [111J]. The characterization of local flow boiling heat transfer coefficients under very high heat flux conditions revealed a need for major modifications in correlations used to describe the subcooled partial nucleate boiling domain [78J]. Flow boiling under reduced gravity conditions was the subject of [87J] — examining annular gas–liquid mixtures, and [118J] — focusing on verification of the "sliding bubble" mechanism with high subcooling. Studies of flow boiling heat transfer rates in unconventional fluids, including organic–water solutions [122J] and electrolyte solutions [101J], as well as in unconventional geometries, such as porous media [114J], narrow channels [96J], microchanneled plates with binary mixtures [105J], during loss-of-coolant reactor scenarios [103J], and swirl tubes [76J,109J] are described in the 1996 archival literature.

Ebullient heat transfer to refrigerants received considerable attention in the 1996 literature. A state-of-the-art review of refrigerant boiling was presented by [112J]. Flow boiling heat transfer coefficients for R-134 and R-12 flowing in microfin tubes [110J] and in small circular and rectangular channels [115J], respectively, R22 and R407C (itself a mixture) flowing in a microfin tube [95J], both boiling and condensation of quarternary refrigerant mixtures [107J], and the flow boiling behavior of ammonia [104J] have also been reported. The EHD enhancement of flow boiling heat transfer for R-134a flowing in a tube bundle and R-404a in a microfin tube is described in [80J] and [106J], respectively, while the mechanism by which helical ribbing enhances two-phase heat transfer was examined in

[120J]. Experimental techniques for establishing the flow parameters of importance in two-phase heat transfer are discussed in [97J] — dealing with the use of a steady or pulsed neutron beam, in [93J] — dealing with the use of a nonintuitive auto-transformer technique, and [90J] — dealing with the application of laser holography to shock wave propagation and onset of boiling in He II.

Modeling of the "boiling crisis" in flow boiling continues to receive significant attention. Recent publications explored various geometric effects, including the influence of tube diameter on CHF in subcooled flow boiling in [79J], the contribution of spacers and mixing vanes on low velocity CHF in water [81J], and the impact of twisted-tape inserts on CHF in subcooled, small diameter tube flow [113J]. The effect of nonuniform heating [102J], of subcooling and velocity [89J], countercurrent annular flow in a thermosyphon [98J], and oscillatory flow conditions [116J,100J] on flow boiling CHF have also been described. Electronic cooling applications, constrained by the boiling crisis, and applications in which CHF thermal modeling capability must be linked to thermal stress computations, are discussed in [86J,119J] respectively.

Post-CHF and post-dryout phenomena in flow boiling systems are explored in [83J] for one-sided heating and high subcooling and in [91J] for low flow conditions. [88J] examines subcooled film boiling of refrigerants in upflow, while [117J] presents the results of an experimental study of dispersed flow heat transfer in circular bends.

Spray and jet impingement cooling constitute a special case of flow boiling behavior and provide a fertile field for heat transfer research. The transition from jet-induced convection to nucleate boiling is studied experimentally in [84J,85J] The fundamental issues encountered in the boiling of a free-surface, planar jet are the subject of [121J], the interaction between a liquid spray and subcooled liquid film is examined in [94J] and the self-similarity of heat transfer to jets in a multiple jet array is described in [99J]. The application of two-phase multiple jet impingement to the cooling of electronic equipment is discussed in [82J,92J].

13. Change of phase — condensation

Papers on condensation during 1996 were separated into those which dealt with surface geometry effects, those on the effects of global geometry and thermal boundary conditions, papers presenting techniques for modeling and analysis, papers on free-surface condensation, presentations of unsteady effects, and papers dealing with binary mixtures.

13.1. Surface geometry and material effects

One paper analyzed the thermal interaction between laminar film condensation, forced convection, and a conducting wall separating the two [4JJ]. Several dealt with tubes, one with low-fin and 3-D fin enhancement [3JJ], a second with 3-D fins [5JJ] and a third with microfins [2JJ]. Finally, an analysis was performed with plates on which there is fog formation [1JJ].

13.2. Global geometry and thermal boundary condition effects

The bulk of the activity in 1996 was in this category. A numerical solution showed the effects of taking fin nonisothermness into account [24JJ], another conjugate analysis discussed the effects of finite thermal inertia on the problem of condensation on a vertical plate [28JJ], while another analyzed the heat, air, and moisture transport in a residential wall [20JJ]. Several papers investigated tube geometries. One presented a theory for condensation in a vertical tube [19JJ], another presented a measurement technique for experimentally determining the in-tube condensation heat flux [16JJ], while another applied the population balance model to analyze condensation inside of a horizontal tube [9JJ]. An analysis was presented for nonisothermal absorption on horizontal tubes used in absorption heat pump applications [10JJ], another used numerical methods to deal with noncondensables in horizontal tubes and tube banks [7JJ], while another looked at the effects of condensation inundation and noncondensable gases in horizontal tube bundles [33JJ]. Several focused on fin enhancement. One presented a review of properties of refrigerants for low-finned tube applications [27JJ], another presented experimental results for horizontal integral-finned tubes [11JJ], another similar paper focused on low-thermal conductivity fins [14JJ], and another concentrated on R-123 applications [26JJ]. Condensation in tubes of small hydraulic diameter was experimentally evaluated [30JJ,31JJ], condensation was seen to be a limiting process in the cooling of fibers with cross-flow [25JJ], and moisture conditions were addressed for walls with cellulose, loose-fill insulation construction [13JJ]. Three papers dealt with greenhouses; two on dynamic heat transfer [22JJ,23JJ] and another on the influences of condensation and rain on heat transfer coefficients of claddings [21JJ]. Two papers were on nuclear plant containment vessels, one discussed comparisons between computations and test data [15JJ] and another presented primary parameters and methods for heat transfer coefficient evaluation [12JJ]. Other geometric features studied include steam turbines [6JJ], rotating disks [32JJ], agitated vessels [17JJ], closed thermosyphons [18JJ], and cryogenic traps [8JJ]. Finally, experimental results were presented for augmentation of condensation by electrohydrodynamical means [29JJ].

13.3. Modeling and analysis techniques

Papers which seemed to focus on analysis techniques included two which accounted for the effects of wall conduction [41JJ,37JJ], two which showed numerical modeling of condensation with noncondensable gases [39JJ,40JJ], another focused on nonequilibrium condensation in a hypersonic flow [38JJ], and one near-critical region characteristics [35JJ]. Papers dealt with on system analysis included one on inverted U-tubes [34JJ] and another on fume formation and deposition in kraft recovery boilers [36JJ].

13.4. Free surface condensation

Free surface condensation papers were on surface wave effects [46JJ, 45JJ] and on desorption of carbon dioxide from falling films [42JJ]. A two-paper presentation dealt with condensation on water drops [47JJ,44JJ], while another discussed condensation with hygroscopic aerosols [43JJ]. A dropwise condensation paper investigated the performance of Langmuir–Blodgett surfaces [48JJ].

13.5. Unsteady effects

Condensation papers were presented for pulsating bubbles [52JJ], translatory motion of bubbles with high Nusselt numbers where the unsteadiness comes for their rapid growth [49JJ], and condensation influenced by sound [51JJ]. Instability considerations were directed to film growth on a vertical surface [50JJ] and homogeneous nucleation in a laminar flow reactor [53JJ].

13.6. Binary mixtures

Studies with binary mixtures were in vertical tubes [55JJ] and channels [58JJ], horizontal tubes [54JJ], and with noncondensable gases [56JJ]. Finally, a paper was presented for pseudo-dropwise condensation in a binary mixture [57JJ].

14. Change of phase — freezing and melting

14.1. Melting and freezing of spheres, cylinders and slabs

Several freezing investigations in cylindrical and slab geometry were performed. Among the cylindrical geometry studies was ice film accretion on a rotating cylinder to simulate marine conditions [4JM]; melting characteristics along a bundle of horizontal heated cylinders [5JM]; experimental study of natural convection melting of a horizontal ice cylinder immersed in immiscible liquid [oil] [6JM]; and exothermic heat of mixing measured during melting of ice cylinders in sulfuric acid [3JM]. Slab geometry's were investigated in polymer freezing for crystallinity and spherulite effects in reinforced carbon fiber matrix [1JM], and an exact solution of freezing during deep-freezing of slab products was developed [2JM].

14.2. Stefan problems

Fikiin [7JM] developed a generalized numerical modeling for a Stefan problem using an improved enthalpy approach based on a quasi-one-dimensional formulation.

14.3. Ice formation/melting in porous materials

Studies in this area included investigations into natural convection melting of porous media in a rectangular enclosure [8JM]; principles of ice formation in biological materials for cryopreservation [10JM]; experimental and theoretical prediction of freezing times of strawberry pulp in large containers [11JM]; numerical modeling of snowmelt infiltration into frozen soil [12JM]; modeling of melting in heterogeneous snow cover on permeable frozen soil [13JM]; and a numerical analysis of rectangular foods during freezing [9JM].

14.4. Contact melting

One study, [14JM], established a heat transfer correlation for natural convection in a cavity for contact melting applications.

14.5. Melting and melt flows

Activity in this area fell into several major groupings: injection molding, laser melting, metal melts, and miscellaneous.

Injection molding studies investigated microflow marks as a function of the melt temperature in injection molding [38JM]; experimental and numerical study of polymer melt growth in an injection molded part [21JM]; calculation of cooling time in injection cooling [26JM]; and the use of BEM modeling to analyze complex 3D geometric problems in injection molding [30JM].

Thermal effects in pulsed laser melting was studied by [17JM] and a kinetic theory for laser pulse heating including heat transfer in the melt was presented by [32JM]. Other modeling work investigated: laser cutting using BEM [24JM]; heating and melting during pulsed laser fabrication of ultra-shallow *p* plus-junctions at the nanoscale [39JM]; non equilibrium temperature field around the melting and crystallization front induced by pulsed laser irradiation [33JM]; and numerical predictions of oscillatory flow convection in a laser melt pool [29JM]. Experimental studies of laser melting of Ti–15Al–20Nb alloy [37JM], and laser melting interface shapes in float zones [23JM] were also presented.

Experimental studies explored the use of microwave heating as a method to improve iron ore reduction [40JM] and a development of an electromagnetic levitation melting device [16JM]. Several other investigators studied various conditions in the melt: convection in liquid metals [15JM]; heat transfer in the siro-smelting process [34JM]; melt analysis due to electron beams in refining processes [28JM]; micropyretic reaction in the melt [35JM]; simulation of thermosolutal convection in liquid metals [18JM]; numerical study of natural convection melting of pure metals in a cavity [31JM]; Marangoni convection in a 1D model of float zone in a melt [27JM]; and simulation of heat and fluid flow and interface shapes in float zone of lithium niobate melt [20JM]. In addition, modeling of nonisothermal melt flows with water [22JM] and a numerical study of melt–water interaction [25JM] were presented.

Cyclic phase change [freezing and melting] with fluid flow was studied by [36JM] and the viscous stagnation flow solidification problem for a pure substance was addressed by [19JM].

14.6. Powders, films, emulsions, and particles in a melt

The principles of ultrasonic wave atomization of a viscous melt was described by [41JM].

14.7. Glass melting and formation

Several glass burners were described including the cleanfire High Radiation burner which maximizes heat transfer [42JM], and a submerged combustion furnace [46JM]. Analysis of heat transfer optimization in oxy-fuel burners [44JM] and an analytical model to evaluate particulate emissions in oxy-fuel fired glass furnaces [45JM] was also presented. Lastly, [43JM] developed a numerical simulation of creeping flow and heat transfer in a forehearth for glass bottle production.

14.8. Welding

A review of heat transfer studies in arc welding was presented by [49JM]. In addition, studies on thermal cycles in multiple electrode submerged arc welding [47JM] and measurement and prediction of energy absorption in laser beam welding [48JM] were performed.

14.9. Enclosures

An experimental enclosure phase change study was performed using paraffin materials [51JM]. In addition, numerical studies with multizone adaptive grid generation in several enclosures including rectangular, eccentric annuli, and an open cavity [52JM] and a study of flow in and heat transfer across a vertical cavity of water during freezing [50JM] were performed.

14.10. Nuclear reactors

High pressure melt ejection and corium dispersion was studied in large scale models [53JM], in scaled experiments and models by [54JM] and [57JM], and in a scaled annular cavity [55JM]. In addition melt flow dispersion of direct containment heating of a nuclear reactor [58JM] and the molten pool thermal hydraulics during molten core–concrete interactions in a nuclear accident were investigated [56JM].

14.11. Energy storage

Energy storage by PCMs were studied by various groups. Their studies included: measurement of heat transfer characteristics in low-temperature PCM systems using salt-hydrates [60JM]; latent heat thermal energy storage enhancement by using an externally finned [73JM] and an internally finned radial tube [74JM]; thermal storage in a hollow cylinder of PCM [75JM]; and PCMs for use in thermal control of plastic quad flat packages [69JM]. In addition several numerical studies were performed to study thermal protection by latent heat absorption of a PCM filled rectangular cell [66JM,67JM]; cold heat release of PCM of air-emulsions for direct-contact heat exchange [68JM]; cooling of a heated surface with PCM [70JM]; enhanced heat transfer by insertion of a metal matrix into PCM [71JM]; and thermal radiation effects in PCM systems [72JM].

14.12. Multiple PCM studies

The superiority of mixed PCM families vs. single PCM families for energy storage was studied by [59JM]. Other studies in this area included: cyclic heat transfer in a novel storage unit of multiple PCMs [61JM]; 1D FEM model for enhancement of energy charge–discharge rates in slabs of different PCMs

[62JM]; FEM study of multistage PCM system [63JM]; exergetic study of energy storage using multiple PCMs [64JM]; and a theoretical study of thermal energy storage by PCM [65JM].

14.13. Mushy zone—dendritic growth

Work in this area included a study to improve the enthalpy method for multicomponent phase change conditions [78JM]. Other work investigated oscillatory instability during binary alloy solidification in the mushy layer [76JM] and thermosolutal convection during freezing of seawater [77JM].

14.14. Metal solidification

Studies of metal solidification included work in binary alloys and other metals.

Binary alloys studies included: modeling of macroscopic heat flow with microscopic nucleation and growth in a binary alloy [80JM]; numerical study of the solidification of a binary alloy with globulitic morphology [79JM]; study of instabilities in fluid layer of a binary alloy during freezing [83JM]; scaling analysis of unidirectional solidification of a binary alloy [84JM]; modeling of directional solidification to test stability in lead/tin system with remote flow [82JM]; theoretical study of the formation of island films from binary melts [85JM]; and a numerical study of heat and fluid flow in directional crystal growth of GaAs [87JM]. In addition, studies on the heat transfer in spray formed billets [81JM] and numerical approaches to solidification [86JM] were presented.

14.15. Crystal growth from melt

Work in this area was broken up into Czochralski, Bridgman and general crystal growth topic areas.

Czochralksi crystal growth was simulated by [89JM] and a numerical study of Czochralski melt configuration was presented by [102JM]. In addition, a numerical and experimental study of oxygen transfer during Czochralski growth of a single silicon crystal in a magnetic field [94JM] and an experimental study of Czochralski growth of BGO and BSO crystals [105JM] were presented.

Bridgman crystal growth was investigated experimentally to assess interface curvature in vertical Bridgman growth of lnP crystals [104JM] and gravity induced heat transfer effects during Bridgman growth of lnGaAs [90JM]. Numerical simulation of Bridgman growth was also used to investigate the following: interface curvature and macro-segregation in vertical Bridgman growth [93JM]; optimal design strategy for Bridgman crystallization process [91JM]; heat and species transport in vertical Bridgman crystallization processes [92JM]; liquid encapsulated vertical Bridgman crystal growth [98JM]; and Bridgman growth of beta-NiAl crystals [101JM].

A review of crystal growth work at Fukuda Laboratory in Japan over the last 25 years was presented by [103JM]. In addition, general crystal growth topics covered included: latent heat effects on crystal interface stability [96JM]; study of interface shapes and thermal fields during gradient solidification of single sapphire crystals [88JM]; analysis of radiative heat transfer in crystal pulling [95JM]; numerical study of the use of magnetic fields to radially segregate dopants in silicon crystal growth [97JM]; numerical study of crystal growth in vertical zone melts [99JM]; and the study of kinetics and size of crystals formed for use in purification of food concentrates [100JM].

14.16. Casting

The principles of a new technique of "microcasting" of steel objects was investigated by numerical and experimental study of the interface heat transfer and bonding characteristics of successively impinging molten metal droplets [106JM].

14.17. Splat cooling

Experimental investigation of molten solidification on a substrate for use in splat cooling applications was presented by [107JM].

14.18. Miscellaneous

Several miscellaneous phase change studies were also presented. These included: experimental-numerical prediction of thermal properties during phase change [108JM]; a 1-D numerical model of ice formation and melting on lakes [109JM]; and an experimental study of natural convective freezing of warm water faster than cold water under some circumstances [110JM].

15. Radiative heat transfer

The papers below are divided into subcategories which focus on the different impacts of radiation. Papers describing the development or application of models dominate the literature on radiative heat transfer. Papers focusing on the numerical methods themselves are reviewed in the numerical methods section under subcategory radiation.

15.1. Influence of geometry

The calculation of view factors for different geometries continues to be of interest. Analytic expressions for concentric-cylindric view factors are given in [7K]. Khoddam et al. [2K] derive a view factor for a nonuniform cross-section shaft and a concentric cylinder. A cell-to-cell transport Monte Carlo method was developed by Palmer et al. [6K] and applied to arrays of fixed discrete surfaces. Antoniak et al. [1K] address the same problem with the MCLITE code. The radiative exchange between square parallel channels in a concentric monolith structure is modeled in [8K]. A finite volume method for radiative heat transfer in cylindrical enclosures is presented by Moder et al. [5K]. Axisymmetric radiation transfer through cylinders as well as nonaxisymmetric transport through two- and three-dimensional sectors is considered. The radiative heat transfer in three-dimensional complex geometries using the Discrete Transfer Method is described in [3K]. The method is based on body-fitted grids so that it can easily be used in CFD calculations. The reduction of the radiative load on cryostats windows by straight and bend tubes is studied in [4K]. Papers discussing enclosures and processing chambers are referenced in the section on radiation combined with convection and conduction.

15.2. Participating media

Papers in this category can be divided into those which focus on emission and absorption of the media and those which deal with scattering.

Radiation transfer in molecular gases such as CO_2 [22K] and O_2 [32K] is discussed. Lallemant and Webber [27K] use an exponential wide band model to determine radiative properties of a variety of molecular gases. The model for rotary desorbers of Cook et al. [17K] takes into account the real nature of the participating gas as well as CO_2 and H_2O in the gas phase. Bhattacharjee et al. study the influence of gas-phase radiation from O_2:N_2 mixtures in flame spread in microgravity [13K]. Strong radiation solely from three-atomic molecules characterizes combustion using synthetic air [33K]. Radiative transfer in nongray gases is considered in [16K,24K,38K]. A procedure for reordering absorption coefficients to predict radiative gaseous exchange is proposed by [28K]. Bresslof et al. [15K] assess the performance of a differential total absorptivity solution of the radiative transfer equation. Kamiuto et al. study combined radiation and convection in absorbing and emitting gases [23K]. Radiation from shock wave heated gases was studied in a number of investigations: air was considered in [29K,12K,40K,47K], the effect of argon additions to N_2–CH_4 is pointed out in [26K]. Shock tube experiment were conducted in a simulated atmosphere of Titan in order to study the simulated shock layer of the Huygens probe, which will enter the Titan atmosphere in 2003 [37K].

The emission and absorption of radiation by particulates plays an important role in high soot density flames [9K,25K]. Baek [11K] studies the ignition of propane–air mixtures by radiatively heated inert particles.

A large number of studies deal with the effects of scattering and/or refraction. A two flux method has been used to model the radiative transfer in semitransparent layers [44K,45K,42K] and in composites [43K,46K]. Scattering also plays a major role for the radiative transfer in porous media [20K,10K], powdered and fibrous polymers [36K], as well as fibrous thermal insulation [18K,19K,34K]. Siegel [41K] discusses internal radiation effects in zirconia thermal barrier coatings. Dependent/Independent scattering regimes were studied in [21K] using a discrete dipole approximation.

The radiative transfer in two-layer media with Fresnel interfaces is analyzed in [48K,30K]. These studies are extended to multi-layer media in [31K]. Absorption, emission and scattering in two-dimensional media is investigated in [49K,39K,14K]. Combined effects of radiative and conductive heat transfer can lead to thermal stresses in semitransparent sapphire crystals which is discussed in [35K].

15.3. Radiation combined with convection, conduction, or mass transfer

The interaction between conduction, convection and radiation was studied in such different investigations as on rapid thermal processing systems [72K], gradually expanding channels [67K], discretely heated open cavities [54K], L corners [51K], backward facing steps [68K], packed beds [64K], and isobutane crackers [53K]. Radiation and conduction heat transfer play an important role in silica aerogels [61K]. Coupled inverse conduction-radiation problems are considered in [78K]. The authors propose an iterative algorithm based on a space-marching technique. Sakami et al. [79K] use a discrete ordinates method to describe the conductive-radiative heat transfer in complex two-dimensional geometry. A finite-volume multi-grid solver is proposed in [65K] for the modeling of gray-body surface radiation coupled with fluid flow. A finite volume method is also used to describe the radiative–convective heat transfer around a circular cylinder in a cross flow [70K]. Convection and radiation also play a role in thermocapillary flows in microgravity [66K] and in chemically reactive nozzle flows [71K,75K]. Convection and radiation in micropolar fluids is studied in [77K]. Convection and radiation interaction are also important in fluidized beds [56K], in porous radiant burners [69K], in the transient thermal performance of line traps [60K], in waste-heat boilers [82K], and in furnaces [59K,76K,63K]. Natural and mixed convection combined with radiation are considered in [80K,62K,50K] and in the discussion of enclosures [73K,52K]. Combined heat transfer is also discussed in connection with insulation [57K,58K] and radiation barriers in ventilated attics [74K,81K]. Heat, momentum, and mass transfer are considered in the shrinking of biomass particles exposed to thermal radiation [55K].

15.4. Intensely irradiated materials

This year only a small number of studies is concerned with intensely irradiated materials. Foss and Davis discuss the transient laser heating of single solid microspheres [83K] based on a Mie theory model. Ultrashort laser pulses are used for the heating of silicon microstructures in order to reduce adhesion [84K]. The use of CO_2-laser radiation for the localized curing of epoxy-based materials is described by Scarparo et al. [85K].

15.5. Experimental methods and properties

A number of studies focused primarily on experimental methods. Interference images were used to determine the temperature distribution in the boundary layer near the wall in studies of propagation of premixed flames in a closed vessel [87K]. A direct radiometric technique was used to measure the spectral and directional distribution of radiation exiting a packed bed [90K]. Jones et al. [89K] measure the spectral–directional emittance of oxidized copper in a wavelength range from 2–10 micron. Zaworski et al. [93K] use Monte-Carlo methods to interpret their measurements of bi-directional reflectance data. Spectral IR directional-hemispherical transmission and reflection measurements were performed in [86K] on fine cell PU rigid foams. The measurement of Hall coefficients and DC resistivities was used to determine radiative properties of liquid metal alloys [88K]. Yoshida et al. [92K] report the simultaneous measurement of thermophysical and radiative properties of semi-transparent liquids. The cooling characteristic of cutting grain in grinding is measured via infrared pyrometry using an optical fiber [91K].

16. Numerical methods

The development and application of numerical methods continue as topics of significant research. New procedures and algorithms are developed for solving the partial differential equations that govern heat transfer and fluid flow.

Methods are also adapted to new computer hardware enabling parallel processing. There is an ever-increasing variety of practical problems, to which numerical methods are applied. In this review, the papers that primarily focus on the application of a numerical method to a specific problem are included in the appropriate application category. The papers that describe the details of a numerical method are referenced in this section.

16.1. General techniques

New approaches and algorithms of general utility are described in a number of papers. A generalized object-oriented approach for solving differential equations is outlined in [2N]. The modified strongly implicit procedure is combined in [5N] with an adaptive optimization procedure based on the residual vector norm. The addition correction multigrid method is analyzed in [3N]. Reference [1N] describes different acceleration schemes for eigen function expansions of partial differential equations. Parallelization tools and their application to structured CFD codes are discussed in [4N]. Parallel computing is applied to heat and moisture transfer in unsaturated soils [6N,7N].

16.2. Conduction

The ADI method is extended to multidimensional heat conduction equation in [10N]. Transfer functions are used for obtaining transient temperature fields in cylinders [8N]. For diffusion models, [11N] describes a new boundary treatment as applied to hexagonal meshes. The conjugate heat and mass transfer is calculated in a desiccant system [9N].

16.3. Buoyant convection

Reference [15N] describes the analysis of the instability in buoyant convection in cylinders heated from below., The Galerkin and pseudo-spectral methods are compared in [12N] for the simulation of Rayleigh–Benard convection. Reference [14N] evaluates the roll patterns formed in a Rayleigh–Benard convection in a rectangular layer. The convection and solute segregation in vertical Bridgman crystal growth process are analyzed in [13N].

16.4. Phase change

A temperature-based formulation is described in [16N] for the phase change situation. The Stefan problem in a stagnation flow is defined and investigated in [21N]. Reference [20N] develops a conjugate heat transfer analysis for a phase change system. Numerical anomalies in the simulation of directional solidification are discussed in [18N]. A finite-volume method is described for directional solidification [19N]. A number of numerical techniques are used to determine the effect of mold heat transfer during transfer molding [17N].

16.5. Convection and diffusion

A new finite-volume method is described for the convection–diffusion problem [23N]. For high-resolution convective schemes, a novel technique is proposed for accelerating the convergence rate [22N]. Normalized splines are used for the finite-volume solution of convection–diffusion problems [25N]. Reference [24N] presents flux-based finite-volume formulations.

16.6. Flow equations

A parallel implementation for solving the Navier–Stokes equations is described in [34N]. Reference [32N] develops a Fourier analysis of the SIMPLE algorithm on a collocated grid. A local grid refinement method for fluid flow analysis is described in [31N]. Reference [30N] reports on the performance of a multigrid method with a higher-order convection–diffusion scheme for three-dimensional flow. A simplified control-volume finite-element method is described in [29N]. Reference [26N] presents a complete pressure-correction algorithm for a nonstaggered grid. The continuity constraint method for three-dimensional fluid flow is given in [37N]. Time-dependent Navier–Stokes equations are solved by the vorticity–velocity method [36N]. A Riemann-problem-based approach is described for steady incompressible flows [35N]. Reference [33N] presents a second-order splitting algorithm for thermally-driven flows. Error estimation and adaptivity in finite-element analysis of convective heat transfer are discussed in [27N,28N].

16.7. Application to special problems

A number of papers describe the application of numerical methods (with appropriate enhancements) to problems with special physical or numerical features. Reference [49N] presents a numerical study of flow and heat transfer in a wavy channel. Flow in an annulus with a moving core is analyzed in [48N]. A multigrid method is used to calculate thermocapillary convection [47N]. An analysis is presented in [46N] for the combustion chamber of a diesel engine. Reference [45N] describes a numerical prediction of flow and heat transfer in a welding process. Heat transfer in a baffled channel is calculated in [44N]. A numerical study of combustion of a liquid droplet is given in [43N]. Reference [42N] describes a simulation of premixed flames. Numerical techniques are applied to the creeping flow of a Bingham plastic [41N]. The flow in an impulsively started driven cavity is analyzed in [40N]. Boundary fitted coordinates are used for the calculation of flow in ducts with irregular cross sections [39N]. The flow during the collision of a liquid droplet on a substrate is calculated in [51N]. Finite element modeling is used for the simulation of laser welding [50N]. Particle methods are employed for the numerical solution of the Boltzmann equation [38N].

17. Transport properties

17.1. Transport properties

Contributions in this section range from the basic i.e. the influence of low-energy molecular collisions involving a light collision partner (H2) upon the transport properties of air to a concern with the transport coefficients for specific systems: textile fibers, common building materials, food products and Seebeck effect materials [1P–5P].

17.2. Thermal conductivity and thermal diffusivity

Strikingly different experimental techniques are used to measure thermal properties of diverse systems. The accuracy of thermal conductivity and diffusivity measurements by the parallel wire method is assessed by a model accounting for the probe radius and contact resistance between material and probe [11P]. A laser-induced grating technique determines the diffusivity of aqueous solutions of methanol [18P]. A transient spherical source method measures the thermal conductivity of liquids and gels [12P]. An AC-heated strip (wire) technique obtains thermal properties of ammonium salts in solid and molten states (thiocyanate, formate, acetate, nitrate) [14P]. Using an apparatus based on the flash method, thermal properties for polycrystalline HgS and Sb253 were observed [9P].

A number of papers focus on specific systems using temperature measurements in the system and effective thermal conductivity to express findings. Thus the influence of firing temperature and porosity on thermal conductivity and diffusivity of iron ore pellets are reported [16P]; the effective thermal conductivity of loose particulate systems measured (273–900 K) [6P]; and the findings of a geothermal project in Albania for rock sample thermal conductivity and temperature profiles in selected boreholes of a region [8P].

Other studies consider: the quantities affecting the thermal conductivity of a magnetic fluid [17P]; polishing and honing abrasive and the internal heat transfer process [10P]; polarization and anomalous heat transport in a ferroelectric (MAPCB crystal) [15P] and thermal effects in a high-performance reactor [13P]. A method of determining temperature variable properties of composite materials is validated by comparison with experiment in [7P].

17.3. Diffusion, surface tension, viscosity and radiation properties

The diffusion phenomenon is examined for the very hot electron gas [21P], metal system and semiconductors [19P], and its basic transport expression shown to follow the path of J. Stefan (1871) [24P]. The surface tension of aqueous solutions of lithium bromide containing 1-octanol (simulating heat-pump working fluids) is measured for the first time [20P]. The non-Newtonian behavior of glass melts is considered and four different expressions for representing the gross viscosity effect assessed [25P]. For radiation, properties of cellular ceramics at high temperatures (1200–1400 K) are measured and models are assessed for determining absorptivities for absorbing, emitting and scattering media [22P,23P].

17.4. Thermodynamics

Work here clusters about two themes. The first is the extension and refinement of thermodynamic analysis to include evolving interfaces far from equilibrium [26P], work, heat and material exchange between a discrete system and its environment as derived by field-theoretical methods [27P], transport process theory in semiconductors as viewed by equilibrium and irreversible thermodynamics [29P], the reproduction of linear nonequilibrium thermodynamics within the framework of general relativity for static space-times [31P], and perturbational thermodynamics for coupled electrochemical heat and mass transfer [32P]. The second theme is the optimum performance of models of practical systems: optimum operation of irreversible Carnot heat engines of finite size at maximum power output [28P], optimizing the energy output for an endoreversible Carnot refrigerator [33P], and second law analysis of adsorption cycles with thermal regeneration [30P]. Thermodynamic properties for binary mixtures of R-32/125 are reported based on the Van Der Waals equation of state [34P].

18. Heat transfer applications: heat exchangers and heat pipes

Reported work includes the analysis and experimental test of applications conventional and innovational, utilizing materials and designs which extend and enhance heat transfer performance.

18.1. Heat exchangers

Numerical analysis is employed to determine the performance of perforated plate matrix exchangers, the heat transfer coefficients in a gas fluidized bed and cross-flow heat exchangers [36Q,21Q,35Q,6Q,26Q,38Q]. Heat exchanger networks are modeled for minimum area and total annual cost and for optimal retrofit. Transient operation is considered for a matrix solar air heater and a shell and tube exchanger [16Q,7Q,3Q,11Q]. A number of sharply focused studies investigate: The heat transfer of elastic, nonNewtonian fluids in rectangular ducts, gas (CO2) absorption with wetted flow surfaces, a microporous heat sink for cooling radar systems and exchanger performance in geothermal heating systems [14Q,27Q,24Q,22Q].

Experimental works focus on fluid-to-particle heat transfer under a variety of conditions, low-temperature, helium heat exchangers, and heat exchange in the presence of phase change [4Q,17Q,28Q,32Q,9Q,40Q,20Q,10Q,19Q,18Q]. Yet others report data for exchangers with helical baffles, perforated-plates, propeller driven fluid rotation in double-pipe design, and in conjunction with hot water storage [23Q,31Q,39Q,13Q]. A group of papers provide a general approach and overview of heat exchangers with specific consideration of fundamentals, compact designs, exchanger networks, cost minimization, high-altitude aircraft exchangers, shell-and-tube optimization and trouble shooting, chemical accumulators and the comparative virtues of plate and tubular exchangers [5Q,33Q,37Q,30Q,8Q,12Q,15Q,29Q,2Q,34Q,25Q,1Q].

18.2. Design/materials

The use of aluminum is the common thread linking a number of efforts: Micro heat exchangers using porous layers, brazed shell-and-tube for use with noncorrosive gases and liquids, and automotive exchangers [42Q,55Q,64Q,45Q]. The concern with materials continues with the study of plastic crossflow exchangers for the air–water vapor mixtures, fluoropolymer resins for low cost, high performance exchanger material, the heat transfer behavior between PVC and steel and the electronic packages and semiconductor laser diode array [44Q,63Q,47Q,43Q,57Q].

A significant cluster of works feature phase change as the chief heat transfer design element. The wettability of aluminum plates in an air-to-air heat is evaluated experimentally; the capillary pump loop with phase change is tested for possible use as a space thermal control system; the torque tube heat exchanger for super-conducting generators is analyzed, and the thermal-hydraulic performance for helium-cooled divertors used in large tokamak is optimized [61Q,53Q,58Q,50Q]. Other papers feature bayonet-tube evaporators and condensers in refrigeration practice, a comparison between two approaches to condenser design, a design model for an absorption heat pump rectifier, powerplant generator air-cooler design and exchanger test for structural integrity [54Q,62Q,52Q,46Q,51Q,48Q]. A final group of papers in this area provide general information on heat exchangers, the pinch analysis method including energy factors and exchanger optimization using second law analysis [56Q,59Q,60Q,49Q,41Q].

18.3. Direct contact exchangers/cooling towers

These devices are central in water conservation efforts but also occur in electronic component cooling and air purification activities among others. The cross-flow cooling tower, dominant in process, industrial, and power plant applications for half a century has been joined by a growing number of industrial counterflow towers. Mathematical modeling and computer simulation, and cross to counter-flow repack highlight this emerging application [74Q,68Q,75Q,73Q]. For the thermal design of wet, counterflow and crossflow types of mechanical and natural draught cooling towers a detailed, step by step methodology is given using logical decisions, empirical relations and assumptions. Such efforts in cooling tower design and water treatment have overcome many of the difficulties associated with cooling tower use [71Q,72Q,66Q,76Q,69Q]. Cooling tower efficiency and its relationship to energy conservation and overall building or plant efficiency is described [70Q,65Q], and field tests of heat and mass exchangers with steam-gas mixtures presented [67Q].

18.4. Enhancement

Attempts to enhance heat transfer rest on strikingly different approaches: The use of porous coatings and inserts; surface modification and surfactants; additives, including solid particle suspensions; twisted tape inserts, vortex generators; spiral coils of finned tubes; and spine finning of tubes [97Q–100Q,84Q,90Q,92Q,104Q,77Q,102Q,103Q,79Q]. Also considered are compact and miniature exchangers, the effect of flow character (natural, forced and mixed convection) on heat transfer, and the limited influence of a radiating fin array [87Q,80Q,91Q,89Q,88Q]. Several papers report data for free convection and radiation in horizontal finned tube bundles, three-dimensional plate-fin and tube exchangers, preformed trapezoidal fins for tube-in-fin exchangers effective in low Reynolds number flow, and absorption exchanger performance [96Q,85Q,86Q,81Q,83Q]. A final group of works provide general background information regarding heat transfer enhancement [82Q,94Q,93Q,95Q,101Q,78Q].

18.5. Fouling/deposits/surface effects

For heat exchangers subject to fouling, investigations focus on the fouling mechanism as well as maintenance strategies and fouling assessments [118Q,115Q,106Q,105Q]. Fine particle deposition in compact plate fin exchangers is studied, the thermal resistance in nonuniform fouling of cross-flow exchanger tubes is analyzed, and progress with gas-side fouling of surfaces reviewed [112Q,114Q,111Q,113Q]. Fireside fouling by ash, slag and corrosion is the focus of several papers [108Q,117Q,109Q]; several others center on scale formation and microbiological growth on the water side and leak detection [110Q,107Q,119Q,116Q].

18.6. Reactors — chemical/nuclear

Interest here is directed toward flame support layer geometry and materials on the efficiency of gas radiant burners, the estimation of kinetic and heat transfer parameters for a wall-cooled fixed-bed reactor and the observation of heat transfer in a circulating fluidized-bed combustor [122Q,120Q,121Q].

18.7. Thermosyphons — heat pipes

As understanding and the range of application increases these devices continue to interest investigators and designers. The grooved or finned heat-pipe of disk shape is considered for cooling electronic components as well as other applications [142Q,132Q,141Q,131Q,133Q,128Q]. Additional studies consider pressure and velocity effects for the flat-plate design [129Q,134Q], and the influence of working fluids, container materials, and wick structures on the heat transfer, characterized as effective thermal conductivity of the device [123Q]. Specific consideration is given to the stainless steel/ammonia loop, a model to analyze a liquid-metal heat-pipe start up, the development of a heat-pipe thermal diode, vibration effects on the capillary limit for a copper/water design and transient behavior of the device [140Q,139Q,137Q,130Q,125Q]. The state of our knowledge of the heat-pipe is provided by two papers. One describes the measure of heat transfer performance of an industry standard, wavy plate fin-tube condenser and compares the results with a R22 thermosyphon test rig, analysis revealing excessive fin-tube resistance in the industry standard. Sectioning and microscopic examination confirmed this finding [127Q]. The second describes the use of a double-heat pipe (concentric) to create a large area black body for generating precise spectral irradiance in the red and near-infrared range [138Q]. The device's versatility is further confirmed by its applications in diverse situations: cooling of metal oxide semiconductor thyristors by miniature heat pipes, geothermal use, reciprocating heat pipes under development for engine pistons, and air conditioning in industrial plants [124Q,136Q,135Q,126Q].

18.8. Miscellaneous — thermodynamic analysis/energy conservation/ storage

For condensers, conditions causing pinch points are identified when using zeotropic refrigerant mixtures, methods for calculating shell-side condensation in rod-baffle configurations and the performance of water and air cooled units predicted [157Q,155Q,154Q]. Waste heat recovery is considered for industrial refrigeration plants, metal-hydride heat transformers and waste-to-energy power plants [156Q,149Q,151Q]. A number of analytical studies examine the performance of energy storage concepts [147Q,158Q,153Q,152Q]. A novel conservation concept is applied to turbomachinery analysis, and the performance of irreversible refrigerators, heat pumps, and thermodynamic water pump examined [145Q,143Q,144Q]. A new graphical technique is presented for assessing the integration of utility systems; a work exchanger network is proposed analogous to the existing heat and mass exchanger networks, and a radiator system presented as an alternative to traditional air conditioning [150Q,148Q,146Q].

19. Heat transfer applications: general

19.1. Aeronautics

A study of the cooling of aerospace planes at the stagnation point, leading edges of wings, and engine parts by various gases finds hydrogen as the clear winner [1S]. A new model for the prediction of recombination rates of O and N atoms at silica reentry protection systems is based on realistic surface potentials [5S]. All 4 space shuttle orbiters were instrumented for measurement of heat transfer rates and the results are now compared with previous measurements and analysis [2S]. The fibers in ceramic composites have to be coated to obtain adhesion in reinforced ceramic composites. This was studied in a reaction chamber [3S]. Bolted joints cannot be recommended in satellites [4S]. The design of the cooling system for a lunar base recommends a Rankine cycle for the heat pump [6S]. A thermally controlled test chamber is based on the principle to convect the heat by a layer of cool air away from the chamber [7S].

19.2. Bioengineering

The microvascular system of a tissue is modeled by a quasiporous medium in an equivalent tube. From experimental results it is concluded that venovenous perfusion can predictably induce hyperthermia [18S]. An inverse method is used to optimize heating conditions in RF-capacitive hyperthermia [17S].

Water transport in meat was studied in an oven at 175C showing that water moves initially toward the center but reverses its direction when the center has reached about 70C [16S]. The heating process in laser heating induced thrombosis of microvessels was predicted by a simple heat transfer model [14S], also the temperature drop and weight loss during meat chilling [8S]. Theoretical and experimental aspects of freeze drying of dairy biomaterials are discussed [13S]. An analysis of freeze drying is based on a model considering a uniformly retreating ice front in a body of spherical geometry [11S]. A model for the study of heat transfer in tissues is developed and tested using a counter-current network [9S]. A new algorithm for identifying the temperature and space dependent conductivity, blood perfusion rate, metabolic rate, and thermal diffusibility is proposed and tested [10S].

A new technique for the production of high purity polymers for biomedical purposes is developed and tested by experiments [15S]. A mathematical model for the cooking of cocktail shrimp describes the heat transfer and microbial inactivation kinetics in agreement with experimental data [12S].

19.3. Digital data processing/electronics

The first paper in this section offers an overview of cooling technology of electronic systems, characterizing the fan performance and the systems impedance (pressure drop) in the laminar and turbulent flow regimes [19S]. Heat is removed from the printed circuit board to a cooled metal plate (copper, aluminum, molybdenum or alloy) with channels for liquid or air coolant flow [21S]. Attempts to predict the temperature and stress field are made difficult by the involved geometry and length and time scales occurring [22S]. Graphite fiber reinforced aluminum and copper are considered for module frames providing support and heat sinks. The thermal conductivities are measured [20S].

19.4. Energy

A new model for predicting heat transfer in the rotary combustion engine was formulated [33S]. Combustion technology for gas turbines is reviewed [27S]. A calculation method addresses the temperature distribution in turbine blades [29S]. Heat transfer measurements are reported for endwalls and guide vanes of turbine blades [37S]. Recent modeling of low emission gas turbine combustors includes finite rate chemistry and turbulence [28S].

The radiant efficiency of 4 gas burners was evaluated based on spectral radiosity measurements [38S].

A model based on conservation equations serves to evaluate the effectiveness of dry-cooling systems [26S].

A paper reviews implementation of combined heat and power systems [34S]. The pressure response of a water wall containment cooling system was evaluated experimentally [31S]. A new system of this type is described [30S]. The boiloff pattern in the high pressure core was observed following a small break loss of coolant accident [35S]. The operation of an isolation condenser submerged in a large water pool was observed and evaluated [32S].

The pressure rise and boiling process of the thermofluid ITER in a Tokamak plant during a transient accident is studied experimentally [39S]. The screw tube is compared in its action with the swirl tube for the cooling of experimental fusion machines [23S].

The oil heating requirements of floating storage vessels for crude oil are studied [25S]. Phase change thermal energy storage using spherical capsules is studied for refrigeration and air conditioning [24S]. Experimental research studied a 5 mm diameter coaxial pulse tube made of nylon used for a refrigerator [40S].

The thermal resistance of a ball bearing and heat transfer by conduction, convection and radiation is analyzed by computation [36S].

19.5. Environment

The LEK diagram is described as a means to predict overall heat transfer coefficients for building envelopes [45S]. Composite absorbents have better heat transfer characteristics than granular packed beds for heat pump applications [46S]. Thermal testing results are reported for fiber-reinforced plastic building envelopes [41S]. Several correlations describing convection heat transfer for interpane window cavities are examined and their backgrounds discussed [51S]. Experiments studied the insulating behavior of layers of textiles under wind assualt [42S]. Overall heat transfer coefficients of existing wall systems in Turkey were measured. It was found that insulation of the external wall would reduce heating demand by fifty percent [43S]. Plate heat transfer technology can handle all hot fluid demands of hotels and prisons [50S].

The use of the ground as heat source for heat pumps was studied by computer simulation [44S]. The thermal environment of a wellbore is required for a thermal wellbore analysis [48S]. Available software and publications for ground source heating, ventilation and air conditioning are discussed [47S].

Artificial circulation of water can influence average lake temperature [49S]. Environmentally friendly polymer additives to halogenated flame retardants are explored [52S].

19.6. Manufacturing

A large number of papers was again published on castings. Programs for development of models [77S] for continuing casting, strain analysis [56S], mold powders [53S, 54S], simulations of solidification [65S], surface crack formation [79S,80S], process time reduction [66S], cooling [55S], thin strip casting [67S], steel flow and heat transfer [73S] are available.

Three inverse methods estimate heat flux and convection distribution in a work piece subjected to grinding [62S,63S]. Partitioning of heat between two sliding bodies determines grinding process [74S]. Critical factors for thermal damage [75S] are compared for the cutting process [76S].

Analysis considers conditions for metal weld cracking [61S] as well as micropore formation in spray deposition [59S]. The cooling process is investigated for strip cooling [64S] for castings [72S] and for clinkers [58S].

Finite element analysis is applied to machining [68S,70S].

Heat transfer and fluid flow are studied for extruder processing of polymers [57S], for microwave heating of polymers [69S]. The thermal conductivity and contact conductance have been measured in the range 10°C–100°C [71S].

The heat effect in sorption of organic vapors in rubbery polymers is studied experimentally and analytically [78S]. A new technique studies nonisothermal crystallization of polymers at high cooling rates [60S].

19.7. Processing

The study of the heat transfer processes by computer analysis or experiments is extended to more and more manufacturing processes.

A new method is proposed for calorimetry of stirred tank reactors [105S]. Thermophoretic vapor deposition [106S], injection molding [96S], dendritic growth in solidification [86S], and heat transfer in flowing polymers [94S] were studied. Thermophoresis can decrease particle transfer in a laminar boundary layer by two orders of magnitude [83S]. Russian developed aerodynamic furnaces [104S], process safety [88S] are discussed. Calculations of flame impingement heat transfer are compared with experiments [81S]. Laser heating of engineering materials [107S,108S] and of particles [99S] found attention. Platelet growth is a desirable means for crystal growth [98S,91S]. Simple models can describe the process in furnaces [103S] and rotary kilns [82S]. Experiments carried out at the International Flame Research Foundation [95S] clarified the effect of fuel/air mixing on Nox reduction. Heat transfer was studied in strip rolling [100S], in rotating roll [84S], and in a cement rotary kiln [87S]. Theory and experiments clarify heat transfer at thermoplastic sheet formation [93S].

The drying process is optimized for batch dryers [90S]. The temperature distribution is estimated based on experiments in sterilization and cooling of canned products [85S]. A polypropylene particle was suspended in a high temperature oil bath to measure the overall heat transfer coefficient with end-over-end rotation [102S]. Heat transfer and thermal stress formation are formulated for continuous quenching of aluminum plates [101S]. Drying-induced stress is reviewed for elastic, viscous, and viscoelastic materials [89S]. Effects of variable properties and viscous dissipation is considered for optical fiber drawing of fused silica [92S]. The heat load in a mine ventilation network is simulated for various geothermal parameters [97S].

20. Solar energy

Reviewed papers include research on solar thermal technologies, resource assessment and use of renewable energy and energy conservation in buildings. Papers that do not address heat transfer issues, for example, papers dealing specifically with photovoltaics or wind energy, are not included.

20.1. Radiation characteristics and related effects

The majority of the published research concerns methods to improve predictions of solar radiation. Interpretation of satellite images are discussed by [2T,4T]. Models include a statistical regression to predict daily radiation in locations or during periods of time for which measured data are not available [1T], a physically based model of the radiative balance over snow [3T], use of monthly average values to predict hourly values [8T], and a new algorithm to determine the integral Rayleigh optical thickness [5T]. A comparison of models of diffuse radiation for prediction of total radiation on tilted surfaces is presented by [9T]. Site specific date are an inventory of heat fluxes from residential and industrial sections of Lodz, Poland [6T]. A new optical method to measure directional spectral emissivity and surface temperature is used in a high flux solar furnace [7T].

20.2. Nonconcentrating collectors

The maturity of the field of nonconcentrating solar collectors has resulted in a continuing decrease in the number of papers on this topic. Analytical studies address solar gain and heat storage characteristics of a collector constructed of soil/sand/concrete [10T], comparison of predicted and measured gas conduction in an evacuated tube solar collector [11T], optimization of flat-plate air collectors [12T], characterization of natural convection in a corrugated enclosure [13T], and a model for estimating the thermal resistance of the absorber/coolant in systems using advanced heat transfer mediums [14T]. Experimental data are presented for a pentane-based collector intended for solar thermal water pumping [15T]. Measurements of storage tank temperature are used to estimate collector optical and heat loss characteristics for a water heating system [16T].

20.3. Concentrating collectors and systems

The topics considered are divided into two categories: concentrator/reflectors and receivers. In the area of concentrators, [22T] presents experimental data showing that a solar concentration of 50,000 is possible with a dielectric, nonimaging concentrator. A two stage concentrator with on-axis tracking intended for use with high efficiency solar cells achieves concentrations as high as 300 [17T]. [26T] describes a focusing concentrator that uses two reflecting troughs. He compares performance of this design to that of conventional parabolic toughs. [21T] shows how tailored edge-ray concentrators in two-stage solar collectors can be constructed using a simple method of strings. Modeling of thermal and optical behavior of line-axis concentrating collectors is discussed in terms of modifications in geometry [19T]. Surface characterization of parabolic reflecting surfaces using close range photogrammetry is demonstrated [27T].

Work on receivers addresses the suitability of modeling arrays as a homogeneous medium [25T], refinement of an analytical technique for the prediction of flux distribution on receiver surfaces [20T], modeling of flow in volumetric receivers [24T], heat transfer through gases at low pressures [18T], and analysis of radiation and conduction through honeycomb-cored panels for use in a space based power system [23T].

20.4. Buildings

Energy conservation in buildings continues to attract significant research on materials and simulation models. Papers that relate primarily to fenestration include design charts for appropriate selection of multiple glazed windows in terms of thermal, sound, daylight and solar transmission [43T], models of solar heat gain in windows with a venetian blind inside double glazing [39T,40T], effect of glazing shape on energy consumption in a commercial building [38T], and modeling of solar gain through windows for three sites in Jordan [46T].

Studies associated with the building envelope include modeling of radiation and conduction across transparent honeycomb insulation [29T], development of simple algorithms to predict energy savings of transparent insulation [35T], an experimental study to evaluate the impact of various radiant barrier systems on cooling loads [28T], experimental characterization of energy consumption due to infiltration [32T], use of the overall transfer value to predict heat gain through external walls and roofs of large buildings [30T], a review of the interaction between environment and damage of concrete [44T], and transient modeling of vertical temperature distributions in an atrium [47T]. More applied studies are experimental comparison of five protected membrane roofs installed between 1981 and 1992 [36T], simulation of heat exchange through structural panels commonly used in refrigerating storage [34T], a model of the heat transfer from cattle useful for the design of livestock buildings [33T], determination of heat demand in public baths [49T], assessment of occupancy patterns on solar heating contribution of roof space solar energy collectors [41T], discussion of use of the roof as a solar collector [45T,48T], comparison of three thermal simulation programs) ESP, HTB2 and SERIRES) for a range of passive designs used in the UK. [42T], and minimization of heating and ventilation costs in greenhouses [37T]. [31T] assess the impact of using different weather files on building energy use predicted by BLAST.

20.5. Water and space heating

Characterization of the effect of various off-peak and water use schedules on thermal efficiency of electric water heaters is intended to allow comparison of water heating technologies (including solar) for reduction of peak electrical demand [52T]. [51T] compares use of various renewable sources for integration with residential heat pumps in Poland. [50T] models heat transfer from finned surfaces in a thermal storage tank.

20.6. Cooling and refrigeration

[53T] presents and analytical solution for the effect of air on heat and mass transfer rates during absorption of water vapor from a film of lithium bromide flowing down a vertical wall. The heat exchangers in 20-ton lithium bromide/water absorption cooling system were optimized in terms of system cost [56T]. In related papers, the effects of various operating and design parameters on solar fraction are modeled [57T,58T].

Thermodynamic optimization of solar-driven refrigerators is presented by [55T]. Limited experimental data on a carbon–ammonia refrigerator driven by a thermosyphon heat pipe are presented along with plans to develop a solar ice maker [54T].

20.7. Storage

Papers that address the use of storage as part of a system are discussed by application in the appropriate section. See, for example papers [84T,89T,92T] in the section on power generation, and Ref. [50T] in the water and space heating section.

[59T] suggests that exergy efficiency is the most appropriate value to determine storage efficiency. The paper evaluates variable and constant temperature systems. [62T] examines entropy production in a cylindrical sensible heat storage system. [60T] considers irreversibilities of a latent heat storage module with a cylindrical shell surrounding a coaxial tube. A two-dimensional model of melting in a rectangular enclosure heated from one side shows heat transfer is dominated by convection [61T]. [63T]'s numerical model of latent heat storage placed in the ground indicates that thermal performance is dominated by thermal diffusivity of the phase-change material. [64T] predicts the performance of a thermal storage system in which pipes with brine flowing inside are sequentially charged and discharged. The model focuses on the formation of ice and liquid on the outside of the pipes.

20.8. Stills and desalination

A new desalination process that dehumidifies air by pervaporation through hydrophilic or microporous hydrophobic hollow fibers and then dehumidifies with cooling water is investigated in a 6 liter/hour pilot plant. Solar energy is suggested as one possible heat source for the hot water that passes through the hollow fibers in the recycled air-sweep pervaporation process [65T].

The majority of papers on solar stills present models to predict effects of various design parameters on performance of traditional designs. [66T] considers the effect of evaporation area on distillation yield. Analysis of the effects of inlet water temperature and flow rate on heat and mass transfer is presented by [67T]. A series of papers model the effects of glass cover inclination [68T,71T], water flow rate over the glass cover [72T], and collector area in a system with a collector and heat exchanger [70T]. Comparison of temperatures and heat and mass transfer rates in solar stills and solar evaporators shows that evaporation in stills is much less than that in open evaporation [69T]. [73T] considers coating the transparent cover plate with SnO_2. [74T] applies a simple empirical model to show the suitability of using solar stills to provide drinking water in Iran.

20.9. Ponds

A one-dimensional model of a closed-cycle salt gradient pond is used to investigate methods of salt cycling. Results indicate seasonal surface flushing is the most desirable [75T]. Models of mixing and entrainment due to an injecting diffuser are presented to analyze a new gradient maintenance technique for salt-gradient ponds [76T]. Stability analysis of layers with adverse temperature gradients is used to model ponds where the salt concentration gradients is intended to prevent convective mixing induced by absorption of solar radiation [77T]. Enhancement of storage in the ground beneath solar ponds predicts as much as a 36% reduction in salt requirement [78T]. [79T] presents field tests of a nonsalt pond for greenhouse heating.

20.10. Cooking and drying

The two papers in this study present preliminary test data for a prototype V-groove back-pass solar air collector intended for drying [81T] and a coconut oil flat-plate collector for solar cooking [80T].

20.11. Solar chemistry

[82T] present experimental data of demonstration of photocatalytic oxidation with titanium dioxide of wastewater from 5-fluorouracil manufacturing. The addition of hydrogen peroxide increased reaction rates. At UV intensities as low as 15 W/m^2 decolorization rate remained high. Destruction of organic compounds in water was studied using titanium dioxide supported on silica gel. Both model and experiments are presented [83T].

20.12. Power generation and industrial applications

This diverse group of papers address sensible heat storage in conjunction with dish-Stirling systems [89T], thermoelectric generation [85T], direct steam generation in parabolic trough power plants [88T], combined power generation and desalination in an OTEC plant [91T], use of seawater as the working fluid in a regenerative-reheat cycle [90T], Kalina absorption power cycles [86T], metal hydride hydrogen storage in hydrogen energy systems [92T], control of solar process heat plants [87T], and heat storage of magnesium nickel hydride used for recovering waste heat [84T].

21. Plasma heat transfer and magnetohydrodynamics

21.1. Plasma characterization

A thermodynamic description of an atmospheric pressure nonequilibrium plasma in supersonic nozzle flow is presented by Chen and Eddy [1U]. Thermodynamic relations are extended to include deviations from composition equilibrium without going through a full scale chemical kinetics calculation, and the results are presented in the form of multi-dimensional graphs. The influence of tungsten vapor on the thermodynamic and transport properties of an SF6 plasma is presented by Chervy [2U] in the form of results of property calculations, and the conclusion is reached that below a molar concentration of 10% only the electrical conductivity is affected. Tsintsadze et al. [9U] present a theory of a plasma in equilibrium with a blackbody radiation field. The interaction of an electric arc with a transverse magnetic field is described by Speckhofer and Schmidt [8U] using experimental and theoretical results, including a time dependent simulation of arc instabilities at large magnetic fields. A description of a microwave generated nonequilibrium hydrogen plasma uses a three-temperature thermochemical model, and this model is applied to a diamond deposition reactor [7U]. Several studies concern themselves with description of plasmas in arcjet thruster configurations. Megli et al. [3U] use a two-temperature model with the composition calculated with a chemical kinetics approach, with the results demonstrating the expected strong deviations from equilibrium for the case of a N2/H2 arcjet. A similar calculation is presented for a hydrogen arcjet in [5U] with a somewhat different numerical approach. The erosion of the cathode of a magneto-plasma dynamic thruster has been modeled using a finite element algorithm [4U]. An experimental study using mass spectrometry and optical spectroscopy in a low pressure plasma jet has been used to characterize the conditions which are expected during entry into the atmosphere of Mars or Titan [6U]. In a review article, Zhukov proposes a classification method for plasma torches and describes various applications of the torches [10U].

21.2. Laser–plasma interaction

A self-consistent model of the absorption profile of an ultrashort laser pulse by a high density plasma is given by Rozmus et al. [12U]. The interaction between a laser pulse and the plasma in front of a solid is simulated by Mazhukin et al. [11U].

21.3. Applications

A number of publications deal with describing plasmas under conditions and in configurations for specific applications. The plasma heating of a tundish is simulated by modeling a steam jet impinging on water [13U]. The problem of increasing the plasma generator power in a ladle furnace is addressed by Neuschuetz and Stueber [25U], and the result shows that addition of up to 40% CO_2 to the argon as plasma gas will significantly increase power dissipation and heating rate while adding only an insignificant amount of oxygen take-up by the metal. Two papers deal with plasma cutting issues, one describing a model for the heat flux distribution in the work piece [21U], the other modeling the movement of the liquid metal inside the cut, indicating a reduced heat transfer rate after formation of the liquid metal layer [24U]. Two papers deal with arc welding, one describing results of a simulation of the heat transfer and fluid flow for different arc currents, electrode geometries and arc lengths [16U], the other showing results for a new method of underwater welding using gas shielding to reduce the arc pressure [15U].

Three papers are concerned with the plasma–particle interaction in plasma spray applications, two describing the particle heating and trajectories in d.c. spray jets [27U,19U], and the third one analyzing the heat transfer and fluid flow in a d.c.–r.f. hybrid reactor [23U]. Plasma treatment of titanium carbide powders is described in two publications by the same group of authors, one presenting a study of the influence of the particle injection on the r.f. plasma [29U], the other concentrating on the evaluation of the morphology and composition of the powders in the experiments [18U]. Synthesis of WC-Co powders in an argon-hydrogen plasma with acetylene as carbon source is described by Fan et al. [17U], and the need for hydrogen for improving the heat transfer and avoiding formation of carbon particulates is pointed out.

Two papers are concerned with the plasma surface hardening process of steel, one using a finite element model for describing the thermal diffusion of the nitrogen in the solid [26U], the other presenting some experimental results to verify the model predictions [20U].

Plasma heat transfer in the processing of microelectronic components is the subject of two papers, one describing the measured temperature rise of a multilayer structure on a silicon substrate exposed to a low pressure argon-hydrogen plasma [22U], the other presenting a model for wafer heating during etching as a function of ion flux to the surface, helium cooling of the backside, and different wafer clamping arrangements [28U]. A model for the heat dissipation in plasma based ozone generators and its influence on the ozone generation efficiency is presented by Bes et al. [14U].

21.4. Magnetohydrodynamics

MHD continues to provide interesting problems for numerical model solutions, although majority of the publications treat applications other than MHD power generation. An analysis of the thermal efficiency of a MHD generator based on optimal power density and including component inefficiencies is given by Sahin et al. [40U]. Several papers deal with the influence of a magnetic field perpendicular to a free convection flow field of an electrically conducting fluid with different configurations: along a semi-infinite vertical plate with radiation heat transfer included [41U], inside a cubic enclosure [39U], from a horizontal cylinder with forced convection included [31U], for the same configuration but with the cylinder inside a porous medium [30U], from a cone and a wedge inside a porous medium [36U], within a shallow porous cavity [34U], and within an inclined rectangular porous cavity [35U]. In general, results are obtained for different boundary conditions and/or for different values of the governing dimensionless parameters, e.g. Hartmann number and Rayleigh number.

Further modeling results include configurations of MHD flow between two infinitely long, insulated parallel plates with one plate moving and the other stationary [32U], and past a continuously moving porous plate with a similarity transformation for investigating the effect of suction or injection, and magnetic field on heat transfer and skin friction [37U]. The effects of a combination of rotation and translation of a rotating disk on the MHD flow of an electrically conducting, compressible viscous fluid are described in [33U]. Hung et al. find that the instabilities in a MHD flow of a condensate film along a vertical plate with constant heat flux can be reduced by the applied magnetic field [38U].

Acknowledgements

The authors would like to thank Mr. Karl Geisler and Mr. Vinod Srinivasan for their invaluable help in preparing this review.

References

Conduction: contact conduction/contact resistance

[1A] J. Deng, G. Pagliarini, S. Salvigni, Error in lumped parameter analysis of heat flow rate through extended surfaces accounting for thermal contact resistance, Journal of Enhanced Heat Transfer 4 (1) (1996) 7.

[2A] E.E. Marotta, D.G. Blanchard, L.S. Fletcher, Thermal contact conductance of diamond-like films, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 19.

[3A] E.E. Marotta, L.S. Fletcher, Thermal contact conductance of refractory ceramic coatings, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 10.

[4A] F.N. Masana, Closed form solution of junction to substrate thermal resistance in semiconductor chips, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (4) (1996) 539.

[5A] M.R. Sridhar, M.M. Yovanovich, Elastoplastic contact conductance model for isotropic conforming rough surfaces and comparison with experiments, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 3.

[6A] M.R. Sridhar, M.M. Yovanovich, Thermal contact conductance of tool steel and comparison with model, International Journal of Heat and Mass Transfer 39 (4) (1996) 831.

[7A] A.A. Tseng, S.R. Wang, Effects of interface resistance on heat transfer in steel cold rolling, Steel Research 67 (2) (1996) 44.

Conduction: composite and heterogeneous media

[8A] I. Andrianov, V. Danishevskyi, S. Tokarzewski, Two-point quasifractional approximants for effective conductivity of a simple cubic lattice of spheres, International Journal of Heat and Mass Transfer 39 (11) (1996) 2349.

[9A] C. Argento, D. Bouvard, Modeling the effective thermal conductivity of random packing of spheres through densification, International Journal of Heat and Mass Transfer 39 (7) (1996) 1343.

[10A] R.C. Costen, J.M. Marchello, High productivity model for in-situ tow placement of thermoplastic composites, International SAMPE Symposium and Exhibition 41 (2) (1996) 1346.

[11A] J.D. Farmer, E.E. Covert, Thermal conductivity of a thermosetting advanced composite during its cure, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 467.

[12A] J.M. Gurgel, R.P. Kluppel, Thermal conductivity of hydrated silica-gel, Chemical Engineering Journal and the Biochemical Engineering Journal 61 (2) (1996) 133.

[13A] J.H. Huang, On the thermoelastic field in a composite material with inhomogeneities, Journal of Thermoplastic Composite Materials 9 (3) (1996) 246.

[14A] Y. Itoh, M. Takahashi, H. Takano, Design of tungsten/copper graded composite for high heat flux components, Fusion Engineering and Design 31 (4) (1996) 279.

[15A] S.M. Moschiar, M.M. Reboredo, J.M. Kenny, A. Vazquez, Analysis of pultrusion processing of composites of unsaturated polyester resin with glass fibers, Polymer Composites 17 (3) (1996) 478.

[16A] S.M. Moschiar, M.M. Reboredo, H. Larrondo, A. Vazquez, Pultrusion of epoxy matrix composites: pulling force model and thermal stress analysis, Polymer Composites 17 (6) (1996) 850.

[17A] B.A. Peavy, Heat transfer note on temperature dependent thermal conductivity, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 76.

[18A] T. Roussos, Optimization of multilayer high temperature thermal insulation, Industrial Heating 63 (6) (1996) 60.

[19A] L. Yang, D.H. Osborne, R.F. Haglund, R.H. Magruder, C.W. White, R.A. Zuhr, H. Hosono, Probing interface properties of nanocomposites by third-order nonlinear optics, Applied Physics A: Materials Science and Processing 62 (5) (1996) 403.

Conduction: thermal waves, laser and pulse heating applications

[20A] P. Baeri, E. Rimini, Laser annealing of silicon, Materials Chemistry and Physics 46 (23) (1996) 169.

[21A] A. Barletta, Hyperbolic propagation of an axisymmetric thermal signal in an infinite solid medium, International Journal of Heat and Mass Transfer 39 (15) (1996) 3261.

[22A] A. Barletta, E. Zanchini, Hyperbolic heat conduction and thermal resonances in a cylindrical solid carrying a steady-periodic electric field, International Journal of Heat and Mass Transfer 39 (6) (1996) 1307.

[23A] W. Bloehs, B. Gruenenwald, F. Dausinger, H. Huegel, Recent progress in laser surface treatment: I. Implications of laser wavelength, Journal of Laser Applications 8 (1) (1996) 15.

[24A] J. Marciak-Kozlowska, M. Kozlowski, Thermal inertia of materials heated with a laser pulse faster than relaxation time, International Journal of Thermophysics 17 (5) (1996) 1099.

[25A] J. Marciak-Kozlowska, M. Kozlowski, Velocity of thermal waves generated by femtosecond laser pulses in nanometer thick gold films, Lasers in Engineering 5 (1) (1996) 51.

[26A] W. Pitscheneder, T. DebRoy, K. Mundra, R. Ebner, Role of sulfur and processing variables on the temporal evolution of weld pool geometry during multikilowatt

laser beam welding of steels, Welding Journal 75 (3) (1996) 71s.
[27A] J.C. Roberts, M.H. Luesse, T.C. Magee, Technique for locally increasing surface heat spreading and through-thickness thermal conductivity of graphite/epoxy laminates, Journal of Composite Materials 30 (2) (1996) 231.
[28A] D.W. Tang, N. Araki, Analytical solution of nonFourier temperature response in a finite medium under laser-pulse heating, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 359.
[29A] D.W. Tang, N. Araki, Non-Fourier heat conduction in a finite medium under periodic surface thermal disturbance, International Journal of Heat and Mass Transfer 39 (8) (1996) 1585.
[30A] D.W. Tang, N. Araki, Non-Fourier heat conduction in a finite medium under periodic surface thermal disturbance — II. Another form of solution, International Journal of Heat and Mass Transfer 39 (15) (1996) 3305.
[31A] D.W. Tang, N. Araki, Wave characteristics of thermal conduction in metallic films irradiated by ultra-short laser pulses, Journal of Physics D—Applied Physics 29 (10) (1996) 2527.
[32A] B.S. Yilbas, M. Sami, A.K. Kar, A.Z. Sahin, First- and second-law efficiencies for laser drilling of stainless steel, Energy 21 (3) (1996) 197.
[33A] S.M. Zubair, M.A. Chaudhry, Heat conduction in a semi-infinite solid due to time-dependent laser source, International Journal of Heat and Mass Transfer 39 (14) (1996) 3067.

Conduction: heat conduction in fins, tubes, solids and different geometries

[34A] A. Aziz, A.D. Kraus, Optimum design of radiating and convecting-radiating fins, Heat Transfer Engineering 17 (3) (1996) 44.
[35A] A. Campo, A.O. Nieckele, Heat removal from tubes with externally, longitudinal fins: distributed and lumped models, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 378.
[36A] A. Campo, A. Salazar, Matching solutions for unsteady conduction in simple bodies with surface heat fluxes, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 699.
[37A] L.M. Chamra, R.L. Webb, M.R. Randlett, Advanced micro-fin tubes for evaporation, International Journal of Heat and Mass Transfer 39 (9) (1996) 1827.
[38A] C.-H. Chen, J.-S. Chiou, Periodic heat transfer in a vertical plate fin cooled by a forced convective flow, International Journal of Heat and Mass Transfer 39 (2) (1996) 429.
[39A] S.P. Kearney, A.M. Jacobi, Local convective behavior and fin efficiency in shallow banks of in-line and staggered, annularly finned tubes, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 317.
[40A] M.A. Kedzierski, M.S. Kim, Single-phase heat transfer and pressure drop characteristics of an integral-spine fin within an annulus, Journal of Enhanced Heat Transfer 3 (3) (1996) 201.
[41A] K. Laor, H. Kalman, Performance and optimum dimensions of different cooling fins with a temperature-dependent heat transfer coefficient, International Journal of Heat and Mass Transfer 39 (9) (1996) 1993.
[42A] R. Matsumoto, S. Kikkawa, M. Senda, Effect of pin fin arrangement on endwall heat transfer, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1953.
[43A] C.O. Olsson, B. Sunden, Heat transfer and pressure drop characteristics of ten radiator tubes, International Journal of Heat and Mass Transfer 39 (15) (1996) 3211.
[44A] N. Onur, Simplified approach to the transient conduction in a two-dimensional fin, International Communications in Heat and Mass Transfer 23 (2) (1996) 225.
[45A] B.S.V. Prasad, Fin efficiency and mechanisms of heat exchange through fins in multi-stream plate-fin heat exchangers: formulation, International Journal of Heat and Mass Transfer 39 (2) (1996) 419.
[46A] H. Shaukatullah, W.R. Storr, B.J. Hansen, M.A. Gaynes, Design and optimization of pin fin heat sinks for low velocity applications, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (4) (1996) 486.
[47A] C.-C. Wang, Y.-J. Chang, Y.-C. Hsieh, Y.-T. Lin, Sensible heat and friction characteristics of plate fin-and-tube heat exchangers having plane fins, International Journal of Refrigeration—Revue Internationale du Froid 19 (4) (1996) 223.
[48A] C.C. Wang, P.Y. Chen, J.Y. Jang, Heat transfer and friction characteristics of convex-louver fin-and-tube heat exchangers, Experimental Heat Transfer 9 (1) (1996) 61.
[49A] A.S. Wood, G.E. Tupholme, M.I.H. Bhatti, P.J. Heggs, Performance indicators for steady-state heat transfer through fin assemblies, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 310.
[50A] S.-S. Wu, C.-L. Shiu, W.-J. Wu, Analysis on transient heat transfer in annular fins of various shapes with their bases subjected to a heat flux varying as a sinusoidal time function, Computers and Structures 61 (4) (1996) 725.
[51A] X. Yang, H. He, Periodic heat transfer in the fins with variable thermal parameters, Applied Mathematics and Mechanics (English Edition) 17 (2) (1996) 169.
[52A] R.-H. Yeh, Optimum dimensions of longitudinal rectangular fins and cylindrical pin fins with variable heat transfer coefficient, Canadian Journal of Chemical Engineering 74 (1) (1996) 144.
[53A] S.M. Zubair, A.Z. Al-Garni, J.S. Nizami, Optimal dimensions of circular fins with variables profile and temperature-dependent thermal conductivity, International Journal of Heat and Mass Transfer 39 (16) (1996) 3431.

Conduction: mathematical models, simulations and/or experimental results

[54A] J. Alvarez, F. Sobron, S. Bolado, Solution for heat flow in soil with a heat source at a fixed depth, Soil Science Society of America Journal 60 (4) (1996) 1028.
[55A] R.P. Batycky, H. Brenner, On the need for fictitious initial conditions in effective medium theories of transient

nonconservative transport phenomena. Some elementary unsteady-state heat conduction examples, Chemical Engineering Communications 1996 (1996) 173.

[56A] G. Cannistra, S.M. Labini, Finite element analysis of the thermal field in the rotor during induction motor start-up, Numerical Heat Transfer Part A—Applications 29 (5) (1996) 525.

[57A] H.-T. Chen, S.-M. Chang, Numerical simulation for conjugate problem of natural convection on both sides of a vertical wall, International Journal of Heat and Mass Transfer 39 (2) (1996) 383.

[58A] G. Comini, M. Malisan, M. Manzan, Accuracy comparison of control-volume and Bubnov–Galerkin finite-element methods for heat conduction problems, Numerical Heat Transfer Part B—Fundamentals 29 (1) (1996) 43.

[59A] M.G. Davies, Time-domain estimation of wall conduction transfer function coefficients, ASHRAE Transactions 102 (1) (1996) 328.

[60A] J.J. De Saegher, T. Detemmerman, G.F. Froment, Three dimensional simulation of high severity internally finned cracking coils for olefins production, Revue de l'Institut Francais du Petrole 51 (2) (1996) 245.

[61A] A.A. Dehghan, M. Behnia, Numerical investigation of natural convection in a vertical slot with two heat source elements, International Journal of Heat and Fluid Flow 17 (5) (1996) 474.

[62A] Y. Dong, K.A. Tagavi, T.W. Wu, L.C. Chow, Numerical modeling of void migration in solids due to temperature gradient using the boundary element method, Numerical Heat Transfer Part A—Applications 30 (4) (1996) 365.

[63A] D. Eriksson, B. Sunden, Numerical investigation of the transient conduction in a rotating cylindrical shell exposed to an incident time varying heat flux, International Journal of Numerical Methods for Heat and Fluid Flow 6 (6) (1996) 25.

[64A] A.S. Franca, K. Haghighi, Adaptive finite element analysis of microwave driven convection, International Communications in Heat and Mass Transfer 23 (2) (1996) 177.

[65A] D. Frayce, R.E. Khayat, A. Derdouri, Dual reciprocity boundary element approach to three-dimensional transient heat conduction as applied to materials processing, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 243.

[66A] T. Goto, M. Suzuki, Boundary integral equation method for nonlinear heat conduction problems with temperature-dependent material properties, International Journal of Heat and Mass Transfer 39 (4) (1996) 823.

[67A] S. Graff, A.D. Snider, Mathematical analysis of the length-of-arc assumption, Heat Transfer Engineering 17 (2) (1996) 67.

[68A] Y.N. Jeng, Z.-S. Lee, Revisit to the modified multiple one-dimensional adaptive grid method, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 305.

[69A] C.-C. Ji, H.-Y. Jang, Recursive least squares algorithm for estimation of heat source, Numerical Heat Transfer Part A—Applications 30 (6) (1996) 619.

[70A] N. Kamiya, Y. Aikawa, K. Kawaguchi, Extension of the adaptive boundary element scheme for the problem with mixed boundary conditions, Structural Engineering and Mechanics 4 (2) (1996) 191.

[71A] N. Koizumi, Y. Takahashi, H. Tsuji, Numerical model using an implicit finite difference algorithm for stability simulation of a cable-in-conduit superconductor, Cryogenics 36 (9) (1996) 649.

[72A] D. Lesnic, L. Elliott, D.B. Ingham, Application of the boundary element method to inverse heat conduction problems, International Journal of Heat and Mass Transfer 39 (7) (1996) 1503.

[73A] Y.C. Li, Approximate analytical solutions for diffusion problems in unbounded media and their application in infinite elements, International Journal of Numerical Methods for Heat and Fluid Flow 6 (7) (1996) 63.

[74A] H.-W. Lin, L.-D. Chen, Application of the Krylov subspace method to numerical heat transfer, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 249.

[75A] Z.C. Lin, C.C. Shen, Three-dimensional finite element method for a nonisothermal aluminum flat strip rolling process, Journal of Materials Engineering and Performance 5 (4) (1996) 452.

[76A] D. Lindeman, Steady-state current conduction analysis featuring electrochemical kinetics, Finite Elements in Analysis and Design 22 (3) (1996) 187.

[77A] L. Malinowski, Relaxation heat conduction and generation: an analysis of the semi-infinite body case by method of Laplace transforms, International Journal of Heat and Mass Transfer 39 (7) (1996) 1543.

[78A] A. Mezin, J. Lepage, P.B. Abel, Analytical solution for nonsteady-state diffusion through thin films, Thin Solid Films 272 (1) (1996) 124.

[79A] M.D. Mikhailov, R.M. Cotta, Ordering rules for double and triple eigenseries in the solution of multidimensional heat and fluid flow problems, International Communications in Heat and Mass Transfer 23 (2) (1996) 299.

[80A] P. Misharev, A. Kossoy, A. Benin, Methodology and software for numerical simulation of thermal explosion, Process Safety and Environmental Protection 74 (1) (1996) 17.

[81A] G.F. Naterer, Conduction shape factors of long polygonal fibers in a matrix, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 721.

[82A] A. Ould El Moctar, H. Peerhossaini, J.P. Bardon, Numerical and experimental investigation of direct electric conduction in a channel flow, International Journal of Heat and Mass Transfer 39 (5) (1996) 975.

[83A] T. Ouyang, K.K. Tamma, Finite element simulations involving simultaneous multiple interface fronts in phase change problems, International Journal of Heat and Mass Transfer 39 (8) (1996) 1711.

[84A] J. Pakanen, Conduction of heat through one- and multilayer slabs: a differential-difference approach, Numerical Heat Transfer Part B—Fundamentals 30 (1) (1996) 67.

[85A] M. Rooney, Well-conditioned matrix for (kux)x with discontinuous k, International Journal for Numerical Methods in Engineering 39 (21) (1996) 3663.

[86A] T. Shimizu, M. Ohtani, Numerical simulation of heat transfer and fluid flow applied to exhaust manifold, JSAE Review 17 (1) (1996) 17.

[87A] A. Sluzalec, M. Kleiber, Shape sensitivity analysis for nonlinear steady-state heat conduction problems, International Journal of Heat and Mass Transfer 39 (12) (1996) 2609.

[88A] S. Sunil, J.R.N. Reddy, C.B. Sobhan, Natural convection heat transfer from a thin rectangular fin with a line source at the base — a finite difference solution, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 127.

[89A] L.Q. Tang, K. Pochiraju, C. Chassapis, S. Manoochehri, Three-dimensional transient mold cooling analysis based on Galerkin finite element formulation with a matrix-free conjugate gradient technique, International Journal for Numerical Methods in Engineering 39 (18) (1996) 3049.

[90A] A.A. Tseng, F.Z. Zhao, Multidimensional inverse transient heat conduction problems by direct sensitivity coefficient method using a finite-element scheme, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 365.

[91A] P.-C. Tuan, C.-C. Ji, L.-W. Fong, W.-T. Huang, Input estimation approach to on-line two-dimensional inverse heat conduction problems, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 345.

[92A] A.M. van den Brink, H. Dekker, Local temperature measurement and Kapitza boundary resistance, Physica B: Condensed Matter 219 (22014) (1996) 656.

[93A] K. Varadi, Z. Neder, K. Friedrich, Evaluation of the real contact areas, pressure distributions and contact temperatures during sliding contact between real metal surfaces, Wear 200 (12) (1996) 55.

[94A] R. Villasenor, P. Krutitskii, Efficient linear multistep method for nonlinear Volterra integral equations, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 689.

[95A] J.A. Visser, A. Bekker, Different approach to discretization for the numerical simulation of three-dimensional heat conduction in irregularly shaped materials, Communications in Numerical Methods in Engineering 12 (4) (1996) 223.

[96A] B. Wilhelmsson, S. Stenstrom, L. Nilsson, R. Krook, H. Persson, R. Wimmerstedt, Modeling multicylinder paper drying—validation of a new simulation program, TAPPI Journal 79 (4) (1996) 157.

[97A] H.-W. Wu, J.-J. Juang, Analysis/finite-element combined methodology on transient heat conduction of a finite domain with planar–discrete sources, Numerical Heat Transfer Part B—Fundamentals 29 (4) (1996) 459.

[98A] R.-H. Yeh, Errors in one-dimensional fin optimization problem for convective heat transfer, International Journal of Heat and Mass Transfer 39 (14) (1996) 3075.

[99A] S.V. Zhluktov, S.V. Utyuzhnikov, G.A. Tirskiy, Numerical investigation of thermal and chemical nonequilibrium flows past slender blunted cones, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 137.

[100A] S.M. Zubair, M.A. Chaudhry, Temperature solutions due to time-dependent moving-line-heat sources, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 185.

Conduction: thermo-elastic and thermo-mechanical problems

[101A] T.S. Brockett, L.E. Barrett, P.E. Allaire, Thermoelastohydrodynamic analysis of fixed geometry thrust bearings including runner deformation, Tribology Transactions 39 (3) (1996) 555.

[102A] C.K. Chao, J.Y. Lee, Interaction between a crack and a circular elastic inclusion under remote uniform heat flow, International Journal of Solids and Structures 33 (26) (1996) 3865.

[103A] J. Fainber, H.J. Leister, Finite volume multigrid solver for thermo-elastic stress analysis in anisotropic materials, Computer Methods in Applied Mechanics and Engineering 137 (2) (1996) 167.

[104A] S.-S. Lee, W.-H. Chen, Three-dimensional thermoelastic contact between two plates with bolted joints, Journal of Thermal Stresses 19 (2) (1996) 123.

[105A] Y. Matsunaga, N. Noda, Transient thermoelastic problem for an infinite plate containing a penny-shaped crack at an arbitrary position, Journal of Thermal Stresses 19 (4) (1996) 379.

[106A] M. Murozono, Thermally induced bending vibrations of internally heated beams in air, Journal of Thermal Stresses 19 (7) (1996) 649.

[107A] Y. Ochiai, T. Sekiya, Axisymmetric thermal stress analysis in the steady state with heat generation in the region by boundary element method, Journal of Thermal Stresses 19 (3) (1996) 273.

[108A] T. Sakuma, U. Iwata, Biot's number and thermal stress in liquid quenches for ceramics, Nippon Seramikkusu Kyokai Gakujutsu Ronbunshi—Journal of the Ceramic Society of Japan 104 (1212) (1996) 743.

[109A] C. Saltiel, M. Leon, Thermal and stress analysis during diffusion bonding of metal drum rotor disks using electromagnetic heating, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 35.

[110A] H.-W. Sonn, C.-G. Kim, C.-S. Hong, B.-I. Yoon, Axisymmetric analysis of transient thermoelastic behaviors in composite brake disks, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 69.

[111A] S. Takezono, K. Tao, E. Inamura, M. Inoue, Thermal stress and deformation in functionally graded material shells of revolution under thermal loading due to fluid, JSME International Journal Series I—Solid Mechanics Strength of Materials 39 (4) (1996) 573.

[112A] R.C. Wetherhold, J. Wang, Controlling thermal deformation by using laminated plates, Composites Part B: Engineering 27 (1) (1996) 51.

Conduction: inverse problems and applications

[113A] J.V. Beck, B. Blackwell, A. Haji-Sheikh, Comparison of some inverse heat conduction methods using experimental data, International Journal of Heat and Mass Transfer 39 (17) (1996) 3649.

[114A] J. Taler, Semi-numerical method for solving inverse heat conduction problems, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 105.

[115A] W.K. Yeung, Lam TT, Second-order finite difference approximation for inverse determination of thermal conductivity, International Journal of Heat and Mass Transfer 39 (17) (1996) 3685.

Conduction: flow/convection effects and change of phase

[116A] A. Barletta, E. Zanchini, Thermal entrance region for laminar forced convection in a circular tube with a power-law wall heat flux, International Journal of Heat and Mass Transfer 39 (6) (1996) 1265.
[117A] S. Bounds, K. Davey, S. Hinduja, Modified effective capacitance method for solidification modelling using linear tetrahedral finite elements, International Journal for Numerical Methods in Engineering 39 (18) (1996) 3195.
[118A] Z.-G. Feng, E.E. Michaelides, Unsteady heat transfer from a sphere at small Peclet numbers, Journal of Fluids Engineering—Transactions of the ASME 118 (1) (1996) 96.
[119A] Z.G. Feng, E.E. Michaelides, M.F. Scibilia, The energy equation of a sphere in an unsteady and nonuniform temperature field, Revue Generale de Thermique 35 (409) (1996) 5.
[120A] F. Folio, A. Lacour, Heat transfer by conduction and convection between a spherical droplet particle and a two-phase fluid, International Journal of Rapid Solidification 9 (2) (1996) 75.
[121A] Z. Ilken, H. Gunerhan, Investigation about the relations between the results of heat conduction problems with and without phase change, International Communications in Heat and Mass Transfer 23 (6) (1996) 899.
[122A] K. Jambunathan, S.L. Hartle, S. Ashforth-Frost, V.N. Fontama, Evaluating convective heat transfer coefficients using neural networks, International Journal of Heat and Mass Transfer 39 (11) (1996) 2329.
[123A] R.G. Keanini, N.N. Desai, Inverse finite element reduced mesh method for predicting multi-dimensional phase change boundaries and nonlinear solid phase heat transfer, International Journal of Heat and Mass Transfer 39 (5) (1996) 1039.
[124A] M. Lacroix, A. Joyeux, Coupling of wall conduction with natural convection from heated cylinders in a rectangular enclosure, International Communications in Heat and Mass Transfer 23 (1) (1996) 143.
[125A] Y. Liu, N. Phan-Thien, R. Kemp, Coupled conduction–convection problem for a cylinder in an enclosure, Computational Mechanics 18 (6) (1996) 429.
[126A] W. Nakayama, S.H. Park, Conjugate heat transfer from a single surface-mounted block to forced convective air flow in a channel, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 301.
[127A] S. Piva, Axial wall conduction preheating effects in high Peclet number laminar forced convection, International Journal of Heat and Mass Transfer 39 (16) (1996) 3511.
[128A] A.Z. Sahin, Direct resistance and induction heating of a slab with convective surfaces, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 133.
[129A] T. Suzuki, K. Mitachi, H. Yokoo, Fluid motion and heat transmission in a horizontal liquid layer heated locally from free surface, JSME International Journal Series B—Fluids and Thermal Engineering 39 (4) (1996) 780.
[130A] C. Trevino, A. Espinoza, F. Mendez, Steady-state analysis of the conjugate heat transfer between forced counterflowing streams, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 476.
[131A] M. Vynnycky, S. Kimura, Conjugate free convection due to a heated vertical plate, International Journal of Heat and Mass Transfer 39 (5) (1996) 1067.

Conduction: microelectronic heat transfer

[132A] J.-M. Dorkel, P. Tounsi, P. Leturcq, Three-dimensional thermal modeling based on the two-port network theory for hybrid or monolithic integrated power circuits, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (4) (1996) 501.
[133A] K.E. Goodson, Thermal conduction in nonhomogeneous CVD diamond layers in electronic microstructures, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 279.
[134A] R.A. Wirtz, D.M. Colban, Comparison of the cooling performance of staggered and in-line arrays of electronic packages, Journal of Electronic Packaging 118 (1) (1996) 27.
[135A] G. Xu, P.B. McGrath, Electrical and thermal analysis of polymer insulator under contaminated surface conditions, IEEE Transactions on Dielectrics and Electrical Insulation 3 (2) (1996) 289.
[136A] T. Zhou, M. Hundt, Board and system level effects on plastic package thermal performance, in: Proceedings Electronic Components Conference, Orlando, USA, 1996, p. 911.

Conduction: miscellaneous studies and special applications

[137A] I.M.L.B. Avila, MdC Manso, C.L.M. Silva, Modelling the thermal sterilisation of foods inside packs with two divisions, Mathematics and Computers in Simulation 42 (23) (1996) 279.
[138A] R.W. Bartlett, K.A. Prisbrey, Solid-state diffusion-based processing kinetics for uniaxial self-propagating high-temperature synthesis of $MoSi_2$, Metallurgical and Materials Transactions A—Physical Metallurgy and Materials Science 27A (8) (1996) 2086.
[139A] T. Basak, K.K. Rao, A. Bejan, Model for heat transfer in a honey bee swarm, Chemical Engineering Science 51 (3) (1996) 387.
[140A] A. Biswas, W. Michaeli, Fabric-reinforced thermoplastics: simulation of the forming process, Advances in Polymer Technology 15 (2) (1996) 165.
[141A] H. Boyer, J.P. Chabriat, B. Grondin-Perez, C. Tourrand, J. Brau, Thermal building simulation and com-

puter generation of nodal models, Building and Environment 31 (3) (1996) 207.
[142A] K.R. Cercone, D. Deming, H.N. Pollack, Insulating effect of coals and black shales in the appalachian basin, Western Pennsylvania, Organic Geochemistry 24 (2) (1996) 243.
[143A] J.E. Christian, J. Kosny, Thermal performance and wall ratings, ASHRAE Journal 38 (3) (1996).
[144A] S.L. Cockcroft, D.W. Tripp, A. Mitchell, Effect of pressure on power transfer in electron beam remelting of cylinders, High Temperature Materials and Processes 15 (12) (1996) 41.
[145A] I. Dincer, S. Dost, Method of determining thermal parameters of granular coal particles during devolatilization, International Journal of Energy Research 20 (11) (1996) 943.
[146A] F.S. Epstein, G.L. White, Understanding impedance heating, Chemical Engineering 103 (5) (1996) 112.
[147A] I.S. Han, C.B. Chung, J.H. Kim, S.J. Kim, H.C. Chung, C.T. Cho, S.C. Oh, Dynamic simulation of the tire curing process, Tire Science and Technology 24 (1) (1996) 50.
[148A] K. Hayashi, N. Sakudo, T. Kawai, New measure of local temperature distribution in nonequilibrium molecular dynamics simulation of friction, Surface and Coatings Technology 83 (13) (1996) 313.
[149A] D. Homentcovschi, G. Stanescu, A. Bejan, Cooling of a two-dimensional space with one or more streams making one or more passes, International Journal of Heat and Fluid Flow 17 (1) (1996) 78.
[150A] P. Hui, H.S. Tan, Three-dimensional analysis of a thermal dissipation system with a rectangular diamond heat spreader on a semi-infinite copper heat sink, Japanese Journal of Applied Physics Part 1—Regular Papers Short Notes and Review Papers 35 (9A) (1996) 4852.
[151A] Y. Imai, A. Watanabe, M. Mukaida, T. Tsunoda, Electrostatic potential and temperature distribution in case of a series and a parallel configuration of two thermoelectric conversion phases, Nippon Seramikkusu Kyokai Gakujutsu Ronbunshi—Journal of the Ceramic Society of Japan 104 (1209) (1996) 361.
[152A] N. Jarvstrat, S. Tjotta, Process model for on-line quenching of aluminium extrusions, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (3) (1996) 501.
[153A] A.I. Karamavruc, N.N. Clark, Correction factor for one-dimensional heat transfer coefficients around a horizontal tube in a fluidized bed, Powder Technology 86 (2) (1996) 209.
[154A] M. Krarti, Effect of spatial variation of soil thermal properties on slab-on-ground heat transfer, Building and Environment 31 (1) (1996) 51.
[155A] M. Krarti, S. Choi, Simplified method for foundation heat loss calculation, ASHRAE Transactions 102 (1) (1996) 140.
[156A] E.I. Lin, J.W. Stultz, R.T. Reeve, Effective emittance for Cassini multilayer insulation blankets and heat loss near seams, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 357.
[157A] H.M. Park, D.H. Cho, Low dimensional modeling of flow reactors, International Journal of Heat and Mass Transfer 39 (16) (1996) 3311.
[158A] M. Romdhane, C. Gourdon, G. Casamatta, Time response modelling of an ultrasonic thermoelectric probe, Ultrasonics 34 (8) (1996) 835.
[159A] V.I. Rudnev, D.L. Loveless, M.R. Black, P.J. Miller, Progress in study of induction surface hardening of carbon steels, gray irons and ductile (nodular) irons, Industrial Heating 63 (3) (1996).
[160A] S.S. Sadhal, E.H. Trinh, P. Wagner, Thermocapillary flows in a drop with unsteady spot heating in a microgravity environment, Microgravity Science and Technology 9 (2) (1996) 80.
[161A] W. Schmid, T. Schreiber, High luminous intensity, long service life: design a thermal model for TOPLEDs, Components 31 (6) (1996) 21.
[162A] S.M. Sellers, W.Z. Black, Refinements to the Neher–McGrath model for calculating the ampacity of underground cables, IEEE Transactions on Power Delivery 11 (1) (1996) 12.
[163A] C.A. Soule, Augmentation improves thermal performance of air cooled heat sinks, Power Conversion and Intelligent Motion 22 (11) (1996) 45.
[164A] O. Tsukamoto, K. Ryu, P. Michael, N. Amemiya, Transient heat transfer characteristics of supercritical helium and stability analysis of CCICS, Cryogenics 36 (3) (1996) 183.
[165A] Y. Wachi, M. Ono, S. Hanawa, T. Hamajima, J. Yamamoto, O. Motojima, Effect of insulation on stability of cable-in-conduit type forced-cooled superconducting coils, Cryogenics 36 (3) (1996) 155.
[166A] B. Williams, S. Jensen, M. Chadek, J.C. Batty, Solderless flexible thermal links, Cryogenics 36 (10) (1996) 867.
[167A] B.G. Williams, S.M. Jensen, J.C. Batty, Advanced solderless flexible thermal link, Proceedings of SPIE the International Society for Optical Engineering 1996 (1996) 209.
[168A] E.W. Williams, H.C. Patel, D. de Cogan, S.H. Pulko, TLM modeling of thermal processes in magneto-optic multi-layered media, Journal of Physics D—Applied Physics 29 (5) (1996) 1124.
[169A] J.P. Wu, H.S. Chu, Substrate effects on intrinsic thermal stability and quench recovery for thin-film superconductors, Cryogenics 36 (11) (1996) 925.
[170A] X. Yin, H.H. Bau, Conjugate Graetz problem with axial conduction, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 482.
[171A] Z.M. Zhang, D.J. Livigni, R.D. Jones, T.R. Scott, Thermal modeling and analysis of laser calorimeters, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 350.

Boundary layers and external flows: external effects

[1B] R.J. Adrian, Variation of temperature and velocity fluctuations in turbulent thermal convection over horizontal surfaces, International Journal of Heat and Mass Transfer 39 (11) (1996) 2303.

[2B] A.F. Averill, H.S. Mahmood, Forced convection mass transfer in electrodeposition cells — theoretical aspects, Transactions of the Institute of Metal Finishing 74 (pt) (1996) 11.

[3B] T. Igarashi, N. Terachi, Heat transfer enhancement and drag reduction of flat plate normal to airstream (flow control using a rod), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1945.

[4B] S. Komori, K. Nagata, Effects of molecular diffusivities on counter-gradient scalar and momentum transfer in strongly stable stratification, Journal of Fluid Mechanics 1996 (1996) 205.

[5B] J. Lumley, B. Podvin, Dynamical systems theory and extra rates of strain in turbulent flows, Experimental Thermal and Fluid Science 13 (3) (1996) 180.

[6B] G. Nicoletti, Heat and momentum transfer in flows adjacent to vibrating wall surfaces, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 145.

[7B] K.A. Thole, D.G. Bogard, High freestream turbulence effects on turbulent boundary layers, Journal of Fluids Engineering—Transactions of the ASME 118 (2) (1996) 276.

[8B] T. Tsutsui, T. Igarashi, Enhancement of heat transfer and reduction of drag of a circular cylinder (flow control using a small rod), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1802.

[9B] D. Zhou, T. Wang, Combined effects of elevated freestream turbulence and streamwise acceleration on flow and thermal structures in transitional boundary layers, Experimental Thermal and Fluid Science 12 (3) (1996) 338.

Boundary layers and external flows: geometric effects

[10B] R.A. Ahmad, Steady-state numerical solution of the Navier–Stokes and energy equations around a horizontal cylinder at moderate Reynolds numbers from 100 to 500, Heat Transfer Engineering 17 (1) (1996) 31.

[11B] A.E. Bergles, M.K. Jensen, B. Shome, Literature on enhancement of convective heat and mass transfer, Journal of Enhanced Heat Transfer 4 (1) (1996) 1.

[12B] R.A. Brittingham, E.C. Mladin, D.A. Zumbrunnen, Heat transfer transients in stagnation flows due to changes in flow velocity, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 186.

[13B] R.J. Han, O.R. Moss, B.A. Wong, Derivation and application of an analytical solution of the mass transfer equation to the case of forced convective flow around a cylindrical and a spherical particle with fluid surface properties, Journal of Aerosol Science 27 (2) (1996) 235.

[14B] K.S. Hwang, H.J. Sung, J.M. Hyun, Mass transfer measurements from a blunt-faced flat plate in a uniform flow, International Journal of Heat and Fluid Flow 17 (2) (1996) 179.

[15B] O. Imagawa, F. Ishimaru, Y. Kurahashi, T. Yamada, Analysis of urethane reaction in a tubular reactor with mixing elements, Polymer Reaction Engineering 4 (1) (1996) 47.

[16B] H. Kazeminejad, M. Ghamari, M.A. Yaghoubi, Numerical study of convective heat transfer from a blunt plate at low Reynolds number, International Journal of Heat and Mass Transfer 39 (1) (1996) 125.

[17B] A.A. Kendoush, Theory of convective heat and mass transfer to fluids flowing normal to a plane, International Communications in Heat and Mass Transfer 23 (2) (1996) 249.

[18B] M.E. Kithcart, D.E. Klett, Heat transfer and skin friction comparison of dimpled versus protrusion roughness, Journal of Enhanced Heat Transfer 3 (4) (1996) 273.

[19B] S. Lorenz, C. Nachtigall, W. Leiner, Permanent three-dimensional patterns in turbulent flows with essentially two-dimensional wall configurations, International Journal of Heat and Mass Transfer 39 (2) (1996) 373.

[20B] H. Martin, Theoretical approach to predict the performance of chevron-type plate heat exchangers, Chemical Engineering and Processing 35 (4) (1996) 301.

[21B] T.Y. Na, I. Pop, Flow and heat transfer over a longitudinal circular cylinder moving in parallel or reversely to a free stream, Acta Mechanica 118 (1996) 1.

[22B] G.F. Naterer, J. Boros, X. Wang, Turbulence integral model for the evaluation of the thermal effectiveness of a static damper in gas-fired water heaters, Transactions of the Canadian Society for Mechanical Engineering 20 (4) (1996) 437.

[23B] H.S. Takhar, G. Nath, Unsteady three-dimensional flow due to a stretching flat surface, Mechanics Research Communications 23 (3) (1996) 325.

[24B] V.I. Terekhov, N.I. Yarygina, Forced-convection heat transfer from the bottom of trenches with rectangular or inclined walls, Experimental Heat Transfer 9 (2) (1996) 133.

[25B] D.A. Tyszka, D.E. Wroblewski, Heat transfer and fluid mechanics measurements for the endwall boundary layer downstream of a streamlined strut, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 485.

[26B] M. Wang, J.G. Georgiadis, Conjugate forced convection in crossflow over a cylinder array with volumetric heating, International Journal of Heat and Mass Transfer 39 (7) (1996) 1351.

[27B] T.-Y. Wang, Convective heat transfer between a moving cylinder and flowing nonNewtonian fluids, International Communications in Heat and Mass Transfer 23 (1) (1996) 101.

[28B] R.J. Yang, W.J. Luo, Turbine blade heat transfer prediction in flow transition using κ–omega two-equation model, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 613.

Boundary layers and external flows: compressibility and high-speed flow effects

[29B] S. Bhattacharyya, A.S. Gupta, Transient compressible boundary layer on a wedge impulsively set into motion, Archive of Applied Mechanics 66 (5) (1996) 338.

[30B] L. Brusniak, D.S. Dolling, Engineering estimation of fluctuating loads in shock wave/turbulent boundary-layer interactions, AIAA Journal 34 (12) (1996) 2554.

[31B] G. Colonna, M. Capitelli, Electron and vibrational kinetics in the boundary layer of hypersonic flow, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 406.

[32B] T.T. Evans, A.J. Smits, Measurements of the mean heat transfer in a shock wave–turbulent boundary layer interaction, Experimental Thermal and Fluid Science 12 (1) (1996) 12–87.

[33B] F. Grasso, M. Marini, Analysis of hypersonic shock-wave laminar boundary-layer interaction phenomena, Computers and Fluids 25 (6) (1996) 561.

[34B] B.R. Hollis, J.N. Perkins, High-enthalpy and perfect-gas heating measurements on a blunt cone, Journal of Spacecraft and Rockets 33 (5) (1996) 628.

[35B] R.L. Kimmel, A. Demetriades, J.C. Donaldson, Space–time correlation measurements in a hypersonic transitional boundary layer, AIAA Journal 34 (12) (1996) 2484.

[36B] S.G. Mallinson, S.L. Gai, N.R. Mudford, Upstream influence and peak heating in hypervelocity shock wave/boundary-layer interaction, Journal of Propulsion and Power 12 (5) (1996) 984.

[37B] S.Y. Moon, K.T. Yoon, T.J. Chung, Numerical simulation of heat transfer in chemically reacting shock wave–turbulent boundary layer interactions, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 55.

[38B] K.K. Muramoto, Model for predicting hypersonic laminar near-wake flowfields, Journal of Spacecraft and Rockets 33 (2) (1996) 305.

[39B] A.G. Panaras, Review of the physics of swept-shock/boundary layer interactions, Progress in Aerospace Sciences 32 (1996) 2.

[40B] M. Sheplak, E.F. Spina, C.B. McGinley, Progress in hot-film anemometry for hypersonic flow, Experimental Thermal and Fluid Science 13 (1) (1996) 21.

[41B] B.R. Smith, Prediction of hypersonic shock-wave/turbulent boundary-layer interactions, Journal of Spacecraft and Rockets 33 (5) (1996) 614.

[42B] H. Wei, C.P. Chen, Nonequilibrium algebraic model for turbulent density fluctuations, International Journal of Heat and Mass Transfer 39 (18) (1996) 3989.

[43B] M.E. White, D.A. Ault, Expansion corner effects on hypersonic shock wave/turbulent boundary-layer interactions, Journal of Propulsion and Power 12 (6) (1996) 1169.

Boundary layers and external flows: analysis and modeling

[44B] K. Abe, T. Kondoh, Y. Nagano, Two-equation heat transfer model reflecting second-moment closures for wall and free turbulent flows, International Journal of Heat and Fluid Flow 17 (3) (1996) 228.

[45B] R.S. Amano, N.F. Rieger, S. Hesler, Aerodynamic analysis of turbine cascade by using a second-order closure of turbulence, International Journal of Heat and Fluid Flow 17 (3) (1996) 278.

[46B] I. Dincer, Development of a new number (the Dincer number) for forced-convection heat transfer in heating and cooling applications, International Journal of Energy Research 20 (5) (1996) 419.

[47B] H. Hanazaki, J.C.R. Hunt, Linear processes in unsteady stably stratified turbulence, Journal of Fluid Mechanics 1996 (1996) 303.

[48B] D.B. Hash, H.A. Hassan, Assessment of schemes for coupling Monte Carlo and Navier–Stokes solution methods, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 242.

[49B] H. Herwig, P. Schaefer, Combined perturbation/finite-difference procedure applied to temperature effects and stability in a laminar boundary layer, Archive of Applied Mechanics 66 (4) (1996) 264.

[50B] G. Hetsroni, L.P. Yarin, D. Kaftori, Mechanistic model for heat transfer from a wall to a fluid, International Journal of Heat and Mass Transfer 39 (7) (1996) 1475.

[51B] K. Heyerichs, A. Pollard, Heat transfer in separated and impinging turbulent flows, International Journal of Heat and Mass Transfer 39 (12) (1996) 2385.

[52B] O.J. Ilegbusi, Calculation of forced-air cooling of electronic modules with a two-fluid model of turbulence, Journal of Electronic Packaging 118 (4) (1996) 250.

[53B] B.A. Kader, Second moments, spectra and correlation functions of velocity and temperature fluctuations in the gradient sublayer of a retarded boundary layer, International Journal of Heat and Mass Transfer 39 (2) (1996) 331.

[54B] M. Kadja, J.S. Anagnostopoulos, G.C. Bergeles, Study of wind flow and pollutant dispersion by newly developed precision-improving methods, International Communications in Heat and Mass Transfer 23 (8) (1996) 1065.

[55B] C.W. Li, F. Zhang, Three-dimensional simulation of thermals using a split-operator scheme, International Journal of Numerical Methods for Heat and Fluid Flow 6 (2) (1996) 25.

[56B] Y. Mo, O. Miyatake, Numerical analysis of the transient turbulent flow field in a thermally stratified thermal storage water tank, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 649.

[57B] P. Padilla, S. Toxvaerd, Simulating shear flow, Journal of Chemical Physics 104 (15) (1996) 5956.

[58B] T.W.H. Sheu, S.F. Tsai, M.M.T. Wang, Monotone multidimensional upwind finite element method for advection–diffusion problems, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 325.

[59B] T.-M. Shih, M.M. Ohadi, W. Liu, Literature survey on numerical heat transfer (1992–1993), Numerical Heat Transfer Part A—Applications 29 (5) (1996) 441.

[60B] R.M.C. So, T.P. Sommer, Explicit algebraic heat-flux model for the temperature field, International Journal of Heat and Mass Transfer 39 (3) (1996) 455.

[61B] D.E. Wroblewski, Conditionally sampled turbulent Prandtl number in the outer region of a turbulent boundary layer, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 480.

Boundary layers and external flows: unsteady effects

[62B] K. Fukui, H. Ueda, W. Sha, K. Uehara, Transient turbulence structure in the unstable boundary layer under the

condition of step cooling from below, Atmospheric Environment 30 (16) (1996) 2811.
[63B] M. Kumari, G. Nath, Boundary layer development on a continuous moving surface with a parallel free stream due to impulsive motion, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 283.
[64B] R.L. LeBoeuf, R.D. Mehta, Topology of the near-field vortical structures in a three-dimensional wake, Experimental Thermal and Fluid Science 13 (3) (1996) 223.
[65B] M. Nasiri, W.K. Van Moorhem, Investigation of heat and mass transfer in oscillating flows at high acoustic Reynolds numbers, International Communications in Heat and Mass Transfer 23 (5) (1996) 613.
[66B] A.F.P. van Putten, M.J.A.M. van Putten, M.H.P.M. van Putten, Silicon thermal anemometry: developments and applications, Measurement Science and Technology 7 (10) (1996) 1360.
[67B] T. Wang, F.J. Keller, D. Zhou, Flow and thermal structures in a transitional boundary layer, Experimental Thermal and Fluid Science 12 (3) (1996) 352.
[68B] T. Wang, D. Zhou, Spectral analysis of boundary-layer transition on a heated flat plate, International Journal of Heat and Fluid Flow 17 (1) (1996) 12.
[69B] D. Wroblewski, Effect of large-scale periodic unsteadiness on the heat transport in the downstream region of a junction boundary layer, International Journal of Heat and Fluid Flow 17 (1) (1996) 3.

Boundary layers and external flows: films and interfacial effects

[70B] X.Q. Chen, J.C.F. Pereira, Computation of turbulent evaporating sprays with well-specified measurements: a sensitivity study on droplet properties, International Journal of Heat and Mass Transfer 39 (3) (1996) 441.
[71B] B. Dabir, M.R. Riazi, H.R. Davoudirad, Modelling of falling film reactors, Chemical Engineering Science 51 (11) (1996) 2553.
[72B] K.J. Kim, N.S. Berman, B.D. Wood, Turbulence d'interface pendant l'absorption en films tombants: effet d'additifs, International Journal of Refrigeration—Revue Internationale du Froid 19 (5) (1996) 322.
[73B] E. Nogueira, R.M. Cotta, N.C.L. Brum, S. Kakac, Integral transform solution of heat transfer in two-phase gas–liquid annular flow, Heat and Technology 14 (1) (1996) 97.
[74B] V. Patnaik, H. Perez-Blanco, Roll waves in falling films: an approximate treatment of the velocity field, International Journal of Heat and Fluid Flow 17 (1) (1996) 63.
[75B] I. Pop, T. Watanabe, H. Konishi, Gravity-driven laminar film flow along a vertical wall with surface mass transfer, International Communications in Heat and Mass Transfer 23 (5) (1996) 687.

Boundary layers and external flows: effects of fluid type or fluid properties

[76B] E. Alessandri, R.N. Mawhinney, M.K. Patel, E. Galea, Revisiting the carrier-phase source-term formulation in mixed Lagrangian–Eulerian particle models, Numerical Heat Transfer Part B—Fundamentals 30 (1) (1996) 111.
[77B] J. Castiglione, J.T. Tough, Multiple discrete TI states of superfluid turbulence, Journal of Low Temperature Physics 103 (34) (1996) 139.
[78B] Y. Demirel, S.C. Saxena, Heat transfer in rarefied gas at a gas–solid interface, Energy 21 (2) (1996) 99.
[79B] I. Dincer, S. Dost, New correlations for heat transfer coefficients during direct cooling of products, International Journal of Energy Research 20 (7) (1996) 587.
[80B] H. Griem, New procedure for the prediction of forced convection heat transfer at near- and supercritical pressure, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 301.
[81B] I.A. Hassanien, Flow and heat transfer on a continuous flat surface moving in a parallel free stream of power-law fluid, Applied Mathematical Modelling 20 (10) (1996) 779.
[82B] I.A. Hassanien, Mixed convection in micropolar boundary-layer flow over a horizontal semi-infinite plate, Journal of Fluids Engineering—Transactions of the ASME 118 (4) (1996) 833.
[83B] H.O.E. Karlsson, G. Tragardh, Heat transfer in pervaporation, Journal of Membrane Science 119 (2) (1996) 295.
[84B] A.J. Mord, H.A. Snyder, Comparison of different ways of using superfluid helium to cool superconducting magnets, Cryogenics 36 (3) (1996) 209.
[85B] N.T. Nguyen, D. Bochnia, R. Kiehnscherf, W. Doetzel, Investigation of forced convection in microfluid systems, Sensors and Actuators A—Physical 55 (1) (1996) 49.
[86B] Y. Pan, S. Banerjee, Numerical simulation of particle interactions with wall turbulence, Physics of Fluids 8 (10) (1996) 2733.
[87B] K. Wichterle, Colburn analogy for heat transfer in nonNewtonian liquids, International Communications in Heat and Mass Transfer 23 (2) (1996) 287.

Boundary layers and external flows: flows with combustion and reaction

[88B] R.C. Aldredge, Novel flow reactor for the study of heat-loss effects on turbulent flame propagation, International Communications in Heat and Mass Transfer 23 (8) (1996) 1173.
[89B] C.E.Jr Baukal, B. Gebhart, Review of empirical flame impingement heat transfer correlations, International Journal of Heat and Fluid Flow 17 (4) (1996) 386.
[90B] D.L. Bonnett, P.B. Butler, Hot-spot ignition of condensed phase energetic materials, Journal of Propulsion and Power 12 (4) (1996) 680.
[91B] M. Kilic, Flow and convective heat transfer in cylindrical reversed flow combustion chambers, International Communications in Heat and Mass Transfer 23 (8) (1996) 1151.

[92B] G.T. Kim, J.T. Lin, O.C. Jones, M.E. Glicksman, W.M.B. Duval, N.B. Singh, Effects of convection during the physical vapor transport process: application of laser Doppler velocimetry, Journal of Crystal Growth 165 (4) (1996) 429.

[93B] W.S. Kuhn, New hydrodynamic principle for CVD reactors: the boundary condition control, Semiconductor Science and Technology 11 (5) (1996) 783.

[94B] K.G. Shkadinsky, G.V. Shkadinskaya, B.J. Matkowsky, Gravity induced separation in 'liquid flames', Combustion Science and Technology 115 (1996) 4.

[95B] M. Vedha-Nayagam, G. Fairweather, Diffusion flame over a continuous moving fuel plate under microgravity, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 97.

Channel flows: straight-walled ducts

[1C] A. Barletta, E. Zanchini, Existence of an asymptotic thermally developed region for laminar forced convection in a circular duct, International Journal of Heat and Mass Transfer 39 (13) (1996) 2735.

[2C] R.F. Barron, X. Wang, R.O. Warrington, T. Ameel, Evaluation of the eigenvalues for the Graetz problem in slip-flow, International Communications in Heat and Mass Transfer 23 (4) (1996) 563.

[3C] A. Campo, K. Tebeest, U. Lacoa, J.C. Morales, Application of a finite volume based method of lines to turbulent forced convection in circular tubes, Numerical Heat Transfer Part A—Applications 30 (5) (1996) 503.

[4C] W.-J. Chang, Y.-D. You, Hot block elevation effect on mixed convection in a parallel plate channel, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 297.

[5C] S.S. Chen, A.S. Lavine, Laminar, buoyancy induced flow structures in a bottom heated, aspect ratio 2 duct with throughflow, International Journal of Heat and Mass Transfer 39 (1) (1996) 1.

[6C] G. Gerdov, Second law analysis of convective heat transfer in flow through a duct with heat flux as a function of duct length, HVAC&R Research 2 (2) (1996) 149.

[7C] C.C. Huang, T.F. Lin, Numerical simulation of transitional aiding mixed convective air flow in a bottom heated inclined rectangular duct, International Journal of Heat and Mass Transfer 39 (8) (1996) 1697.

[8C] D.B. Ingham, P. Watson, P.J. Heggs, Upstream migration of heat during combined convection in a horizontal parallel plate duct, International Journal of Heat and Mass Transfer 39 (2) (1996) 437.

[9C] D.D. Joye, Comparison of aiding and opposing mixed convection heat transfer in a vertical tube with Grashof number variation, International Journal of Heat and Fluid Flow 17 (2) (1996) 96.

[10C] D.D. Joye, Comparison of correlations and experiment in opposing flow, mixed convection heat transfer in a vertical tube with Grashof number variation, International Journal of Heat and Mass Transfer 39 (5) (1996) 1033.

[11C] D.D. Joye, Design criterion for the heat-transfer coefficient in opposing flow, mixed convection heat transfer in a vertical tube, Industrial and Engineering Chemistry Research 35 (7) (1996) 2399.

[12C] D.D. Joye, M.J. Wojnovich, Aiding and opposing mixed-convection heat transfer in a vertical tube: loss of boundary condition at different Grashof numbers, International Journal of Heat and Fluid Flow 17 (5) (1996) 468.

[13C] K.-T. Lee, W.-M. Yan, Transient conjugated mixed convection inside ducts with convection from the ambient, International Journal of Heat and Mass Transfer 39 (6) (1996) 1203.

[14C] S.H. Lee, J.R. Howell, Gravitational effects on laminar convection to near-critical water in a vertical tube, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 627.

[15C] S.H. Lee, J.R. Howell, Laminar forced convection at zero gravity to water near the critical region, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 504.

[16C] T.K. Lesniewski, T.H.K. Frederking, S.W.K. Yuan, On He II inertia effects in short narrow ducts: entrance effects associated with boundary layer development, Cryogenics 36 (3) (1996) 203.

[17C] W.L. Lin, T.F. Lin, Experimental study of unstable mixed convection of air in a bottom heated horizontal rectangular duct, International Journal of Heat and Mass Transfer 39 (8) (1996) 1649.

[18C] W.L. Lin, T.F. Lin, Unstable aiding and opposing mixed convection of air in a bottom-heated rectangular duct slightly inclined from the horizontal, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 47.

[19C] F.B. Liu, M.N. Ozisik, Inverse analysis of transient turbulent forced convection inside parallel-plate ducts, International Journal of Heat and Mass Transfer 39 (12) (1996) 2615.

[20C] P.K. Maciejewski, A.M. Anderson, Elements of a general correlation for turbulent heat transfer, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 287.

[21C] B. Moshfegh, M. Sandberg, Investigation of fluid flow and heat transfer in a vertical channel heated from one side by PV elements. Part I — numerical study, Renewable Energy 8 (14) (1996) 248.

[22C] C. Nonino, S. Del Giudice, Finite element analysis of laminar mixed convection in the entrance region of horizontal annular ducts, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 313.

[23C] K. Rup, Identification of the flowrate based upon a solution of an inverse heat transfer problem, Acta Mechanica 119 (1996) 1.

[24C] A. Shajii, J.P. Freidberg, Theory of low Mach number compressible flow in a channel, Journal of Fluid Mechanics 1996 (1996) 131.

[25C] S. Shin, Y.I. Cho, Forced convection behavior of a dielectric fluid (FC-77) in a 2:1 rectangular duct, International Communications in Heat and Mass Transfer 23 (5) (1996) 731.

[26C] M. Spiga, G.L. Morini, Laminar heat transfer between parallel plates as the limiting solution for the rectangular duct, International Communications in Heat and Mass Transfer 23 (4) (1996) 555.

[27C] M. Spiga, G.L. Morini, Nusselt numbers in laminar flow for H2 boundary conditions, International Journal of Heat and Mass Transfer 39 (6) (1996) 1165.

[28C] G.F. Steyn, C.J. Stevens, Importance of thermal entrance effects in gas-cooled beam windows for radioisotope production targets, Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 373 (1) (1996) 10.

[29C] D.S.K. Ting, Temperature fluctuation measurements for transitional flow in a square channel, Experimental Heat Transfer 9 (4) (1996) 357.

[30C] V. Velidandla, S. Putta, R.P. Roy, Turbulent velocity field in isothermal and heated liquid flow through a vertical annular channel, International Journal of Heat and Mass Transfer 39 (16) (1996) 3333.

[31C] J.S. Vrentas, C.M. Vrentas, Axial moment analyses of convective heat and mass transfer processes, Chemical Engineering Science 51 (6) (1996) 921.

[32C] B. Weigand, Extract analytical solution for the extended turbulent Graetz problem with Dirichlet wall boundary conditions for pipe and channel flows, International Journal of Heat and Mass Transfer 39 (8) (1996) 1625.

[33C] T.N. Wong, K.T. Ooi, Evaluation of capillary tube performance for CFC-12 and HFC-134A, International Communications in Heat and Mass Transfer 23 (7) (1996) 993.

[34C] W.-M. Yan, Combined buoyancy effects of thermal and mass diffusion on laminar forced convection in horizontal rectangular ducts, International Journal of Heat and Mass Transfer 39 (7) (1996) 1479.

Channel flows: irregular geometries

[35C] S. Charton, V. Blet, J.P. Corriou, Simplified model for real gas expansion between two reservoirs connected by a thin tube, Chemical Engineering Science 51 (2) (1996) 295.

[36C] J. Ding, R.M. Manglik, Analytical solutions for laminar fully developed flows in double-sine shaped cuts, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 269.

[37C] R. Giudici, E. Tronconi, Laminar flow and forced convection heat transfer in plate-type monolith structures by a finite element solution, International Journal of Heat and Mass Transfer 39 (9) (1996) 1963.

[38C] E. Goto, N. Yoshida, Formulas for viscous fluid and heat flows around a hexagonal lattice of circular tubes, Fluid Dynamics Research 18 (4) (1996) 211.

[39C] W.D. Hsieh, K.C. Chang, Calculation of wall heat transfer in pipe-expansion turbulent flows, International Journal of Heat and Mass Transfer 39 (18) (1996) 3813.

[40C] D.B. Ingham, N. Patel, Developing combined convection in an eccentric annulus, Numerical Heat Transfer Part A—Applications 29 (7) (1996) 707.

[41C] T.Y. Kim, S.W. Baek, Thermal development of radiatively active pipe flow with nonaxisymmetric circumferential convective heat loss, International Journal of Heat and Mass Transfer 39 (14) (1996) 2969.

[42C] H. Minhas, G.S.H. Lock, Estimating the influence of Prandtl number on heat transfer in a bayonet tube, International Communications in Heat and Mass Transfer 23 (7) (1996) 1011.

[43C] H. Minhas, G.S.H. Lock, Laminar-turbulent transition in a bayonet tube, International Journal of Heat and Fluid Flow 17 (2) (1996) 102.

[44C] H. Minhas, G.S.H. Lock, Numerical analysis of heat transfer in an air-filled bayonet tube under laminar conditions, International Journal of Heat and Mass Transfer 39 (4) (1996) 761.

[45C] X.F. Peng, G.P. Peterson, Convective heat transfer and flow friction for water flow in microchannel structures, International Journal of Heat and Mass Transfer 39 (12) (1996) 2599.

[46C] X.F. Peng, G.P. Peterson, Forced convection heat transfer of single-phase binary mixtures through microchannels, Experimental Thermal and Fluid Science 12 (1) (1996) 12–98.

[47C] M. Rokni, B. Sunden, Numerical investigation of turbulent forced convection in ducts with rectangular and trapezoidal cross-section area by using different turbulence models, Numerical Heat Transfer Part A—Applications 30 (4) (1996) 321.

[48C] S.Z. Shuja, M.A. Habib, Fluid flow and heat transfer characteristics in axisymmetric annular diffusers, Computers and Fluids 25 (2) (1996) 133.

[49C] K. Velusamy, V.K. Garg, Laminar mixed convection in vertical elliptic ducts, International Journal of Heat and Mass Transfer 39 (4) (1996) 745.

Channel flows: finned and profiled ducts

[50C] S. Al-Fahed, W. Chakroun, Effect of tube-tape clearance on heat transfer for fully developed turbulent flow in a horizontal isothermal tube, International Journal of Heat and Fluid Flow 17 (2) (1996) 173.

[51C] G. Biswas, K. Torii, D. Fujii, K. Nishino, Numerical and experimental determination of flow structure and heat transfer effects of longitudinal vortices in a channel flow, International Journal of Heat and Mass Transfer 39 (16) (1996) 3441.

[52C] S.L. Braga, F.E.M. Saboya, Turbulent heat transfer and pressure drop in an internally finned equilateral triangular duct, Experimental Thermal and Fluid Science 12 (1) (1996) 12–57.

[53C] P.-H. Chen, Z.-C. Chang, B.J. Huang, Effect of oversize in wire-screen matrix to the matrix-holding tube on regenerator thermal performance, Cryogenics 36 (5) (1996) 365.

[54C] Y.M. Chen, K.C. Wang, Simulation and measurement of turbulent heat transfer in a channel with a surface-mounted rectangular heated block, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 463.

[55C] Y.-M. Chen, K.-C. Wang, Numerical and experimental studies on the laminar forced convective heat transfer of a channel with a surface-mounted heated block, Chung-Kuo Chi Hsueh Kung Ch'Eng Hsueh Pao/Journal of the Chinese Society of Mechanical Engineers 17 (5) (1996) 455.

[56C] M. Ciofalo, J. Stasiek, M.W. Collins, Investigation of flow and heat transfer in corrugated passages — II. Numerical simulations, International Journal of Heat and Mass Transfer 39 (1) (1996) 165.

[57C] K.S. Doan, F. Plourde, R. Poisson, Space correlation measurements in a forced shear layer with wall injection, Experiments in Fluids 21 (1) (1996) 26.

[58C] Y.P. Gan, Q.J. Deng, C.F. Ma, X.Y. Yuan, D.Y. Cai, Forced convective air cooling from electronic component arrays in a parallel plate channel, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (2) (1996) 163.

[59C] M. Hishida, Local heat transfer coefficient distribution on a ribbed surface, Journal of Enhanced Heat Transfer 3 (3) (1996) 187.

[60C] S.-S. Hsieh, M.-Y. Wen, Developing three-dimensional laminar mixed convection in a circular tube inserted with longitudinal strips, International Journal of Heat and Mass Transfer 39 (2) (1996) 299.

[61C] Z. Hu, J. Shen, Heat transfer enhancement in a converging passage with discrete ribs, International Journal of Heat and Mass Transfer 39 (8) (1996) 1719.

[62C] J.-J. Hwang, S.-J. Wu, T.-M. Liou, Heat transfer in a low-aspect ratio rectangular channel with thermally-active and -nonactive perforated ribs, Chung-Kuo Chi Hsueh Kung Ch'Eng Hsueh Pao/Journal of the Chinese Society of Mechanical Engineers 17 (2) (1996) 165.

[63C] B.A. Jubran, S.A. Swiety, M.A. Hamdan, Convective heat transfer and pressure drop characteristics of various array configurations to simulate the cooling of electronic modules, International Journal of Heat and Mass Transfer 39 (16) (1996) 3519.

[64C] A. Klaczak, Heat transfer and pressure drop in tubes with short turbulators, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 399.

[65C] T. Krauss, L. Meyer, Characteristics of turbulent velocity and temperature in a wall channel of a heated rod bundle, Experimental Thermal and Fluid Science 12 (1) (1996) 12–75.

[66C] B. Mottahed, M. Molki, Artificial roughness effects on turbulent transfer coefficients in the entrance region of a circular tube, International Journal of Heat and Mass Transfer 39 (12) (1996) 2515.

[67C] T.A. Myrum, S. Acharya, S. Sinha, X. Qui, Effect of placing vortex generators above ribs in ribbed ducts on the flow, flow temperature, and heat transfer behavior, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 294.

[68C] A.K. Naghdi, Laminar flow heat transfer in a cylinder with circumferential tubes, Transactions of the Canadian Society for Mechanical Engineering 20 (1) (1996) 57.

[69C] T.S. Ravigururajan, A.E. Bergles, Development and verification of general correlations for pressure drop and heat transfer in single-phase turbulent flow in enhanced tubes, Experimental Thermal and Fluid Science 13 (1) (1996) 55.

[70C] T.S. Ravigururajan, T.J. Rabas, Turbulent flow in integrally enhanced tubes, Part 1: comprehensive review and database development, Heat Transfer Engineering 17 (2) (1996) 19.

[71C] T.S. Ravigururajan, T.J. Rabas, Turbulent flow in integrally enhanced tubes, Part 2: analysis and performance comparison, Heat Transfer Engineering 17 (2) (1996) 30.

[72C] Amin M. Ruhul, J.A. Khan, Effects of multiple obstructions on conjugate forced convection heat transfer in tubes, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 265.

[73C] B. Shome, M.K. Jensen, Experimental investigation of laminar flow and heat transfer in internally finned tubes, Journal of Enhanced Heat Transfer 4 (1) (1996) 53.

[74C] J. Stasiek, M.W. Collins, M. Ciofalo, P.E. Chew, Investigation of flow and heat transfer in corrugated passages — I. Experimental results, International Journal of Heat and Mass Transfer 39 (1) (1996) 149.

[75C] K. Takase, Experimental results of heat transfer coefficients and friction factors in a 2D/3D rib-roughened annulus, Experimental Thermal and Fluid Science 13 (2) (1996) 142.

[76C] K. Takase, Numerical prediction of augmented turbulent heat transfer in an annular fuel channel with repeated two-dimensional square ribs, Nuclear Engineering and Design 165 (12) (1996) 225.

[77C] C.C. Wang, C.B. Chiou, D.C. Lu, Single-phase heat transfer and flow friction correlations for microfin tubes, International Journal of Heat and Fluid Flow 17 (5) (1996) 500.

[78C] H.-W. Wu, M.-C. Liu, Experimental study of convective heat transfer response to relative humidity in source arrays, International Communications in Heat and Mass Transfer 23 (8) (1996) 1163.

Channel flows: duct flows with secondary motion

[79C] C.J. Bolinder, B. Sunden, Numerical prediction of laminar flow and forced convective heat transfer in a helical square duct with a finite pitch, International Journal of Heat and Mass Transfer 39 (15) (1996) 3101.

[80C] J.M. Choi, N.K. Anand, S.C. Lau, R.T. Kukreja, Heat (mass) transfer in a serpentine channel with right-angled turns, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 211.

[81C] H. Iacovides, B.E. Launder, H.Y. Li, Application of a reflection-free DSM to turbulent flow and heat transfer in a square-sectioned U-bend, Experimental Thermal and Fluid Science 13 (4) (1996) 419.

[82C] H. Ishigaki, Analogy between turbulent flows in curved pipes and orthogonally rotating pipes, Journal of Fluid Mechanics 1996 (1996) 1.

[83C] H. Ishigaki, Flow and heat transfer in rotating curved pipes (the effects of Rossby number), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1788.

[84C] S. Jayaram, Effect of streaming potential on heat transfer in transformer oil, IEEE Transactions on Dielectrics and Electrical Insulation 3 (3) (1996) 410.

[85C] E.S. Jeong, Secondary flow in basic pulse tube refrigerators, Cryogenics 36 (5) (1996) 317.

[86C] P.M. Ligrani, S. Choi, A.R. Schallert, P. Skogerboe, Effects of Dean vortex pairs on surface heat transfer in curved channel flow, International Journal of Heat and Mass Transfer 39 (1) (1996) 27.

[87C] W.L. Lin, Y.T. Ker, T.F. Lin, Experimental observation and conjugated heat transfer analysis of vortex flow development in mixed convection of air in a horizontal rectangular duct, International Journal of Heat and Mass Transfer 39 (17) (1996) 3666.

[88C] M.A. Petrakis, G.T. Karahalios, Technical note: steady flow in a curved pipe with a coaxial core, International Journal for Numerical Methods in Fluids 22 (12) (1996) 1231.

[89C] D.S.K. Ting, K.C. Cheng, Relaminarization of developing turbulent flow in a 180 degree curved square channel: a study based on temperature fluctuation measurements, Experimental Heat Transfer 9 (3) (1996) 267.

[90C] R.C. Xin, A. Awwad, Z.F. Dong, M.A. Ebadian, H.M. Soliman, Investigation and comparative study of the pressure drop in air–water two-phase flow in vertical helicoidal pipes, International Journal of Heat and Mass Transfer 39 (4) (1996) 735.

[91C] G. Yang, M.A. Ebadian, Turbulent forced convection in a helicoidal pipe with substantial pitch, International Journal of Heat and Mass Transfer 39 (10) (1996) 2015.

Channel flows: oscillatory and pulsatile flow

[92C] M. Arik, C.A.C. Santos, S. Kakac, Turbulent forced convection with sinusoidal variation of inlet temperature between two parallel-plates, International Communications in Heat and Mass Transfer 23 (8) (1996) 1121.

[93C] T. Fusegi, Numerical study of turbulent forced convection in a periodically ribbed channel with oscillatory throughflow, International Journal for Numerical Methods in Fluids 23 (11) (1996) 1223.

[94C] K.J. Hammad, G.C. Vradis, Viscous dissipation and heat transfer in pulsatile flows of a yield-stress fluid, International Communications in Heat and Mass Transfer 23 (5) (1996) 599.

[95C] Y. Ishino, M. Suzuki, T. Abe, N. Ohiwa, S. Yamaguchi, Flow and heat transfer characteristics in pulsating pipe flows (effects of pulsation on internal heat transfer in a circular pipe flow), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1928.

[96C] M.B. Kim, H.D. Shin, Parametric representation of diffusive enhancement in a confined oscillatory flow, International Journal of Heat and Mass Transfer 39 (16) (1996) 3543.

[97C] M.R. Mackley, P. Stonestreet, E.P.L. Roberts, X. Ni, Residence time distribution enhancement in reactors using oscillatory flow, Chemical Engineering Research and Design 74 (A5) (1996) 541.

[98C] R.J. Naumann, Stabilizing/destabilizing effects of axial accelerations in Bridgman growth, Journal of Crystal Growth 165 (12) (1996) 129.

[99C] Q. Wang, Y. Cao, Oscillatory impingement of liquid inside reciprocating pipes, Journal of Sound and Vibration 197 (5) (1996) 619.

[100C] T.S. Zhao, P. Cheng, Friction coefficient of a fully developed laminar reciprocating flow in a circular pipe, International Journal of Heat and Fluid Flow 17 (2) (1996) 167.

Channel flows: two-component duct flows

[101C] G.B. Awuah, H.S. Ramaswamy, Dimensionless correlations for mixed and forced convection heat transfer to spherical and finite cylindrical particles in an aseptic processing holding tube simulator, Journal of Food Process Engineering 19 (3) (1996) 269.

[102C] G.B. Awuah, H.S. Ramaswamy, B.K. Simpson, J.P. Smith, Fluid-to-particle convective heat transfer coefficient as evaluated in an aseptic processing holding tube simulator, Journal of Food Process Engineering 19 (3) (1996) 242.

[103C] V.M. Balasubramaniam, S.K. Sastry, Estimation of convective heat transfer between fluid and particle in continuous flow using a remote temperature sensor, Journal of Food Process Engineering 19 (2) (1996) 223.

[104C] M.S. Chitti, N.K. Anand, Condensation heat transfer inside smooth horizontal tubes for R-22 and R-32/125 mixture, HVAC&R Research 2 (1) (1996) 79.

[105C] M.-H. Chun, B.-R. Lee, H.-Y. Nam, Theoretical and experimental investigation of the onset of slugging in horizontal stratified air–water countercurrent flow, International Communications in Heat and Mass Transfer 23 (1) (1996) 11.

[106C] T. Elperin, A. Fominykh, Heat transfer during gas hydrate formation in gas–liquid slug flow, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 179.

[107C] A.M. Epinatiev, V.V. Perevezentsev, A.V. Razmerov, Convective heat transfer enhancement when using gas–solid particle two phase coolant for the Tokamak type reactor first wall cooling, Fusion Engineering and Design 31 (2) (1996) 109.

[108C] M. Khattab, M. El-Sallak, S.M. Morcos, A. Salama, Heat transfer and pressure drop for air–water mixtures in an isoflux vertical annulus, Kerntechnik 61 (23) (1996) 93.

[109C] A. Kurklu, A. Wheldon, P. Hadley, Mathematical modelling of the thermal performance of a phase-change material (PCM) store: cooling cycle, Applied Thermal Engineering 16 (7) (1996) 613.

[110C] P. Lang, H. Auracher, Heat transfer to nonmiscible liquid — liquid mixtures flowing in a vertical tube, Experimental Thermal and Fluid Science 12 (3) (1996) 364.

[111C] V.V. Levdansky, V.G. Leitsina, H. Van Viet, Spatial distribution of gas particles emerging from a nonisothermally heated cylindrical channel with heterogeneous processes on the surface, International Journal of Heat and Mass Transfer 39 (5) (1996) 1103.

[112C] J.R. Lister, P.J. Dellar, Solidification of pressure-driven flow in a finite rigid channel with application to volcanic eruptions, Journal of Fluid Mechanics 1996 (1996) 267.

[113C] T.A. Ozbelge, S.H. Koker, Heat transfer enhancement in water–feldspar upflows through vertical annuli, International Journal of Heat and Mass Transfer 39 (1) (1996) 135.

[114C] C.-C. Wang, C.S. Kuo, Y.-J. Chang, D.C. Lu, Two-phase flow heat transfer and friction characteristics of R-

22 and R-407C, ASHRAE Transactions 102 (1) (1996) 830.
[115C] Q. Wu, M. Ishii, Interfacial wave stability of concurrent two-phase flow in a horizontal channel, International Journal of Heat and Mass Transfer 39 (10) (1996) 2067.
[116C] R.C. Xin, A. Awwad, Z.F. Dong, M.A. Ebadian, Heat transfer of air/water two-phase flow in helicoidal pipes, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 442.

Channel flows: nonNewtonian duct flow

[117C] S.G. Etemad, A.S. Mujumdar, R. Nassef, Simultaneously developing flow and heat transfer of non-Newtonian fluids in equilateral triangular duct, Applied Mathematical Modelling 20 (12) (1996) 898.
[118C] A. Lawal, Convective diffusion of power-law fluids inside ducts with single homogeneous and catalytic wall reactions, Chemical Engineering Journal and the Biochemical Engineering Journal 62 (1) (1996) 51.
[119C] H.Z. Li, C. Fasol, L. Choplin, Hydrodynamics and heat transfer of rheologically complex fluids in a sulzer SMX static mixer, Chemical Engineering Science 51 (10) (1996) 1947.
[120C] C.-X. Lin, S.-Y. Ko, F.K. Tsou, Laminar heat transfer in square duct flow of aqueous CMC solutions, International Journal of Heat and Mass Transfer 39 (3) (1996) 503.
[121C] J. Myska, J.L. Zakin, Z. Chara, Viscoelasticity of a surfactant and its drag-reducing ability, Applied Scientific Research 55 (4) (1996) 1995.
[122C] M.F. Naccache, P.R.S. Mendes, Heat transfer to nonNewtonian fluids in laminar flow through rectangular ducts, International Journal of Heat and Fluid Flow 17 (6) (1996) 613.
[123C] C. Nouar, M. Lebouche, Thermal convection for a thermodependent Herschel–Bulkley fluid in an annular duct, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 257.
[124C] X. Qian, W. Hou, T. Jiang, Heat transfer studies of highly viscous non-Newtonian fluids in vertical tubes by finite element method, Chinese Journal of Chemical Engineering 4 (1) (1996) 62.
[125C] S. Shin, Effect of the shear rate-dependent thermal conductivity of non-Newtonian fluids on the heat transfer in a pipe flow, International Communications in Heat and Mass Transfer 23 (5) (1996) 665.
[126C] Mendes P.R. Souza, S.L. Braga, Obstruction of pipelines during the flow of waxy crude oils, Journal of Fluids Engineering—Transactions of the ASME 118 (4) (1996) 722.
[127C] S. Syrjala, Further finite element analyses of fully developed laminar flow of power-law non-Newtonian fluid in rectangular ducts: heat transfer predictions, International Communications in Heat and Mass Transfer 23 (6) (1996) 799.

Channel flows: miscellaneous duct flow

[128C] L. Bouard, M. Fillon, J. Frene, Comparison between three turbulent models — application to thermohydrodynamic performances of tilting-pad journal bearings, Tribology International 29 (1) (1996) 11.
[129C] E. Dyson, A. Hashemi, H. Wong, High-power electronics heat rejection from aircraft skin, Journal of Enhanced Heat Transfer 3 (3) (1996) 165.
[130C] A.E. Ghoneimy, R.S. Dougall, Experimental investigation of coupled natural circulation loops, Nuclear Technology 114 (3) (1996) 399.
[131C] A.R. Hasan, C.S. Kabir, Mechanistic model for computing fluid temperature profiles in gas-lift wells, SPE Production and Facilities 11 (3) (1996) 179.
[132C] S.T. Horseman, T.J. McEwen, Thermal constraints on disposal of heat-emitting waste in argillaceous rocks, Engineering Geology 41 (14) (1996) 5.
[133C] C.S. Kabir, A.R. Hasan, G.E. Kouba, M.M. Ameen, Determining circulating fluid temperature in drilling, workover, and well-control operations, SPE Drilling and Completion 11 (2) (1996) 74.
[134C] B.H. Kang, C.W. Park, C.S. Lee, Dynamic behavior of heat and hydrogen transfer in a metal hydride cooling system, International Journal of Hydrogen Energy 21 (9) (1996) 769.
[135C] C.L. Ko, G.L. Wedekind, Analysis for the optimal performance of three-channel split-flow heat exchangers, International Journal of Heat and Mass Transfer 39 (4) (1996) 691.
[136C] M.V. Krishnamurthy, R. Chandra, S. Jacobs, S. Kasthurirengan, R. Karunanithi, Experimental studies on cool-down and mass flow characteristics of a demountable liquid nitrogen transfer line, Cryogenics 36 (6) (1996) 435.
[137C] B. Peng, L. Zhuang, G. Chen, W. Luo, G. Yan, L. Xin, S. Tang, Experimental study on heat transfer enhancement of air compressor aftercooler, Huaxue Gongcheng/Chemical Engineering 24 (5) (1996).
[138C] Y.F. Rao, Y. Inaba, T. Noda, K. Fukuda, Transient characteristics of He II forced flow heated at the center of a pipe line, Cryogenics 36 (3) (1996) 219.
[139C] T.S. Ravigururajan, A.E. Bergles, Optimization of in-tube enhancement for large evaporators and condensers, Energy 21 (5) (1996) 421.
[140C] N. Saman, H. Mahdi, Analysis of the delay hot/cold water problem, Energy 21 (5) (1996) 395.
[141C] N. Shikazono, N. Kasagi, Second-moment closure for turbulent scalar transport at various Prandtl numbers, International Journal of Heat and Mass Transfer 39 (14) (1996) 2977.

Flow with separated regions

[1D] H.I. Abu-Mulaweh, B.F. Armaly, T.S. Chen, Laminar natural convection flow over a vertical forward-facing step, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 517.
[2D] H.I. Abu-Mulaweh, B.F. Armaly, T.S. Chen, Measurements in buoyancy-opposing laminar flow over a

vertical forward-facing step, International Journal of Heat and Mass Transfer 39 (9) (1996) 1805.

[3D] H. Babinsky, J.A. Edwards, On the incipient separation of a turbulent hypersonic boundary layer, Aeronautical Journal 100 (996) (1996) 209.

[4D] J.L. Balino, Laminar flow in hydrostatic circular step bearings with variable gap, Tribology Transactions 39 (3) (1996) 547.

[5D] A. Campo, G. Li, Optimum separation of asymmetrically heated sub-channels forming a bundle: influence of simultaneous flow and temperature, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 127.

[6D] M.K. Chyu, V. Natarajan, Heat transfer on the base surface of three-dimensional protruding elements, International Journal of Heat and Mass Transfer 39 (14) (1996) 2925.

[7D] R. Devarakonda, J.A.C. Humphrey, Experimental study of turbulent flow in the near wakes of single and tandem prisms, International Journal of Heat and Fluid Flow 17 (3) (1996) 219.

[8D] I. Dincer, Modelling for heat and mass transfer parameters in deep-frying of products, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 109.

[9D] I. Dincer, S. Dost, Modelling study for moisture diffusivities and moisture transfer coefficients in drying of solid objects, International Journal of Energy Research 20 (6) (1996) 531.

[10D] M.M. El-Refaee, M.M. Elsayed, N.M. Al-Najem, I.E. Megahid, Steady-state solutions of buoyancy-assisted internal flows using a fast False Implicit Transient Scheme (FITS), International Journal of Numerical Methods for Heat and Fluid Flow 6 (6) (1996) 3.

[11D] W.A. Engblom, D.B. Goldstein, Nose-tip surface heat reduction mechanism, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 598.

[12D] T. Gokcen, Effects of freestream nonequilibrium on convective heat transfer to a blunt body, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 234.

[13D] Y.T.K. Gowda, P.A.A. Narayana, K.N. Seetharamu, Numerical investigation of mixed convection heat transfer past an in-line bundle of cylinders, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 347.

[14D] Z.-Y. Guo, D.-Y. Li, X.-G. Liang, Thermal effect on the recirculation zone in sudden-expansion gas flows, International Journal of Heat and Mass Transfer 39 (13) (1996) 2619.

[15D] Y. Kanai, T. Tsukamoto, K. Toyama, Y. Saitoh, M. Miyakawa, T. Kashiwa, Analysis of a hyperthermic treatment in a reentrant resonant cavity applicator by solving time-dependent electromagnetic-heat transfer equations, IEEE Transactions on Magnetics 32 (3/1) (1996) 1661.

[16D] K.C. Kim, Y. Lee, Effect of transverse convex curvature on heat transfer from heated cylinders with axisymmetric backward-facing steps, International Journal of Heat and Mass Transfer 39 (8) (1996) 1763.

[17D] H.D. Nguyen, S. Paik, R.W. Douglass, Convective transport about cylinder with surface reaction of arbitrary order, AIChE Journal 42 (6) (1996) 1514.

[18D] B.S.V.P. Patnaik, K.N. Seetharamu, P.A.A. Narayana, Simulation of laminar confined flow past a circular cylinder with integral wake splitter involving heat transfer, International Journal of Numerical Methods for Heat and Fluid Flow 6 (4) (1996) 65.

[19D] S.A. Piralishvili, V.M. Polyaev, Flow and thermodynamic characteristics of energy separation in a double-circuit vortex tube — an experimental investigation, Experimental Thermal and Fluid Science 12 (4) (1996) 399.

[20D] G.H. Rhee, H.J. Sung, A nonlinear low-Reynolds-number k–ε model for turbulent separated and reattaching flows — II. Thermal field computations, International Journal of Heat and Mass Transfer 39 (16) (1996) 3465.

[21D] G. Stanescu, A.J. Fowler, A. Bejan, Optimal spacing of cylinders in free-stream cross-flow forced convection, International Journal of Heat and Mass Transfer 39 (2) (1996) 311.

[22D] A. Valencia, Unsteady flow and heat transfer in a channel with a built-in tandem of rectangular cylinders, Numerical Heat Transfer Part A—Applications 29 (6) (1996) 613.

[23D] R. Wang, P. Zhang, Transient heat transfer from thin wires to a bath of sub-cooled superfluid helium, Cryogenics 36 (1) (1996) 1.

[24D] Y.-T. Yang, C.O.K. Chen, C.-F. Chiu, Convective heat transfer from a circular cylinder under the effect of a solid plane wall, International Journal for Numerical Methods in Fluids 23 (2) (1996) 163.

[25D] F.A. Youssef, Heat transfer from a slender body of revolution at incidence, Journal of Physics D—Applied Physics 29 (1) (1996) 84.

Heat transfer in porous media: property determinations

[1DP] W. Buessing, H.J. Bart, R. Germerdonk, Isothermal liquid transport in porous media: capillary hysteresis effects, International Journal of Heat and Mass Transfer 39 (9) (1996) 1925.

[2DP] F. Couture, W. Jomaa, J.R. Puiggali, Relative permeability relations: a key factor for a drying model, Transport in Porous Media 23 (3) (1996) 303.

[3DP] T. Gambaryan-Roisman, E.Y. Litovsky, M. Shapiro, A. Shavit, Effect of surface segregation kinetics on the effective thermal conductivity of porous ceramics, International Journal of Heat and Mass Transfer 39 (8) (1996) 1687.

[4DP] J. Irudayaraj, Y. Wu, A. Ghazanfari, W. Yang, Application of simultaneous heat, mass, and pressure transfer equations to timber drying, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 233.

[5DP] P. Jouanna, M.A. Abellan, Generalized approach to heterogeneous media, Transport in Porous Media 25 (3) (1996) 351.

[6DP] T. Kawashima, M. Hishinuma, Thermal properties of porous Ni/YSZ particulate composites at high temperatures, Materials Transactions JIM 37 (9) (1996) 1518.

[7DP] C.K. Lee, C.-C. Sun, C.C. Mei, Computation of permeability and dispersivities of solute or heat in periodic porous media, International Journal of Heat and Mass Transfer 39 (4) (1996) 661.
[8DP] S. Lee, N.J. Salamon, R.M. Sullivan, Finite element analysis of poroelastic composites undergoing thermal and gas diffusion, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 672.
[9DP] E. Litovsky, M. Shapiro, A. Shavit, Gas pressure and temperature dependences of thermal conductivity of porous ceramic materials: part 2. Refractories and ceramics with porosity exceeding 30%, Journal of the American Ceramic Society 79 (5) (1996) 1366.
[10DP] K. Muralidhar, A. Chatterjee, B.V. Nagabhushana, Application of domain decomposition in modelling flow and heat transfer problems, Proceedings of the Institution of Mechanical Engineers Part C, Journal of Mechanical Engineering Science 210 (6) (1996) 519.
[11DP] K. Nishioka, T. Murayama, Y. Ono, Estimation of effective thermal diffusivity of porous solid using data for image processing, ISIJ International 36 (2) (1996) 150.
[12DP] M. Okada, K. Matsumoto, M. Fukuzaki, Influences of initial concentration and super-cooling degree on the permeability of a porous medium saturated with partially solidified aqueous solution, International Journal of Heat and Mass Transfer 39 (18) (1996) 3845.
[13DP] L. Pel, H. Brocken, K. Kopinga, Determination of moisture diffusivity in porous media using moisture concentration profiles, International Journal of Heat and Mass Transfer 39 (6) (1996) 1273.
[14DP] Y. Xu, Y. Guo, Z. Guo, Experimental research on transient heat transfer in sand, Acta Mechanica Sinica/ Lixue Xuebao 12 (1) (1996) 39.
[15DP] A. Yelshin, On the possibility of using information entropy as a quantitative description of porous media structural characteristics, Journal of Membrane Science 117 (12) (1996) 279.

Heat transfer in porous media: fluidized beds

[16DP] S. Ashley, Mechanically fluidized vacuum furnace, Mechanical Engineering 118 (1) (1996) 72.
[17DP] P. Basu, L. Cheng, K. Cen, Heat transfer in a pressurized circulating fluidized bed, International Journal of Heat and Mass Transfer 39 (13) (1996) 2711.
[18DP] P. Basu, P.K. Nag, Heat transfer to walls of a circulating fluidized-bed furnace, Chemical Engineering Science 51 (1) (1996) 1.
[19DP] J. Bi, T. Kojima, Prediction of temperature and composition in a jetting fluidized bed coal gasifier, Chemical Engineering Science 51 (11) (1996) 2745.
[20DP] A.C. Caputo, G. Cardarelli, P.M. Pelagagge, Analysis of heat recovery in gas–solid moving beds using a simulation approach, Applied Thermal Engineering 16 (1) (1996) 89.
[21DP] D.G. DiMattia, P.R. Amyotte, F. Hamdullahpur, Fluidized bed drying of large particles, Transactions of the ASAE 39 (5) (1996) 1745.
[22DP] I. Dincer, S. Dost, Estimation of surface temperature distributions during heating of particles in fluidized bed, Energy Sources 18 (7) (1996) 813.
[23DP] G. Ferschneider, P. Mege, Eulerian simulation of dense phase fluidized beds, Revue de l'Institut Francais du Petrole 51 (2) (1996) 301.
[24DP] Z. Gawrzynski, R. Glaser, Drying in a pulsed-fluid bed with relocated gas stream, Drying Technology 14 (5) (1996) 1121.
[25DP] M. Gierse, B. Leckner, Operation control of circulating fluidized bed boilers, International Journal of Energy Research 20 (10) (1996) 839.
[26DP] C. Hudson, C.L. Briens, A. Prakash, Effect of inclination on liquid–solid fluidized beds, Powder Technology 89 (2) (1996) 101.
[27DP] A.I. Karamavruc, N.N. Clark, G. Ganser, Modeling of the transient heat transfer across a heat transfer tube in a bubbling fluidized bed, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 258.
[28DP] Y.H. Khraisha, Heat transfer between an immersed surface and a fluidized bed of oil shale and tar sand, Heat and Technology 14 (2) (1996) 65.
[29DP] R. Moreno, M. Paredes, Convective heat transfer in a sawdust fluidized bed with piston flow, Informacion Tecnologica 7 (5) (1996) 81.
[30DP] D.B. Murray, P. O'Connor, P. Gilroy, Cross-flow heat transfer in the freeboard region of a fluidized bed, Proceedings of the Institution of Mechanical Engineers Part C, Journal of Mechanical Engineering Science 210 (3) (1996) 245.
[31DP] Y.S.H. Najjar, M.B. Habeebullah, Repowering a steam power plant by means of fluidised-bed combustion and a two-shaft gas turbine, Journal of the Institute of Energy 69 (479) (1996) 112.
[32DP] A. Ots, T. Parve, B.J. Skrifvars, M. Hupa, Sintering tendency of ash from calcium-rich oil shale, Journal of the Institute of Energy 69 (481) (1996) 192.
[33DP] P.E.A. Rots, R.F. Mudde, H.E.A. Van Den Akker, T.H.J.J. Van Der Hagen, H. Van Dam, Fluidized bed nuclear fission reactor, Chemical Engineering Science 51 (11) (1996) 2763.
[34DP] D. Sasongko, J.F. Stubington, Significant factors affecting devolatilization of fragmenting, nonswelling coals in fluidized bed combustion, Chemical Engineering Science 51 (16) (1996) 3909.
[35DP] S.C. Saxena, S.S. Dewan, Heat transfer from a horizontal tube in a magnetofluidized bed, International Communications in Heat and Mass Transfer 23 (5) (1996) 655.
[36DP] S.T.S. Suwanayuen, C. Tangsatitkulchai, C. Phromvichit, W. Nimipal, Heat transfer characteristics in a small-scale fluidized bed boiler, International Journal of Energy Research 20 (6) (1996) 521.
[37DP] H. Takeuchi, Particles flow pattern and local heat transfer around tube in moving bed, AIChE Journal 42 (6) (1996) 1621.
[38DP] X.S. Wang, M. Ahmad, B.M. Gibbs, D. Geldart, M.J. Rhodes, Thermal entrance effect for heat transfer in upflowing gas–particle suspensions, Industrial and Engineering Chemistry Research 35 (12) (1996) 4781.
[39DP] X.S. Wang, B.M. Gibbs, M.J. Rhodes, D. Geldart,

Convective wall-to-suspension heat transfer in circulating fluidized bed risers, AIChE Journal 42 (8) (1996) 2112.

[40DP] X.S. Wang, B.M. Gibbs, M.J. Rhodes, D. Geldart, Correlation for the suspension-to-wall heat-transfer coefficient in circulating fluidized beds, Industrial and Engineering Chemistry Research 35 (10) (1996) 3822.

[41DP] I. Zbicinski, P. Strumillo, W. Kaminski, Hybrid neural model of thermal drying in a fluidized bed, Computers and Chemical Engineering 20 (Suppl) (1996) S695.

[42DP] J. Zhou, J.R. Grace, C.H.M. Brereton, C.J. Lim, Influence of wall roughness on the hydrodynamics in a circulating fluidized bed, AIChE Journal 42 (4) (1996) 1153.

Heat transfer in porous media: free convection

[43DP] B.V. Antohe, J.L. Lage, Amplitude effect on convection induced by time-periodic horizontal heating, International Journal of Heat and Mass Transfer 39 (6) (1996) 1121.

[44DP] I. Arend, Y.Z. Li, K. Lueders, U. Ruppert, Heat flux investigations on wires coated with porous insulation in superfluid helium, Cryogenics 36 (3) (1996) 215.

[45DP] R. Bradean, D.B. Ingham, P.J. Heggs, I. Pop, Buoyancy-induced flow adjacent to a periodically heated and cooled horizontal surface in porous media, International Journal of Heat and Mass Transfer 39 (3) (1996) 615.

[46DP] R. Bradean, D.B. Ingham, P.J. Heggs, I. Pop, Free convection fluid flow due to a periodically heated and cooled vertical flat plate embedded in a porous media, International Journal of Heat and Mass Transfer 39 (12) (1996) 2545.

[47DP] G. Degan, P. Vasseur, Natural convection in a vertical slot filled with an anisotropic porous medium with oblique principal axes, Numerical Heat Transfer Part A—Applications 30 (4) (1996) 397.

[48DP] Rao V. Dharma, S.V. Naidu, P.K. Sarma, Non-Darcy effects in natural convection heat transfer in a vertical porous annulus, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 502.

[49DP] D. Getachew, W.J. Minkowycz, D. Poulikakos, Natural convection in a porous cavity saturated with a non-Newtonian fluid, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 640.

[50DP] B. Goyeau, J.P. Songbe, D. Gobin, Numerical study of double-diffusive natural convection in a porous cavity using the Darcy–Brinkman formulation, International Journal of Heat and Mass Transfer 39 (7) (1996) 1363.

[51DP] M. Grundmann, A. Mojtabi, Hof B. Van 'T, Asymptotic solution of natural convection problem in a square cavity heated from below, International Journal of Numerical Methods for Heat and Fluid Flow 6 (5) (1996) 29.

[52DP] S.D. Harris, D.B. Ingham, I. Pop, Transient free convection from a vertical plate subjected to a change in surface heat flux in porous media, Fluid Dynamics Research 18 (6) (1996) 313.

[53DP] T.J. Heindel, F.P. Incropera, S. Ramadhyani, Enhancement of natural convection heat transfer from an array of discrete heat sources, International Journal of Heat and Mass Transfer 39 (3) (1996) 479.

[54DP] J.J. Jou, K.Y. Kung, C.H. Hsu, Thermal stability of horizontally superposed porous and fluid layers in a rotating system, International Journal of Heat and Mass Transfer 39 (9) (1996) 1847.

[55DP] H. Khallouf, G.Z. Gershuni, A. Mojtabi, Some properties of convective oscillations in porous medium, Numerical Heat Transfer Part A—Applications 30 (6) (1996) 605.

[56DP] S.J. Kim, Convective heat transfer in porous and overlying fluid layers heated from below, International Journal of Heat and Mass Transfer 39 (2) (1996) 319.

[57DP] M. Mamou, L. Robillard, E. Bilgen, P. Vasseur, Effects of a moving thermal wave on Benard convection in a horizontal saturated porous layer, International Journal of Heat and Mass Transfer 39 (2) (1996) 347.

[58DP] D. Naylor, P.H. Oosthuizen, Natural convective heat transfer in an enclosure partly filled with a nonporous insulation, International Journal of Numerical Methods for Heat and Fluid Flow 6 (5) (1996) 37.

[59DP] T. Nishimura, K. Kunitsugu, T. Itoh, Natural convection suppression by azimuthal partitions in a horizontal porous annulus, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 65.

[60DP] P. Nithiarasu, K.N. Seetharamu, T. Sundararajan, Double-diffusive natural convection in an enclosure filled with fluid-saturated porous medium: a generalized non-Darcy approach, Numerical Heat Transfer Part A—Applications 30 (4) (1996) 413.

[61DP] P.H. Oosthuizen, D. Naylor, Natural convective heat transfer from a cylinder in an enclosure partly filled with a porous medium, International Journal of Numerical Methods for Heat and Fluid Flow 6 (6) (1996) 51.

[62DP] H.M. Park, H.S. Lee, D.H. Cho, Thermal convective instability in translucent porous media with radiative heat transfer, Chemical Engineering Communications 1996 (1996) 155.

[63DP] I. Pop, T.Y. Na, Free convection from an arbitrarily inclined plate in a porous medium, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 55.

[64DP] D.A.S. Rees, Effect of inertia on free convection from a horizontal surface embedded in a porous medium, International Journal of Heat and Mass Transfer 39 (16) (1996) 3425.

[65DP] P. Vadasz, Convection and stability in a rotating porous layer with alternating direction of the centrifugal body force, International Journal of Heat and Mass Transfer 39 (8) (1996) 1639.

[66DP] K. Vajravelu, A. Kassab, A. Hadjinicolaou, BEM solution to transient free convective heat transfer in a viscous, electrically conducting, and heat generating fluid, Numerical Heat Transfer Part A—Applications 30 (6) (1996) 555.

[67DP] Y.-T. Yang, S.-J. Wang, Free convection heat transfer of non-Newtonian fluids over axisymmetric and two-dimensional bodies of arbitrary shape embedded in a fluid-saturated porous medium, International Journal of Heat and Mass Transfer 39 (1) (1996) 203.

[68DP] M. Zhao, L. Robillard, M. Prud'homme, Effect of weak rotation on natural convection in a horizontal porous cylinder, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 403.

Heat transfer in porous media: coupled heat and mass transfer

[69DP] B.W. Asay, S.F. Son, J.B. Bdzil, Role of gas permeation in convective burning, International Journal of Multiphase Flow 22 (5) (1996) 923.

[70DP] M. Bai, J.-C. Roegiers, H.I. Inyang, Contaminant transport in nonisothermal fractured porous media, Journal of Environmental Engineering 122 (5) (1996) 416.

[71DP] P. Cheng, C.Y. Wang, Multiphase mixture model for multiphase, multicomponent transport in capillary porous media — II. Numerical simulation of the transport of organic compounds in the subsurface, International Journal of Heat and Mass Transfer 39 (17) (1996) 3619.

[72DP] J.F. Collet, V. Volpert, Reactive infiltration in porous media with thermal effects, European Journal of Mechanics B Fluids 15 (1) (1996) 119.

[73DP] M. El-Fadel, A.N. Findikakis, J.O. Leckie, Numerical modelling of generation and transport of gas and heat in landfills. I. Model formulation, Waste Management and Research 14 (5) (1996) 483.

[74DP] M. El-Fadel, A.N. Findikakis, J.O. Leckie, Numerical modelling of generation and transport of gas and heat in sanitary landfills. II. Model application, Waste Management and Research 14 (6) (1996) 537.

[75DP] D. Gawin, B.A. Schrefler, Thermo-hydro-mechanical analysis of partially saturated porous materials, Engineering Computations 13 (7) (1996) 113.

[76DP] A. Nakayama, T. Ashizawa, Boundary layer analysis of combined heat and mass transfer by natural convection from a concentrated source in a saturated porous medium, Applied Scientific Research 56 (1) (1996) 1.

[77DP] K. Noborio, K.J. McInnes, J.L. Heilman, Two-dimensional model for water, heat, and solute transport in furrow-irrigated soil: II. Field evaluation, Soil Science Society of America Journal 60 (4) (1996) 1010.

[78DP] S.W. Peng, K. Mizukami, W. Liu, Mathematical modelling of moisture desorption in a porous medium, International Journal of Energy Research 20 (10) (1996) 923.

[79DP] C.J. Simonson, Y.X. Tao, R.W. Besant, Simultaneous heat and moisture transfer in fiberglass insulation with transient boundary conditions, ASHRAE Transactions 102 (1) (1996) 315.

[80DP] V.M. Soundalgekar, B.S. Jaiswal, Effects of mass transfer and free convection currents on the oscillatory flow past an infinite vertical porous plate with variable suction, Heat and Technology 14 (1) (1996) 121.

[81DP] L. Spiegel, P. Bomio, R. Hunkeler, Direct heat and mass transfer in structured packings, Chemical Engineering and Processing 35 (6) (1996) 479.

[82DP] H.H. Vaziri, Theory and application of a fully coupled thermo-hydro-mechanical finite element model, Computers and Structures 61 (1) (1996) 131.

[83DP] C.Y. Wang, P. Cheng, Multiphase mixture model for multiphase, multicomponent transport in capillary porous media — I. Model development, International Journal of Heat and Mass Transfer 39 (17) (1996) 3607.

[84DP] X. Wang, D. Gawin, B.A. Schrefler, Parallel algorithm for thermo-hydro-mechanical analysis of deforming porous media, Computational Mechanics 19 (2) (1996) 94.

[85DP] G.J. Weir, W.M. Kissling, Enhanced conduction in steady, vertical flows of water, steam and carbon dioxide in a porous medium, Transport in Porous Media 24 (3) (1996) 297.

[86DP] N.E. Wijeysundera, Effect of initial moisture distribution on the transient heat flow through wet porous insulations, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 348.

[87DP] N.E. Wijeysundera, B.F. Zheng, M. Iqbal, E.G. Hauptmann, Numerical simulation of the transient moisture transfer through porous insulation, International Journal of Heat and Mass Transfer 39 (5) (1996) 995.

Heat transfer in porous media: drying processes

[88DP] A.K. Abdel-Rahman, G.N. Ahmed, Computational heat and mass transport in concrete walls exposed to fire, Numerical Heat Transfer Part A—Applications 29 (4) (1996) 373.

[89DP] B. Adu, L. Otten, Modeling microwave heating characteristics of granular hygroscopic solids, Journal of Microwave Power and Electromagnetic Energy 31 (1) (1996) 35.

[90DP] A. Belhamri, J.P. Fohr, Heat and mass transfer along a wetted porous plate in an air stream, AIChE Journal 42 (7) (1996) 1833.

[91DP] C. Fyhr, A. Rasmuson, Mathematical model of steam drying of wood chips and other hygroscopic porous media, AIChE Journal 42 (9) (1996) 2491.

[92DP] S.E.G. Jayamaha, S.K. Chou, N.E. Wijeysundera, Drying of porous materials in the presence of solar radiation, Drying Technology 14 (10) (1996) 2339.

[93DP] M.C. Melaaen, Numerical analysis of heat and mass transfer in drying and pyrolysis of porous media, Numerical Heat Transfer Part A—Applications 29 (4) (1996) 331.

[94DP] K. Murugesan, K.N. Seetharamu, P.A.A. Narayana, One dimensional analysis of convective drying of porous materials, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 81.

[95DP] J. Selih, A.C.M. Sousa, T.W. Bremner, Moisture transport in initially fully saturated concrete during drying, Transport in Porous Media 24 (1) (1996) 81.

[96DP] S.-H. Sun, T.R. Marrero, Experimental study of simultaneous heat and moisture transfer around single short porous cylinders during convection drying by a psychrometry method, International Journal of Heat and Mass Transfer 39 (17) (1996) 3559.

[97DP] K.M. Waananen, M.R. Okos, Effect of porosity on moisture diffusion during drying of pasta, Journal of Food Engineering 28 (2) (1996) 121.

[98DP] R. Wimmerstedt, J. Hager, Steam drying — modelling and applications, Drying Technology 14 (5) (1996) 1099.

[99DP] Y. Wu, J. Irudayaraj, Analysis of heat, mass and pressure transfer in starch based food systems, Journal of Food Engineering 29 (34) (1996) 399.

Heat transfer in porous media: multiphase flow and heat transfer

[100DP] H.J.H. Brouwers, Experimental study of constant-pressure steam injection and transient condensing flow in an air-saturated porous medium, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 449.

[101DP] N.A. Diky, N.Y. Koloskova, V.E. Tuz, V.V. Dubrovskaya, Heat and mass transfer and hydrodynamics of liquid evaporation in contact apparatus with a porous packing, Experimental Thermal and Fluid Science 13 (2) (1996) 85.

[102DP] K. Grosser, R.G. Carbonell, A. Cavero, A.E. Saez, Lateral thermal dispersion in gas–liquid cocurrent downflow through packed beds, AIChE Journal 42 (10) (1996) 2977.

[103DP] S. Hokoi, M. Matsumoto, Condensation process in external concrete walls under random fluctuation of outdoor temperature — fundamental study on heat and moisture behavior by Fokker–Planck equation, HVAC&R Research 2 (4) (1996) 337.

[104DP] S. Kim, Analysis of influence of physical parameters on vapor-liquid flow behavior up to dryout in a heat-generating porous medium, International Communications in Heat and Mass Transfer 23 (8) (1996) 1097.

[105DP] S.H. Kim, Modeling of the liquid–vapor flow in a self-heated porous medium: with application to the dryout limits, Journal of Nuclear Science and Technology 33 (9) (1996) 686.

[106DP] A.S. Lamine, L. Gerth, H. Le Gall, G. Wild, Heat transfer in a packed bed reactor with cocurrent downflow of a gas and a liquid, Chemical Engineering Science 51 (15) (1996) 3813.

[107DP] O. Rahli, F. Topin, L. Tadrist, J. Pantaloni, Analysis of heat transfer with liquid–vapor phase change in a forced-flow fluid moving through porous media, International Journal of Heat and Mass Transfer 39 (18) (1996) 3959.

[108DP] F. Stuber, A.M. Wilhelm, H. Delmas, Modelling of three phase catalytic upflow reactor a significant chemical determination of liquid–solid and gas–liquid mass transfer coefficients, Chemical Engineering Science 51 (10) (1996) 2161.

[109DP] A.J.J. Van Der Zanden, A.M.E. Schoenmakers, Influence of sorption isotherms on the drying of porous materials, International Journal of Heat and Mass Transfer 39 (11) (1996) 2319.

Heat transfer in porous media: forced/mixed convection in stationary beds

[110DP] T.K. Aldoss, M.A. Jarrah, B.J. Al-Sha'er Mixed convection from a vertical cylinder embedded in a porous medium: non-Darcy model, International Journal of Heat and Mass Transfer 1996, 39(6), 1141.

[111DP] R.F. Bartlett, R. Viskanta, Enhancement of forced convection in an asymmetrically heated duct filled with high thermal conductivity porous media, Journal of Enhanced Heat Transfer 3 (4) (1996) 291.

[112DP] H. Budman, M. Kzyonsek, P. Silveston, Control of a nonadiabatic packed bed reactor under periodic flow reversal, Canadian Journal of Chemical Engineering 74 (5) (1996) 751.

[113DP] A. Buikis, N. Ulanova, Modeling of nonisothermal gas flow through a heterogeneous medium, International Journal of Heat and Mass Transfer 39 (8) (1996) 1743.

[114DP] W.-J. Chang, W.-L. Chang, Mixed convection in a vertical parallel-plate channel partially filled with porous media of high permeability, International Journal of Heat and Mass Transfer 39 (7) (1996) 1331.

[115DP] B.H. Chao, H. Wang, P. Cheng, Stagnation point flow of a chemically reactive fluid in a catalytic porous bed, International Journal of Heat and Mass Transfer 39 (14) (1996) 3003.

[116DP] C.-H. Chen, Technical note: NonDarcy mixed convection from a horizontal surface with variable surface heat flux in a porous medium, Numerical Heat Transfer Part A—Applications 30 (8) (1996) 859.

[117DP] C.-H. Chen, T.S. Chen, Co.-K Chen, Non-Darcy mixed convection along nonisothermal vertical surfaces in porous media, International Journal of Heat and Mass Transfer 39 (6) (1996) 1157.

[118DP] S.C. Chen, K. Vafai, Analysis of free surface momentum and energy transport in porous media, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 281.

[119DP] R.E. Critoph, R. Thorpe, Momentum and heat transfer by forced convection in fixed beds of granular active carbon, Applied Thermal Engineering 16 (5) (1996) 419.

[120DP] O.R. Derkx, A.G. Dixon, Determination of the fixed bed wall heat transfer coefficient using computational fluid dynamics, Numerical Heat Transfer Part A—Applications 29 (8) (1996) 777.

[121DP] A.G. Dixon, Improved equation for the overall heat transfer coefficient in packed beds, Chemical Engineering and Processing 35 (5) (1996) 323.

[122DP] S. Frey, M.L. Martins-Costa, Saldanha R.M. da Gama, On the numerical heat transfer based upon mixture theory, Revista Brasileira de Ciencias Mecanicas/Journal of the Brazilian Society of Mechanical Sciences 18 (3) (1996) 282.

[123DP] W.-S. Fu, H.-C. Huang, W.-Y. Liou, Thermal enhancement in laminar channel flow with a porous block, International Journal of Heat and Mass Transfer 39 (10) (1996) 2165.

[124DP] R.S.R. Gorla, A.Y. Bakier, L. Byrd, Effects of thermal dispersion and stratification on combined convection on a vertical surface embedded in a porous medium, Transport in Porous Media 25 (3) (1996) 275.

[125DP] R.S.R. Gorla, M. Kumari, Mixed convection in nonNewtonian fluids along a vertical plate in a porous medium, Acta Mechanica 118 (1996) 1.

[126DP] L.J. Gratton, V.S. Travkin, I. Catton, Influence of

morphology upon two-temperature statements for convective transport in porous media, Journal of Enhanced Heat Transfer 3 (2) (1996) 129.
[127DP] M.M. Hassan, M. Atiqullah, S.A. Beg, M.H.M. Chowdhury, Effects of enzyme microcapsule shape on the performance of a nonisothermal packed-bed tubular reactor, Journal of Chemical Technology and Biotechnology 66 (1) (1996) 41.
[128DP] X.Y. Huang, C.Y. Liu, Developing flow in a channel filled with porous media, International Communications in Heat and Mass Transfer 23 (1) (1996) 123.
[129DP] T.C. Jen, Laminar forced convection in the entrance region of a semiporous channel, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 505.
[130DP] P.-X. Jiang, B.-X. Wang, D.-A. Luo, Z.-P. Ren, Fluid flow and convective heat transfer in a vertical porous annulus, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 305.
[131DP] K. Kamiuto, S. Saitoh, Fully developed forced-convection heat transfer in cylindrical packed beds with constant wall heat fluxes, JSME International Journal Series B—Fluids and Thermal Engineering 39 (2) (1996) 395.
[132DP] D.L. Koch, Hydrodynamic diffusion near solid boundaries with applications to heat and mass transport into sheared suspensions and fixed-fibre beds, Journal of Fluid Mechanics 1996 (1996) 31.
[133DP] Z.H. Kodah, H.M. Duwairi, Inertia effects on mixed convection for vertical plates with variable wall temperature in saturated porous media, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 333.
[134DP] A.V. Kuznetsov, Analysis of heating a three-dimensional porous bed utilizing the two energy equation model, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 173.
[135DP] A.V. Kuznetsov, Perturbation solution for a nonthermal equilibrium fluid flow through a three-dimensional sensible heat storage packed bed, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 508.
[136DP] A.V. Kuznetsov, Stochastic modeling of heating of a one-dimensional porous slab by a flow of incompressible fluid, Acta Mechanica 114 (1996) 1.
[137DP] M.L. Martins-Costa, Local model for a packed-bed heat exchanger with a multiphase matrix, International Communications in Heat and Mass Transfer 23 (8) (1996) 1133.
[138DP] T. Masuoka, Y. Takatsu, Turbulence model for flow through porous media, International Journal of Heat and Mass Transfer 39 (13) (1996) 2803.
[139DP] M.J.J. Mayer, J. Meuldijk, D. Thoenes, Application of the plug flow with axial dispersion model for continuous emulsion polymerization in a pulsed packed column, Chemical Engineering Science 51 (13) (1996) 3441.
[140DP] D.A. Nield, S.L.M. Junqueira, J.L. Lage, Forced convection in a fluid-saturated porous-medium channel with isothermal or isoflux boundaries, Journal of Fluid Mechanics 1996 (1996) 201.
[141DP] M. Niu, T. Akiyama, R. Takahashi, J. Yagi, Reduction of the wall effect in a packed bed by a hemispherical lining, AIChE Journal 42 (4) (1996) 1181.
[142DP] V.M. Polyaev, A.P. Mozhaev, B.M. Galitseysky, A.L. Lozhkin, Study of internal heat transfer in nonuniform porous structures, Experimental Thermal and Fluid Science 12 (4) (1996) 426.
[143DP] I. Pop, D.B. Ingham, Flow past a sphere embedded in a porous medium based on the Brinkman model, International Communications in Heat and Mass Transfer 23 (6) (1996) 865.
[144DP] R.M. Saldanha, M.L. Martins-Costa, Simulation of momentum and energy transfer in a porous medium nonsaturated by an incompressible fluid, International Communications in Heat and Mass Transfer 23 (3) (1996) 407.
[145DP] E.P.S. Schouten, K.R. Westerterp, Angular temperature variations in a wall-cooled packed-bed reactor, AIChE Journal 42 (9) (1996) 2635.
[146DP] M. Taniewski, A. Lachowicz, K. Skutil, D. Czechowicz, Effect of dilution of the catalyst bed on its heat-transfer characteristics in oxidative coupling of methane, Chemical Engineering Science 51 (18) (1996) 4271.
[147DP] M. Varahasamy, R.M. Fand, Heat transfer by forced convection in pipes packed with porous media whose matrices are composed of spheres, International Journal of Heat and Mass Transfer 39 (18) (1996) 3931.
[148DP] V.Z. Yakhnin, A.B. Rovinsky, M. Menzinger, Wave phenomena in the packed-bed reactor: their relation to the differential-flow instability, Canadian Journal of Chemical Engineering 74 (5) (1996) 647.

Experimental techniques and instrumentation: heat flux measurements

[1E] N. Arai, A. Matsunami, S.W. Churchill, Review of measurements of heat flux density applicable to the field of combustion, Experimental Thermal and Fluid Science 12 (4) (1996) 452.
[2E] G.M. Carlomagno, Quantitative infrared thermography, Heat and Technology 14 (2) (1996) 25.
[3E] D.G. Elvery, K. Bremhorst, Directional sensitivity of wall mounted hot-film gauges, Measurement Science and Technology 7 (10) (1996) 1410.
[4E] E. Gaviot, P. Godts, S. Guths, D. Leclercq, Thin foil planar radiometers: application for designing contactless Delta T sensors, Measurement Science and Technology 7 (4) (1996) 489.
[5E] S.E.G. Jayamaha, N.E. Wijeysundera, S.K. Chou, Measurement of the heat transfer coefficient for walls, Building and Environment 31 (5) (1996) 399.
[6E] J.A. Koski, L.A. Gritzo, L.A. Kent, S.D. Wix, Actively cooled calorimeter measurements and environment characterization in a large pool fire, Fire and Materials 20 (2) (1996) 69.

Experimental techniques and instrumentation: temperature measurements

[7E] H. Babinsky, J.A. Edwards, Automatic liquid crystal thermography for transient heat transfer measurements in hypersonic flow, Experiments in Fluids 21 (4) (1996) 227.

[8E] G. Deboy, G. Solker, E. Wolfgang, W. Claeys, Absolute measurement of transient carrier concentration and temperature gradients in power semiconductor devices by internal IR-laser deflection, Microelectronic Engineering 31 (14) (1996) 299.

[9E] G.S. Deep, J.S.R. Neto, A.M.N. Lima, R.C.S. Freire, P.C. Lobo, Thermoresistive radiation sensor response time employing electrical heating, IEEE Transactions on Instrumentation and Measurement 45 (1) (1996) 332.

[10E] S.V. Ekkad, J.-C. Han, Heat transfer inside and downstream of cavities using transient liquid crystal method, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 511.

[11E] D.S. Ellis, W.D. O'Brien, Monopole-source solution for estimating tissue temperature increases for focused ultrasound fields, IEEE Transactions on Ultrasonics Ferroelectrics and Frequency Control 43 (1) (1996) 88.

[12E] T. Inagaki, Y. Okamoto, Surface temperature measurement near ambient conditions using infrared radiometers with different detection wavelength bands by applying a grey-body approximation: estimation of radiative properties for nonmetal surfaces, NDT and E International 29 (6) (1996) 363.

[13E] T. Inagaki, Y. Okamoto, Surface temperature measurement using infrared radiometer by applying a pseudo-gray body approximation: estimation of radiative property for metal surface, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 73.

[14E] J. Lepicovsky, R.J. Bruckner, F.A. Smith, Thin-film thermocouples for localized heat transfer measurements, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 607.

[15E] A. Majumdar, K. Luo, Z. Shi, J. Varesi, Scanning thermal microscopy at nanometer scales: a new frontier in experimental heat transfer, Experimental Heat Transfer 9 (2) (1996) 83.

[16E] F. Mignard, C. Olagnon, G. Fantozzi, P. Chantrenne, M. Raynaud, Thermal shock behaviour of a coarse grain porous alumina Part I Temperature field determination, Journal of Materials Science 31 (8) (1996) 2131.

[17E] M. Olfert, W.W. Duley, Holographic interferometry of isotherms during laser drilling of fused quartz, Journal of Physics D—Applied Physics 29 (5) (1996) 1140.

[18E] M. Stahelin, M.A. Bopp, G. Tarrach, A.J. Meixner, I. Zschokke-Granacher, Temperature profile of fiber tips used in scanning near-field optical microscopy, Applied Physics Letters 68 (19) (1996) 2603.

[19E] K. Storck, M. Karlsson, P. Ask, D. Loyd, Heat transfer evaluation of the nasal thermistor technique, IEEE Transactions on Biomedical Engineering 43 (12) (1996) 1187.

[20E] B.J. Syson, R.G. Pilbrow, J.M. Owen, Effect of rotation on temperature response of thermochromic liquid crystal, International Journal of Heat and Fluid Flow 17 (5) (1996) 491.

[21E] L. Zhu, D.E. Lemons, S. Weinbaum, Microvascular thermal equilibration in rat cremaster muscle, Annals of Biomedical Engineering 24 (1) (1996) 109.

Experimental techniques and instrumentation: velocity measurements

[22E] J.W. Elsner, W. Elsner, On the measurement of turbulence energy dissipation, Measurement Science and Technology 7 (10) (1996) 1334.

[23E] J.R. Feldkamp, Theoretical analysis of an impervious, heated-cylinder 'groundwater velocimeter', International Journal for Numerical and Analytical Methods in Geomechanics 20 (11) (1996) 815.

[24E] J.F. Foss, D.G. Bohl, T.J. Hicks, Pulse width modulated-constant temperature anemometer, Measurement Science and Technology 7 (10) (1996) 1388.

[25E] J.C. Klewicki, R.E. Falco, Spanwise vorticity structure in turbulent boundary layers, International Journal of Heat and Fluid Flow 17 (4) (1996) 363.

[26E] A. Shabbir, P.D. Beuther, W.K. George, X-wire response in turbulent flows of high-intensity turbulence and low mean velocities, Experimental Thermal and Fluid Science 12 (1) (1996) 52.

[27E] D.H. Zhang, Y.T. Chew, S.H. Winoto, Investigation of intermittency measurement methods for transitional boundary layer flows, Experimental Thermal and Fluid Science 12 (4) (1996) 433.

Experimental techniques and instrumentation: thermophysical property measurement

[28E] K.J. Dowding, J.V. Beck, B.F. Blackwell, Estimation of directional-dependent thermal properties in a carbon–carbon composite, International Journal of Heat and Mass Transfer 39 (15) (1996) 3157.

[29E] L. Fabbri, D. Fournier, L. Pottier, L. Esposito, Analysis of local heat transfer properties of tape-cast AlN ceramics using photothermal reflectance microscopy, Journal of Materials Science 31 (20) (1996) 5429.

[30E] H. Watanabe, Accurate and simultaneous measurement of the thermal conductivity and thermal diffusivity of liquids using the transient hot-wire method, Metrologia 33 (2) (1996) 101.

[31E] J.S.Q. Zeng, P.C. Stevens, A.J. Hunt, R. Grief, D. Lee, Thin-film-heater thermal conductivity apparatus and measurement of thermal conductivity of silica aerogel, International Journal of Heat and Mass Transfer 39 (11) (1996) 2311.

Experimental techniques and instrumentation: miscellaneous methods

[32E] S.J. Gibbs, L.D. Hall, What roles are there for magnetic resonance imaging in process tomography, Measurement Science and Technology 7 (5) (1996) 827.

[33E] T. Ida, K. Ohtake, Experimental study of space and time-resolved structures of turbulent diffusion flame, JSME International Journal Series B—Fluids and Thermal Engineering 39 (4) (1996) 815.

[34E] B.P. Rice, C.W. Lee, Novel, low-cost sensors for intelligent process control, International SAMPE Symposium and Exhibition 41 (2) (1996) 1518.

Natural convection — internal flows: plane layers

[1F] S.M. Elsherbiny, Free convection in inclined air layers heated from above, International Journal of Heat and Mass Transfer 39 (18) (1996) 3925.
[2F] J.P. Fontaine, R.L. Sani, Flow and transport in a multi-layered fluid system — II. Influence of thermal boundary conditions and encapsulant, International Journal of Heat and Mass Transfer 39 (13) (1996) 2846.
[3F] K. Kapoor, Y. Jaluria, Penetrative flow due to an isothermal vertical wall in a stable two-layer environment generated by a room fire, International Journal of Heat and Mass Transfer 39 (18) (1996) 3977.
[4F] J.N. Koster, K. Nguyen, Steady natural convection in a double layer of immiscible liquids with density inversion, International Journal of Heat and Mass Transfer 39 (3) (1996) 467.
[5F] G.M. Makhviladze, J.P. Roberts, S.E. Yakush, Turbulent buoyant thermal in a density-stratified atmosphere, International Journal of Heat and Mass Transfer 39 (7) (1996) 1453.
[6F] A. Prakash, J.N. Koster, Steady Rayleigh-Benard convection in a two-layer system of immiscible liquids, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 366.
[7F] J.T. Ratcliff, G. Schubert, A. Zebib, Effects of temperature-dependent viscosity on thermal convection in a spherical shell, Physica D97 (13) (1996) 242.

Natural convection — internal flows: cavities

[8F] S. Armfield, R. Janssen, Direct boundary-layer stability analysis of steady-state cavity convection flow, International Journal of Heat and Fluid Flow 17 (6) (1996) 539.
[9F] F.J. Asfia, V.K. Dhir, Experimental study of natural convection in a volumetrically heated spherical pool bounded on top with a rigid wall, Nuclear Engineering and Design 163 (3) (1996) 333.
[10F] F.J. Asfia, B. Frantz, V.K. Dhir, Experimental investigation of natural convection heat transfer in volumetrically heated spherical segments, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 31.
[11F] A.C. Baytas, Buoyancy-driven flow in an enclosure containing time periodic internal sources, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 113.
[12F] X. Chavanne, F. Chilla, B. Chabaud, B. Castaing, J. Chaussy, B. Hebral, High Rayleigh number convection with gaseous helium at low temperature, Journal of Low Temperature Physics 104 (12) (1996) 109.
[13F] R.A.W.M. Henkes, P. Le Quere, Three-dimensional transition of natural-convection flows, Journal of Fluid Mechanics 1996 (1996) 281.
[14F] S.-S. Hsieh, S.-S. Yang, Transient three-dimensional natural convection in a rectangular enclosure, International Journal of Heat and Mass Transfer 39 (1) (1996) 13.
[15F] R. Janssen, S. Armfield, Stability properties of the vertical boundary layers in differentially heated cavities, International Journal of Heat and Fluid Flow 17 (6) (1996) 547.
[16F] K. Kamakura, H. Ozoe, Oscillatory phenomena of low-Prandtl-number fluids in a rectangular cavity, Numerical Heat Transfer Part A—Applications 30 (5) (1996) 427.
[17F] Y.H. Li, T.C. Chu, T.F. Lin, Numerical simulation of flow pattern formation in a bottom heated cylindrical fluid layer, Numerical Heat Transfer Part A—Applications 30 (5) (1996) 459.
[18F] S. Noorshahi, C.A.I.I.I. Hall, E.K. Glakpe, Natural convection in a corrugated enclosure with mixed boundary conditions, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 50.
[19F] J. Pallares, I. Cuesta, F.X. Grau, F. Giralt, Natural convection in a cubical cavity heated from below at low Rayleigh numbers, International Journal of Heat and Mass Transfer 39 (15) (1996) 3233.
[20F] M. Sakata, Numerical study of natural convection in a cylindrical cavity bounded by a partially-heated vertical wall, Fluid Dynamics Research 18 (4) (1996) 223.
[21F] A.K. Santra, D. Misra, S. Ray, Analysis of laminar natural convection from a discrete isothermal flush heater mounted on the side wall of a partially open rectangular enclosure, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 211.
[22F] T.-H. Song, Stability of a fluid layer with uniform heat generation and convection boundary conditions, International Journal of Heat and Mass Transfer 39 (11) (1996) 2378.
[23F] C.Y. Soong, P.Y. Tzeng, D.C. Chiang, T.S. Sheu, Numerical study on mode-transition of natural convection in differentially heated inclined enclosures, International Journal of Heat and Mass Transfer 39 (14) (1996) 2869.
[24F] J.J. Sturman, G.N. Ivey, J.R. Taylor, Convection in a long box driven by heating and cooling on the horizontal boundaries, Journal of Fluid Mechanics 1996 (1996) 61.
[25F] S. Syrjala, Higher order penalty-Galerkin finite element approach to laminar natural convection in a square cavity, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 197.
[26F] T. Tagawa, H. Ozoe, Effect of Prandtl number and computational schemes on the oscillatory natural convection in an enclosure, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 271.
[27F] M.E. Ulucakli, Turbulent natural convection in an enclosure with localized heating from below, Experimental Heat Transfer 9 (4) (1996) 305.

Natural convection — internal flows: conjugate problems

[28F] C.Y. Choi, S.J. Kim, Conjugate mixed convection in a channel: modified five percent deviation rule, International Journal of Heat and Mass Transfer 39 (6) (1996) 1223.
[29F] J. Fleming, M.R. Amin, Conjugate natural convection

in a planar thermosyphon with multiple inlets — II. Heat transfer, International Journal of Heat and Mass Transfer 39 (1) (1996) 61.

[30F] J. Fleming, Amin M. Ruhul, Conjugate natural convection in a planar thermosyphon with multiple inlets — I. Velocity and temperature fields, International Journal of Heat and Mass Transfer 39 (1) (1996) 49.

[31F] E. Luna, C. Trevino, F.J. Higuera, Conjugate natural convection heat transfer between two fluids separated by a horizontal wall: steady-state analysis, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 353.

Natural convection — internal flows: vertical channels and slots

[32F] A.A. Dafa'Alla, P.L. Betts, Experimental study of turbulent natural convection in a tall air cavity, Experimental Heat Transfer 9 (2) (1996) 165.

[33F] P.W. Griffiths, B. Norton, P.C. Eames, S.N.G. Lo, Detailed simulation of heat transfer across planar evacuated glazing, Building Research and Information 24 (3) (1996) 141.

[34F] H. Gunes, R.A. Sahan, Low-dimensional models of transitional free convective flow and heat transfer, Turkish Journal of Engineering and Environmental Sciences/Turk Muhendislik Ve Cevre Bilimleri Dergisi 20 (5) (1996) 281.

[35F] Y.Y. Jin, C.F. Chen, Instability of convection and heat transfer of high Prandtl number fluids in a vertical slot, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 359.

[36F] Y.Y. Jin, C.F. Chen, Natural convection of high Prandtl number fluids with variable viscosity in a vertical slot, International Journal of Heat and Mass Transfer 39 (13) (1996) 2663.

[37F] J.R. Phillips, Direct simulations of turbulent unstratified natural convection in a vertical slot for Pr equals 0.71, International Journal of Heat and Mass Transfer 39 (12) (1996) 2485.

[38F] S.A.M. Said, Investigation of natural convection in convergent vertical channels, International Journal of Energy Research 20 (7) (1996) 559.

[39F] C.F. Wallgren, F.H. Bark, R. Eriksson, D.S. Simonsson, J. Persson, R.I. Karlsson, Mass transport in a weakly stratified electrochemical cell, Journal of Applied Electrochemistry 26 (12) (1996) 1235.

Natural convection — internal flows: annular flows

[40F] J.C. Chen, G.H. Chou, C.K. Hsieh, Influence of inner-wall motion on the linear stability of natural convection in a tall vertical annulus, International Journal of Heat and Mass Transfer 39 (1) (1996) 193.

[41F] C.-H. Cheng, C.-C. Chao, Numerical prediction of the buoyancy-driven flow in the annulus between horizontal eccentric elliptical cylinders, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 283.

[42F] C.P. Chiu, W.R. Chen, Transient natural convection between concentric and vertically eccentric spheres with mixed boundary conditions, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 137.

[43F] A.K. Mohanty, M.R. Dubey, Buoyancy induced flow and heat transfer through a vertical annulus, International Journal of Heat and Mass Transfer 39 (10) (1996) 2087.

[44F] F. Moukalled, S. Acharya, Natural convection in the annulus between concentric horizontal circular and square cylinders, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 524.

[45F] C.V. Raghavarao, Y.V.S.S. Sanyasiraju, Natural convection heat transfer of cold water in an eccentric horizontal cylindrical annulus — a numerical study, Computational Mechanics 18 (6) (1996) 464.

[46F] J.G. Wei, W.Q. Tao, Numerical study of natural convection in a vertical annulus with constant heat flux on the inner wall, International Journal of Numerical Methods for Heat and Fluid Flow 6 (7) (1996) 31.

Natural convection — internal flows: complex geometries

[47F] R.E. Canaan, D.E. Klein, Experimental investigation of natural convection heat transfer within horizontal spent-fuel assemblies, Nuclear Technology 116 (3) (1996) 306.

[48F] R.B. Chinnakotla, D. Angirasa, R.L. Mahajan, Parametric study of buoyancy-induced flow and heat transfer from L-shaped corners with asymmetrically heated surfaces, International Journal of Heat and Mass Transfer 39 (4) (1996) 851.

[49F] M. De Moor, D. Berckmans, Building a grey box model to model the energy and mass transfer in an imperfectly mixed fluid by using experimental data, Mathematics and Computers in Simulation 42 (23) (1996) 233.

[50F] C.P. Desai, K. Vafai, Experimental and numerical study of buoyancy-induced flow and heat transfer in an open annular cavity, International Journal of Heat and Mass Transfer 39 (10) (1996) 2053.

[51F] K. Hanjalic, S. Kenjeres, F. Durst, Natural convection in partitioned two-dimensional enclosures at higher Rayleigh numbers, International Journal of Heat and Mass Transfer 39 (7) (1996) 1407.

[52F] J.P. Liu, W.Q. Tao, Numerical analysis of natural convection around a vertical channel in a rectangular enclosure, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 313.

[53F] T. Takeda, M. Hishida, Studies on molecular diffusion and natural convection in a multicomponent gas system, International Journal of Heat and Mass Transfer 39 (3) (1996) 527.

[54F] H. Turkoglu, N. Yucel, Natural convection heat transfer in enclosures with conducting multiple partitions and side walls, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 1.

[55F] R.C. Xin, M.A. Ebadian, Natural convection heat transfer from helicoidal pipes, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 297.

Natural convection — internal flows: transient systems

[56F] P.-H. Chen, Effect of the aspect ratio on the transient mass/heat transfer in an open cavity, Chung-Kuo Kung Ch'Eng Hsueh K'An/Journal of the Chinese Institute of Engineers 19 (2) (1996) 273.
[57F] D. Dabiri, M. Gharib, Effects of forced boundary conditions on flow within a cubic cavity using digital particle image thermometry and velocimetry (DPITV), Experimental Thermal and Fluid Science 13 (4) (1996) 349.
[58F] V.A. Demin, G.Z. Gershuni, I.V. Verkholantsev, Mechanical quasi-equilibrium and thermovibrational convective instability in an inclined fluid layer, International Journal of Heat and Mass Transfer 39 (9) (1996) 1979.
[59F] F.T. Ferguson, lu Lilleleht, Thermovibrational convection in a vertical cylinder, International Journal of Heat and Mass Transfer 39 (14) (1996) 2895.
[60F] T. Fusegi, Mixed convection in periodic open cavities with oscillatory throughflow, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 33.
[61F] H.S. Kwak, J.M. Hyun, Natural convection in an enclosure having a vertical sidewall with time-varying temperature, Journal of Fluid Mechanics 1996 (1996) 65.
[62F] A.K. Prasad, J.R. Koseff, Combined forced and natural convection heat transfer in a deep lid-driven cavity flow, International Journal of Heat and Fluid Flow 17 (5) (1996) 460.

Natural convection — internal flows: plumes and thermal discharges

[63F] Z. Dai, G.M. Faeth, Measurements of the structure of self-preserving round buoyant turbulent plumes, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 493.
[64F] H.T. Lin, J.J. Chen, L.W. Kung, W.S. Yu, Y.M. Chen, Inclined and horizontal wall plumes, International Journal of Heat and Mass Transfer 39 (11) (1996) 2243.
[65F] M. Poreh, Investigation of heat islands using small scale models, Atmospheric Environment 30 (3) (1996) 467.
[66F] C. Valeo, I.K. Tsanis, Two case studies of dilution models applied to thermal discharges, Canadian Journal of Civil Engineering 23 (1) (1996) 193.

Natural convection — internal flows: double diffusive and thermocapillary convection

[67F] R. Bennacer, D. Gobin, Cooperating thermosolutal convection in enclosures — I. Scale analysis and mass transfer, International Journal of Heat and Mass Transfer 39 (13) (1996) 2671.
[68F] J.P. Fontaine, R.L. Sani, Flow and transport in a multilayered fluid system — I. Influence of 1- or mu-g environment, International Journal of Heat and Mass Transfer 39 (13) (1996) 2751.
[69F] D. Gobin, R. Bennacer, Cooperating thermosolutal convection in enclosures — II. Heat transfer and flow structure, International Journal of Heat and Mass Transfer 39 (13) (1996) 2683.
[70F] D. Gobin, R. Bennacer, Double diffusive natural convection in aqueous solutions near the density maximum, International Communications in Heat and Mass Transfer 23 (7) (1996) 971.
[71F] Y. Kamotani, J. Masud, A. Pline, Oscillatory convection due to combined buoyancy and thermocapillarity, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 102.
[72F] M. Mamou, P. Vasseur, E. Bilgen, Analytical and numerical study of double diffusive convection in a vertical enclosure, Warme und Stoffubertragung–Thermo and Fluid Dynamics 32 (12) (1996) 115.
[73F] A.T. Shih, C.M. Megaridis, Thermocapillary flow effects on convective droplet evaporation, International Journal of Heat and Mass Transfer 39 (2) (1996) 247.
[74F] P. Wang, R. Kahawita, Transient buoyancy-thermocapillary convection in two superposed immiscible liquid layers, Numerical Heat Transfer Part A–Applications 30 (5) (1996) 477.

Natural convection — internal flows: fires

[75F] A.H. Abib, Y. Jaluria, Generation of stable thermal stratification in a partially enclosed space due to a room fire, International Journal of Numerical Methods for Heat and Fluid Flow 6 (8) (1996) 31.
[76F] S.A. Abu-Zaid, Analyzing a transit subway station during fire emergency using computational fluid dynamics, Transportation Research Record 1996 (1996) 159.
[77F] O. Axenenko, G. Thorpe, Modelling of dehydration and stress analysis of gypsum plasterboards exposed to fire, Computational Materials Science 6 (3) (1996) 281.
[78F] W. Baker, H. Iyengar, R. Sinn, R. Johnson, Bare bones buildings, Civil Engineering (New York) 66 (11) (1996) 42.
[79F] A.M. Birk, M.H. Cunningham, Liquid temperature stratification and its effect on BLEVEs and their hazards, Journal of Hazardous Materials 48 (13) (1996) 219.
[80F] M.R. Buckingham, A.J. Lindsay, D.E. Stevenson, G. Muller, E. Morel, B. Costes, Y. Henry, Synthesis and formulation of novel phosphorylated flame retardant curatives for thermoset resins, Polymer Degradation and Stability 54 (23) (1996) 311.
[81F] J.P. Burelbach, M. Epstein, M.G. Plys, Temperature rise at the surface of a liquid layer subject to a concentrated heat source placed above the layer, Journal of Heat Transfer–Transactions of the ASME 118 (2) (1996) 374.
[82F] W.K. Chow, Simulation of tunnel fires using a zone model, Tunnelling and Underground Space Technology 11 (2) (1996) 221.
[83F] W.L. Dickey, Fire endurance of brick walls and veneer, Building Standards 65 (2) (1996) 6.
[84F] Z. Fu, W. Fan, Zone-type model for a building fire and its sensitivity analysis, Fire and Materials 20 (5) (1996) 215.
[85F] J.T. Gerlich, P.C.R. Collier, A.H. Buchanan, Design of light steel-framed walls for fire resistance, Fire and Materials 20 (2) (1996) 79.

[86F] J.A. Mardini, A.S. Lavine, V.K. Dhir, Heat and mass transfer in wooden dowels during a simulated fire: an experimental and analytical study, International Journal of Heat and Mass Transfer 39 (13) (1996) 2641.

[87F] V. Novozhilov, B. Moghtaderi, D.F. Fletcher, J.H. Kent, Computational fluid dynamics modelling of wood combustion, Fire Safety Journal 27 (1) (1996) 69.

[88F] V. Novozhilov, B. Moghtaderi, D.F. Fletcher, J.H. Kent, Numerical simulation of enclosed gas fire extinguishment by a water spray, Journal of Applied Fire Science 5 (2) (1996) 1995.

[89F] T. Ohlemiller, T. Cleary, J. Shields, Effect of ignition conditions on upward flame spread on a composite material in a corner configuration, International SAMPE Symposium and Exhibition 41 (1) (1996) 734.

[90F] M. Poreh, H.P. Morgan, On power laws for describing the mass flux in the near field of fires, Fire Safety Journal 27 (2) (1996) 159.

[91F] B. Porterie, M. Larini, F. Giroud, J.C. Loraud, Solid-propellant fire in an enclosure fitted with a ceiling safety-vent, International Journal of Heat and Mass Transfer 39 (3) (1996) 575.

[92F] J. Redfern, Feeling the burn: Measuring heat release in fires, Materials World 4 (2) (1996) 73.

[93F] Y. Sakumoto, T. Nakazato, A. Matsuzaki, High-temperature properties of stainless steel for building structures, Journal of Structural Engineering—ASCE 122 (4) (1996) 399.

[94F] J. Soderbom, P. van Hees, P. Meirsschaert, Influence of ignition sources on heat release rate in the furniture calorimeter, Fire and Materials 20 (2) (1996) 61.

[95F] U. Sorathia, C. Beck, Fire protection of glass/vinyl ester composites for structural applications, International SAMPE Symposium and Exhibition 41 (1) (1996) 687.

[96F] M.A. Sultan, Effect of furnace parameters on fire severity in standard fire resistance tests, Fire and Materials 20 (5) (1996) 245.

[97F] M.A. Sultan, Model for predicting heat transfer through noninsulated unloaded steel-stud gypsum board wall assemblies exposed to fire, Fire Technology 32 (3) (1996) 239.

[98F] P.J. Woodburn, R.E. Britter, CFD simulations of a tunnel fire — Part I, Fire Safety Journal 26 (1) (1996) 35.

[99F] P.J. Woodburn, R.E. Britter, CFD simulations of a tunnel fire — Part II, Fire Safety Journal 26 (1) (1996) 63.

[100F] Z. Yan, G. Holmstedt, CFD and experimental studies of room fire growth on wall lining materials, Fire Safety Journal 27 (3) (1996) 201.

Natural convection — external flows: vertical plate

[1FF] C.K. Chen, Y.T. Yang, M.T. Lin, Transient free convection of nonNewtonian fluids along a wavy vertical plate including the magnetic field effect, International Journal of Heat and Fluid Flow 17 (6) (1996) 604.

[2FF] S.K. Dash, Heatline visualization in turbulent flow, International Journal of Numerical Methods for Heat and Fluid Flow 6 (4) (1996) 37.

[3FF] M. Harhira, S.K. Roy, S. Sengupta, Natural convection heat transfer from a vertical flat plate with phase change material suspensions, Journal of Enhanced Heat Transfer 4 (1) (1996) 17.

[4FF] T.J. Heindel, S. Ramadhyani, F.P. Incropera, Conjugate natural convection from an array of protruding heat sources, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 1.

[5FF] H.D. Jiang, S. Ostrach, Y. Kamotani, Thermosolutal transport phenomena in large Lewis number electrochemical systems, International Journal of Heat and Mass Transfer 39 (4) (1996) 841.

[6FF] S.W. Joo, S.H. Davis, S.G. Bankoff, Mechanism for rivulet formation in heated falling films, Journal of Fluid Mechanics 1996 (1996) 279.

[7FF] M. Kumari, A. Slaouti, H.S. Takhar, S. Nakamura, G. Nath, Unsteady free convection flow over a continuous moving vertical surface, Acta Mechanica 116 (1996) 1.

[8FF] K.C. Leong, T.C. Kooi, Natural convection from a vertical rectangular fin, Experimental Heat Transfer 9 (4) (1996) 287.

[9FF] B.Q. Li, g-Jitter induced free convection in a transverse magnetic field, International Journal of Heat and Mass Transfer 39 (14) (1996) 2853.

[10FF] H.-T. Lin, C.-P. Lin, Transient mass transfer in a steady laminar flow driven by thermal buoyancy, Journal of the Chinese Institute of Chemical Engineers 27 (6) (1996) 447.

[11FF] J.H. Merkin, I. Pop, Conjugate free convection on a vertical surface, International Journal of Heat and Mass Transfer 39 (7) (1996) 1527.

[12FF] A. Mongruel, M. Cloitre, C. Allain, Scaling of boundary-layer flows driven by double-diffusive convection, International Journal of Heat and Mass Transfer 39 (18) (1996) 3899.

[13FF] D. Niculin, M. Strelets, A. Dvinsky, A. Bar-Cohen, Navier–Stokes study of natural convection and heat transfer in vertical symmetrically heated plate-fin heat sinks, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 703.

[14FF] Darbhe M. Nitin, K. Muralidhar, Natural convection heat transfer from a discrete protruding surface, International Communications in Heat and Mass Transfer 23 (3) (1996) 417.

[15FF] C. Trevino, F. Mendez, F.J. Higuera, Heat transfer across a vertical wall separating two fluids at different temperatures, International Journal of Heat and Mass Transfer 39 (11) (1996) 2231.

[16FF] Y.-T. Yang, Co.-K Chen, M.-T. Lin, Natural convection of nonNewtonian fluids along a wavy vertical plate including the magnetic field effect, International Journal of Heat and Mass Transfer 39 (13) (1996) 2831.

Natural convection — external flows: inclined and horizontal surfaces

[17FF] S. Honda, Local Rayleigh and Nusselt numbers for cartesian convection with temperature-dependent viscosity, Geophysical Research Letters 23 (18) (1996) 2445.

[18FF] A.A. Mohammadein, R.S.R. Gorla, Effects of transverse magnetic field on mixed convection in a micropolar fluid on a horizontal plate with vectored mass transfer, Acta Mechanica 118 (1996) 1.

[19FF] W.J. Sheu, M.C. Lin, Thermal ignition in buoyancy-driven boundary layer flows along inclined hot plates, International Journal of Heat and Mass Transfer 39 (10) (1996) 2187.

Natural convection — external flows: spheres and cylinders

[20FF] Y.-M. Chen, K.C. Wang, Numerical and experimental studies on natural convection from a horizontal elliptic cylinder, Journal of the Chinese Institute of Chemical Engineers 27 (5) (1996) 353.

[21FF] I. Dincer, S. Dost, Immersing cooling of large spherical produces: thermal parameters, International Journal of Energy Research 20 (4) (1996) 351.

[22FF] G.N. Facas, H.L. Brown, Natural convection from a cylinder with multiple, low-conductivity, longitudinal baffles, International Journal of Heat and Mass Transfer 39 (10) (1996) 2077.

[23FF] H. Jia, G. Gogos, Laminar natural convection heat transfer from isothermal spheres, International Journal of Heat and Mass Transfer 39 (8) (1996) 1603.

[24FF] H. Jia, G. Gogos, Transient laminar natural convection heat transfer from isothermal spheres, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 83.

[25FF] H. Koizumi, I. Hosokawa, Chaotic behavior and heat transfer performance of the natural convection around a hot horizontal cylinder affected by a flat ceiling, International Journal of Heat and Mass Transfer 39 (5) (1996) 1081.

Natural convection — external flows: mixed convection

[26FF] R.S.R. Gorla, M.A. Mansour, A.A. Mohammedien, Combined convection in an axisymmetric stagnation flow of micropolar fluid, International Journal of Numerical Methods for Heat and Fluid Flow 6 (4) (1996) 47.

[27FF] F.M. Hady, A.Y. Bakier, R.S.R. Gorla, Mixed convection boundary layer flow on a continuous flat plate with variable viscosity, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (3) (1996) 169.

[28FF] C.J. Kobus, G.L. Wedekind, Modeling the local and average heat transfer coefficient for an isothermal vertical flat plate with assisting and opposing combined forced and natural convection, International Journal of Heat and Mass Transfer 39 (13) (1996) 2723.

[29FF] D.L. Loveday, A.H. Taki, Convective heat transfer coefficients at a plane surface on a full-scale building facade, International Journal of Heat and Mass Transfer 39 (8) (1996) 1729.

[30FF] A.A. Mohammedien, R.S.R. Gorla, I.A. Hassanien, Mixed convection in an axisymmetric stagnation flow of micropolar fluid on a vertical cylinder, Acta Mechanica 114 (1996) 1.

[31FF] K. Nakabe, H. Hasegawa, K. Matsubara, K. Suzuki, Numerical simulation of combined convection heat transfer from heated cylinder mounted in flow between parallel plates, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1937.

[32FF] G.L. Wedekind, C.J. Kobus, Predicting the average heat transfer coefficient for an isothermal vertical circular disk with assisting and opposing combined forced and natural convection, International Journal of Heat and Mass Transfer 39 (13) (1996) 2843.

Natural convection — external flows: miscellaneous

[33FF] C. Barat, J.P. Garandet, Effect of natural convection in liquid phase mass transport coefficient measurements: the case of thermosolutal convection, International Journal of Heat and Mass Transfer 39 (10) (1996) 2177.

[34FF] A. Fernandes, S.K. Loyalka, Modeling of thermophoretic deposition of aerosols in nuclear reactor containments, Nuclear Technology 116 (3) (1996) 270.

[35FF] D.J. Goering, P. Kumar, Winter-time convection in open-graded embankments, Cold Regions Science and Technology 24 (1) (1996) 57.

[36FF] M. Nishimura, H. Shibazaki, S. Fujii, I. Maekawa, Natural convection heat transfer in the horizontal dry storage system for the LWR spent fuel assemblies, Journal of Nuclear Science and Technology 33 (11) (1996) 821.

[37FF] V. Pines, A. Chait, M. Zlatkowski, Thermal diffusion dominated dendritic growth — an analysis of the wall proximity effect, Journal of Crystal Growth 167 (12) (1996) 383.

[38FF] S. Volker, T. Burton, S.P. Vanka, Finite-volume multigrid calculation of natural-convection flows on unstructured grids, Numerical Heat Transfer Part B—Fundamentals 30 (1) (1996) 1.

[39FF] J. Xu, A. Zebib, Improved boundary-element method and its application to time-dependent convection, Numerical Heat Transfer Part B—Fundamentals 30 (1) (1996) 93.

[40FF] X. Ye, B. Tabarrok, D. Walsh, Influence of thermosolutal convection on CdTe growth by the travelling heater method, Journal of Crystal Growth 169 (4) (1996) 704.

[41FF] B. Zappoli, P. Carles, Speeding up of heterogeneous reactions in near-critical phases, Acta Astronautica 38 (1) (1996) 39.

Rotating surfaces: rotating disks

[1G] S. Bhattacharyya, A. Pal, G. Nath, Unsteady flow and heat transfer between rotating coaxial disks, Numerical Heat Transfer Part A—Applications 30 (5) (1996) 519.

[2G] R. Labbe, J.F. Pinton, S. Fauve, Power fluctuations in turbulent swirling flows, Journal de Physique II6 (7) (1996) 1099.

[3G] C.Y. Soong, Theoretical analysis for axisymmetric mixed convection between rotating coaxial disks, International Journal of Heat and Mass Transfer 39 (8) (1996) 1569.

[4G] P.G. Tucker, C.A. Long, Numerical investigation into influence of geometry on flow in a rotating cavity with an axial throughflow, International Communications in Heat and Mass Transfer 23 (3) (1996) 335.

[5G] A. Yevtushenko, R. Chapovska, Effect of a thin film on the heat distribution between a stationary pin and a rotating disk, Numerical Heat Transfer Part A—Applications 30 (8) (1996) 835.

Rotating surfaces: rotating channels

[6G] T. Bo, H. Iacovides, Numerical study of the effects of rotational buoyancy on fully developed flow in rotating rectangular ducts, International Journal of Numerical Methods for Heat and Fluid Flow 6 (7) (1996) 47.
[7G] P.R.N. Childs, C.A. Long, Review of forced convective heat transfer in stationary and rotating annuli, Proceedings of the Institution of Mechanical Engineers Part C Journal of Mechanical Engineering Science 210 (2) (1996) 123.
[8G] S. Dutta, M.J. Andrews, J.-C. Han, Prediction of turbulent heat transfer in rotating smooth square ducts, International Journal of Heat and Mass Transfer 39 (12) (1996) 2505.
[9G] S. Dutta, J.-C. Han, Lee C. Pang, Local heat transfer in a rotating two-pass ribbed triangular duct with two model orientations, International Journal of Heat and Mass Transfer 39 (4) (1996) 707.
[10G] H. Iacovides, B.E. Launder, H.Y. Li, Computation of flow development through stationary and rotating U-ducts of strong curvature, International Journal of Heat and Fluid Flow 17 (1) (1996) 22.
[11G] S. Imao, M. Itoh, T. Harada, Turbulent characteristics of the flow in an axially rotating pipe, International Journal of Heat and Fluid Flow 17 (5) (1996) 444.
[12G] H. Ishigaki, Laminar flow and heat transfer in a square duct rotating around a perpendicular axis, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1795.
[13G] A.A. Kolyshkin, R. Vaillancourt, Linear stability of Couette flow with rotating inner cylinder and radially nonuniform internal heat sources, International Journal of Heat and Mass Transfer 39 (3) (1996) 537.
[14G] C.R. Kuo, G.J. Hwang, Experimental studies and correlations of radically outward and inward air-flow heat transfer in a rotating square duct, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 23.
[15G] E. Lamballais, M. Lesieur, O. Metais, Effects of spanwise rotation on the vorticity stretching in transitional and turbulent channel flow, International Journal of Heat and Fluid Flow 17 (3) (1996) 324.
[16G] M. Mahadevappa, V.R. Rao, V.M.K. Sastri, Numerical study of steady laminar fully developed fluid flow and heat transfer in rectangular and elliptical ducts rotating about a parallel axis, International Journal of Heat and Mass Transfer 39 (4) (1996) 867.
[17G] H. Mori, H. Ogata, Measurement of liquid helium heat transfer in a high-speed rotational field and consideration of effect of obstacles blocking channels on the heat transfer, Cryogenics 36 (3) (1996) 149.
[18G] W.D. Morris, Rotating facility to study heat transfer in the cooling passages of turbine rotor blades, Proceedings of the Institution of Mechanical Engineers A (1996).
[19G] W.D. Morris, Rahmat-Abadi K. Farhadi, Convective heat transfer in rotating ribbed tubes, International Journal of Heat and Mass Transfer 39 (11) (1996) 2253.
[20G] L. Wang, K.C. Cheng, Flow transitions and combined free and forced convective heat transfer in a rotating curved circular tube, International Journal of Heat and Mass Transfer 39 (16) (1996) 3381.
[21G] C. Yildiz, Y. Bicer, D. Pehlivan, Efficiency of heat exchangers with rotating inner pipes, Energy 21 (10) (1996) 947.

Rotating surfaces: enclosures

[22G] P.Z. Bar-Yoseph, Y. Kryzhanovski, Axisymmetric vortex breakdown for generalized Newtonian fluid contained between rotating spheres, Journal of Non-Newtonian Fluid Mechanics 66 (23) (1996) 145.
[23G] N.K. Ghaddar, Natural convection over rotating cylindrical heat source in an enclosure, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 303.
[24G] M. Jaeger, M. Medale, A. Randriamanpianina, Numerical modeling of buoyancy-driven flows in a rotating cylindrical cavity: comparison of a finite element model with a spectral model, Numerical Heat Transfer Part A—Applications 30 (8) (1996) 779.
[25G] K. Julien, S. Legg, J. McWilliams, J. Werne, Rapidly rotating turbulent Rayleigh–Benard convection, Journal of Fluid Mechanics 1996 (1996) 243.
[26G] Y.T. Ker, T.F. Lin, Combined numerical and experimental study of air convection in a differentially heated rotating cubic cavity, International Journal of Heat and Mass Transfer 39 (15) (1996) 3193.
[27G] T.L. Lee, T.F. Lin, Transient three-dimensional convection of air in a differentially heated rotating cubic cavity, International Journal of Heat and Mass Transfer 39 (6) (1996) 1243.
[28G] P.C. Liu, Onset of Benard–Marangoni convection in a rotating liquid layer with nonuniform volumetric energy sources, International Journal of Heat and Fluid Flow 17 (6) (1996) 579.
[29G] W.Y.D. Yuen, Steady-state heat transfer in a rotating cylinder subject to convective surface cooling, Mathematical Engineering in Industry 5 (4) (1996) 305.

Rotating surfaces: cylinders, spheres, bodies of revolution

[30G] N. Hatem, C. Philippe, C. Mbow, Z. Kabdi, S. Najoua, M. Daguenet, Numerical study of mixed convection around a sphere rotating about its vertical axis in a Newtonian fluid at rest and subject to a heat flux, Numerical Heat Transfer Part A—Applications 29 (4) (1996) 397.
[31G] A.A. Kendoush, Approximate solution of the convective heat transfer from an isothermal rotating cylinder, International Journal of Heat and Fluid Flow 17 (4) (1996) 439.
[32G] W.N. Kim, J.M. Hyun, H. Ozoe, Effect of aspect ratio on mass transfer from a rotating cup, International Journal of Heat and Mass Transfer 39 (11) (1996) 2375.

[33G] H.D. Nguyen, S. Paik, R.W. Douglass, Unsteady mixed convection about a rotating circular cylinder with small fluctuations in the free-stream velocity, International Journal of Heat and Mass Transfer 39 (3) (1996) 511.

[34G] G. Zheng, R. List, Convective heat transfer of rotating spheres and spheroids with nonuniform surface temperatures, International Journal of Heat and Mass Transfer 39 (9) (1996) 1815.

Rotating surfaces: miscellaneous

[35G] O.M. Ibrahim, D.E. Nagle, Effects of rotation on ice formation, ASHRAE Transactions 102 (1) (1996) 344.

[36G] J.D. Johnston, E.A. Thornton, Thermal response of radiantly heated spinning spacecraft booms, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 60.

[37G] J. Xin, C.M. Megaridis, Droplet spindown in a high-temperature gas environment, International Journal of Heat and Fluid Flow 17 (6) (1996) 567.

[38G] J. Xin, C.M. Megaridis, Effects of rotating gaseous flows on transient droplet dynamics and heating, International Journal of Heat and Fluid Flow 17 (1) (1996) 52.

Combined heat and mass transfer: transpiration and ablation

[1H] F. Chen, W.J. Bowman, R. Bowersox, Effect of transpiration cooling on nozzle heat transfer, Journal of Spacecraft and Rockets 33 (3) (1996) 453.

[2H] C. Di Blasi, Heat transfer mechanisms and multi-step kinetics in the ablative pyrolysis of cellulose, Chemical Engineering Science 51 (10) (1996) 2211.

[3H] R.E. Hogan, B.F. Blackwell, R.J. Cochran, Application of moving grid control volume finite element method to ablation problems, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 312.

[4H] M.F. Modest, Three-dimensional, transient model for laser machining of ablating/decomposing materials, International Journal of Heat and Mass Transfer 39 (2) (1996) 221.

[5H] F. Ren, H.S. Sun, L.Y. Liu, Theoretical analysis for mechanical erosion of carbon-base materials in ablation, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 593.

[6H] N.M. Sreekanth, Reddy, Injection cooling of blunt bodies flying at high Mach numbers, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 586.

[7H] G. Tingwei, Z. Tingying, H. Jichuan, G. Linghui, Effect of the geometric parameters of a perforated plate on its heat transfer characteristics, Cryogenics 36 (6) (1996) 443.

Combined heat and mass transfer: film cooling

[8H] V.K. Garg, R.E. Gaugler, Leading edge film-cooling effects on turbine blade heat transfer, Numerical Heat Transfer Part A—Applications 30 (2) (1996) 165.

[9H] M.Y. Jabbari, K.C. Marston, E.R.G. Eckert, R.J. Goldstein, Film cooling of the gas turbine endwall with discrete hole injection, Journal of Turbomachinery 118 (1996) 278.

[10H] H.W. Jiang, J.C. Han, Effect of film hole row location on film effectiveness on a gas turbine blade, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 327.

[11H] B.A. Jubran, A.S. Al-Salaymeh, Heat transfer enhancement in electronic modules using ribs and 'film-cooling-like' techniques, International Journal of Heat and Fluid Flow 17 (2) (1996) 148.

[12H] T. Kanda, F. Ono, M. Takahashi, T. Saito, Y. Wakamatsu, Experimental studies of supersonic film cooling with shock wave interaction, AIAA Journal 34 (2) (1996) 265.

[13H] S.-L. Kuo, N.-L. Zhang, W.-J. Yang, Role of mainstream flow velocity in film cooling in a duct, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 382.

[14H] B.L. Lapworth, M.G. Rose, R.G.D. Nedar, Calculation of flow and heat transfer near the entrance to film-cooling holes using three-dimensional mesh embedding with solution adaptation, International Journal of Heat and Fluid Flow 17 (2) (1996) 155.

[15H] P.M. Ligrani, R. Gong, J.M. Cuthrell, J.S. Lee, Bulk flow pulsations and film cooling — I. Injectant behavior, International Journal of Heat and Mass Transfer 39 (11) (1996) 2271.

[16H] P.M. Ligrani, R. Gong, J.M. Cuthrell, J.S. Lee, Bulk flow pulsations and film cooling — II. Flow structure and film effectiveness, International Journal of Heat and Mass Transfer 39 (11) (1996) 2283.

[17H] J.-T. Yang, C.-H. Tsai, High temperature heat transfer of separated flow over a sudden-expansion with base mass injection, International Journal of Heat and Mass Transfer 39 (11) (1996) 2293.

[18H] R.J. Yang, Assessment of turbulence and chemistry models for film-cooled nozzle flows, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 284.

Combined heat and mass transfer: submerged jets

[19H] H. Al-Salam, A. Haji-Sheikh, S.M. You, Effect of turbulence on heat transfer in stagnation flow, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 290.

[20H] S. Ashforth-Frost, K. Jambunathan, Numerical prediction of semi-confined jet impingement and comparison with experimental data, International Journal for Numerical Methods in Fluids 23 (3) (1996) 295.

[21H] A.P. Bhansali, W.Z. Black, Local, instantaneous heat transfer coefficients for jet impingement on a phase change surface, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 334.

[22H] D.W. Colucci, R. Viskanta, Effect of nozzle geometry on local convective heat transfer to a confined impinging air jet, Experimental Thermal and Fluid Science 13 (1) (1996) 71.

[23H] T. Elperin, A. Fominykh, Mass transfer between a two-dimensional wall jet with a heterogeneous chemical reaction of the first order and a wall: analytical solution,

International Journal of Heat and Mass Transfer 39 (15) (1996) 3287.
[24H] M.D. Fox, M. Kurosaka, Supersonic cooling by shock–vortex interaction, Journal of Fluid Mechanics 1996 (1996) 363.
[25H] N.D. Francis, W.J. Wepfer, Jet impingement drying of a moist porous solid, International Journal of Heat and Mass Transfer 39 (9) (1996) 1911.
[26H] K. Hourigan, M. Rudman, E. Brocher, Feedback loop in impinging two-dimensional high-subsonic and supersonic jets, Experimental Thermal and Fluid Science 12 (2) (1996) 265.
[27H] M.A. Jarrah, T.K. Aldoss, A.M. Al-Sarkhi, Interaction of two opposite conical curved wall jets, International Journal of Heat and Fluid Flow 17 (4) (1996) 397.
[28H] K. Kapoor, Y. Jaluria, Flow and heat transfer due to a buoyant ceiling jet turning downward at a corner, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 38.
[29H] P.P. Khramtsov, O.G. Martynenko, V.S. Burak, I.A. Shikh, Stable vortex structures in axisymmetric convective torch during oscillating combustion, International Journal of Heat and Mass Transfer 39 (7) (1996) 1519.
[30H] D.S. Kim, S.H. Yoon, D.H. Lee, K.C. Kim, Flow and heat transfer measurements of a wall attaching offset jet, International Journal of Heat and Mass Transfer 39 (14) (1996) 2907.
[31H] J.C.S. Lai, D. Lu, Effect of wall inclination on the mean flow and turbulence characteristics in a two-dimensional wall jet, International Journal of Heat and Fluid Flow 17 (4) (1996) 377.
[32H] H. Laschefski, T. Cziesla, G. Biswas, N.K. Mitra, Numerical investigation of heat transfer by rows of rectangular impinging jets, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 87.
[33H] X. Li, Study of the jet-flow rate of cooling in machining. Part 1. Theoretical analysis, Journal of Materials Processing Technology 62 (13) (1996) 149.
[34H] X. Li, Study of the jet-flow rate of cooling in machining. Part 2. Simulation study, Journal of Materials Processing Technology 62 (13) (1996) 157.
[35H] O. Likhachev, A. Tumin, Stability of a compressible laminar wall-jet with heat transfer, Journal of Fluids Engineering—Transactions of the ASME 118 (4) (1996) 824.
[36H] Z.-H. Lin, C.-L. Huang, Y.-H. Hung, Heat transfer investigation on a flat plate by using confined round jet impingement, Chung-Kuo Chi Hsueh Kung Ch'Eng Hsueh Pao/Journal of the Chinese Society of Mechanical Engineers 17 (2) (1996) 173.
[37H] T. Liu, J.P. Sullivan, Heat transfer and flow structures in an excited circular impinging jet, International Journal of Heat and Mass Transfer 39 (17) (1996) 3695.
[38H] C. Meola, L. de Luca, G.M. Carlomagno, Influence of shear layer dynamics on impingement heat transfer, Experimental Thermal and Fluid Science 13 (1) (1996) 29.
[39H] W.D. Morris, J.O. Medwell, Methodology for designing impingement air jet coolers for continuous annealing of steel strip, Ironmaking and Steelmaking 23 (5) (1996) 438.
[40H] K. Nishino, M. Samada, K. Kasuya, K. Torii, Turbulence statistics in the stagnation region of an axisymmetric impinging jet flow, International Journal of Heat and Fluid Flow 17 (3) (1996) 193.
[41H] R.H. Page, P.S. Chinnock, J. Seyed-Yagoobi, Self-oscillation enhancement of impingement jet heat transfer, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 380.
[42H] J. Sakakibara, K. Hishida, Heat transfer in the stagnation region of an excited plane impinging jet, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1962.
[43H] J. Seyed-Yagoobi, Enhancement of heat and mass transfer with innovative impinging jets, Drying Technology 14 (5) (1996) 1173.
[44H] R. Subba, R. Gorla, Nonsimilar solutions for heat transfer in wall jet flows, Chemical Engineering Communications 1996 (1996) 139.
[45H] A.A. Tawfek, Heat transfer and pressure distributions of an impinging jet on a flat surface, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 49.
[46H] X. Yan, N. Saniei, Measurements of local heat transfer coefficients from a flat plate to a pair of circular air impinging jets, Experimental Heat Transfer 9 (1) (1996) 29.

Combined heat and mass transfer: liquid jets and sprays

[47H] S.V. Garimella, B. Nenaydykh, Nozzle-geometry effects in liquid jet impingement heat transfer, International Journal of Heat and Mass Transfer 39 (14) (1996) 2915.
[48H] K.M. Graham, S. Ramadhyani, Experimental and theoretical studies of mist jet impingement cooling, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 343.
[49H] W. Nakayama, M. Behnia, H. Mishima, H. Sun, Heat transfer from an array of strips to fluorinert coolant in a mixed impinging-jet/channel-flow configuration, Journal of Electronic Packaging 118 (1) (1996) 31.
[50H] J.-J. Shu, G. Wilks, Heat transfer in the flow of a cold, two-dimensional vertical liquid jet against a hot, horizontal plate, International Journal of Heat and Mass Transfer 39 (16) (1996) 3367.
[51H] V. Slesarenko, Condition particularities of a jet-impact spraying desalination plant, Desalination 105 (12) (1996) 185.
[52H] I. Stewart, J.D. Massingham, J.J. Hagers, Heat transfer coefficient effects on spray cooling, Iron and Steel Engineer 73 (7) (1996) 17.

Combined heat and mass transfer: drying

[53H] C. Bonazzi, E. Dumoulin, A.-L. Raoult-Wack, Z. Berk, J.J. Bimbenet, F. Courtois, G. Trystram, J. Vasseur, Food drying and dewatering, Drying Technology 14 (9) (1996) 2135.
[54H] T. Constant, C. Moyne, P. Perre, Drying with internal heat generation: theoretical aspects and application to microwave heating, AIChE Journal 42 (2) (1996) 359.
[55H] K. Cronin, B. Norton, J. Taylor, M. Riepen, A.

Dalhuijsen, Development of a simulation tool to enable optimization of the energy consumption of the industrial timber-drying process, Applied Energy 53 (4) (1996) 325.
[56H] F.A. Cubillos, P.I. Alvarez, J.C. Pinto, E.L. Lima, Hybrid-neural modeling for particulate solid drying processes, Powder Technology 87 (2) (1996) 153.
[57H] S.A. Giner, R.H. Mascheroni, M.E. Nellist, Cross-flow drying of wheat. A simulation program with a diffusion-based deep-bed model and a kinetic equation for viability loss estimations, Drying Technology 14 (78) (1996) 1625.
[58H] S.A. Giner, R.H. Mascheroni, M.E. Nellist, Cross-flow drying of wheat: a simulation program with a diffusion-based deep-bed model and a kinetic equation for viability loss estimation, Drying Technology 14 (10) (1996) 2255.
[59H] P.S. Kuts, C. Strumillo, I. Zbicinski, Evaporation kinetics of single droplets containing dissolved biomass, Drying Technology 14 (9) (1996) 2041.
[60H] S.M.A. Mayta, G. Massarani, J.C. Pinto, Modeling of grain drying in continuous cross-flow sliding bed dryers, Canadian Journal of Chemical Engineering 74 (5) (1996) 797.
[61H] P.M. Phelan, D.I. Orloff, C.M. Kerschner, Effect of thermal mass and peak pressure on energy transfer in impulse drying, TAPPI Journal 79 (11) (1996) 131.
[62H] C. Shene, F. Cubillos, R. Perez, P.I. Alvarez, Modelling and simulation of a direct contact rotary dryer, Drying Technology 14 (10) (1996) 2419.
[63H] W.Z. Tarnawski, J. Mitera, P. Borowski, A. Klepaczka, Energy analysis on use of air and superheated steam as drying media, Drying Technology 14 (78) (1996) 1733.
[64H] D. Voronjec, D. Antonijevic, Drying potential of humid air — a thermodynamical analysis, Drying Technology 14 (78) (1996) 1751.

Combined heat and mass transfer: miscellaneous

[65H] V.V. Avilov, M. Vicanek, G. Simon, Thermal diffusion in laser beam welding of metals, Journal of Physics D—Applied Physics 29 (5) (1996) 1146.
[66H] B.R. Becker, A. Misra, B.A. Fricke, Bulk refrigeration of fruits and vegetables Part I: theoretical considerations of heat and mass transfer, HVAC&R Research 2 (2) (1996) 122.
[67H] N.J. Brownless, S.C. Anand, D.A. Holmes, T. Rowe, Dynamics of moisture transportation Part I: the effect of 'wicking' on the thermal resistance of single and multilayer fabric systems, Journal of the Textile Institute Part 1: Fibre Science and Textile Technology 87 (1) (1996) 172.
[68H] H. Cawte, D.A. Sanders, G.A. Poland, Effect of lubricating oil contamination on evaporation in refrigerants R12 and R22, International Journal of Energy Research 20 (8) (1996) 663.
[69H] C.-b Chiou, D.-c Lu, C.-c Wang, Analysis of evaporation of nonazeotropic refrigerants in a horizontal tube, Applied Thermal Engineering 16 (10) (1996) 817.
[70H] T.-W. Chung, T.K. Ghosh, A.L. Hines, Comparison between random and structured packings for dehumidification of air by lithium chloride solutions in a packed column and their heat and mass transfer correlations, Industrial and Engineering Chemistry Research 35 (1) (1996) 192.
[71H] A.T. Conlisk, Model for the prediction of the performance of a spined-tube absorber — Part 2: model and results, ASHRAE Transactions 102 (1) (1996) 122.
[72H] P. Dashora, Study of transport of mass and energy through inert liquids, Materials Science Forum 1996 (1996) 33.
[73H] T. Elperin, A. Fominykh, Cell model of nonisothermal gas absorption in gas–liquid bubbly media, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 307.
[74H] R. Lang, T. Westerfeld, A. Gerlich, K.F. Knoche, Enhancement of the heat and mass transfer in compact zeolite layers, Adsorption 2 (2) (1996) 121.
[75H] T. Murugesan, P.G. Rao, Analogous model for heat and mass transfer coefficients involving single file drops, Hungarian Journal of Industrial Chemistry 24 (1) (1996) 11.
[76H] D. Njomo, R. Tchinda, E. Kaptouom, Heat and mass transfer from a streaming hot saline water in an enclosure partitioned by an active baffle, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 177.
[77H] V. Patnaik, H. Perez-Blanco, Study of absorption enhancement by wavy film flows, International Journal of Heat and Fluid Flow 17 (1) (1996) 71.
[78H] R. Shepherd, R.J. Wiltshire, Spectral decompositions in nonlinear coupled diffusion, IMA Journal of Applied Mathematics 56 (3) (1996) 277.
[79H] F.I. Talens-Alesson, G. Pereira-Goncalves, F. Chenlo-Romero, G. Vazquez-Una, Device for research into falling film wave structures under shear stress, AIChE Journal 42 (11) (1996) 3293.
[80H] R.N. Yong, A.-M.O. Mohamed, Evaluation of coupled heat and moisture flow parameters in a bentonite-sand buffer material, Engineering Geology 41 (14) (1996) 269.

Change of phase — boiling: droplets and film evaporation

[1J] Durand A.M.I. Anaya, Shortcut for designing evaporators, Chemical Engineering 103 (1) (1996) 123.
[2J] J.D. Bernardin, I. Mudawar, Experimental and statistical investigation of changes in surface roughness associated with spray quenching, International Journal of Heat and Mass Transfer 39 (10) (1996) 2023.
[3J] Y.A. Buyevich, V.N. Mankevich, Cooling of a superheated surface with a jet mist flow, International Journal of Heat and Mass Transfer 39 (11) (1996) 2353.
[4J] M. Gavaises, A. Theodorakakos, G. Bergeles, Modeling wall impaction of diesel sprays, International Journal of Heat and Fluid Flow 17 (2) (1996) 130.
[5J] W.M. Healy, J.G. Hartley, S.I. Abdel-Khalik, Comparison between theoretical models and experimental data for the spreading of liquid droplets impacting a solid surface, International Journal of Heat and Mass Transfer 39 (14) (1996) 3079.
[6J] M.A. Jog, P.S. Ayyaswamy, I.M. Cohen, Evaporation

and combustion of a slowly moving liquid fuel droplet: Higher-order theory, Journal of Fluid Mechanics 1996 (1996) 135.

[7J] D.D. Joseph, A. Huang, G.V. Candler, Vaporization of a liquid drop suddenly exposed to a high-speed airstream, Journal of Fluid Mechanics 1996 (1996) 223.

[8J] I.Y. Kim, P.C.Jr Wayner, Shape of an evaporating completely wetting extended meniscus, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 320.

[9J] S.P. Lin, M. Hudman, Nonequilibrium evaporation from a heated liquid layer, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 497.

[10J] S.A. Moeykens, M.B. Pate, Effect of lubricant on spray evaporation heat transfer performance of R-134a and R-22 in tube bundles, ASHRAE Transactions 102 (1) (1996) 410.

[11J] S. Nishio, Y.C. Kim, Heat transfer model of spray cooling focusing on liquid sensible heat, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1984.

[12J] K. Park, A.P. Watkins, Comparison of wall spray impaction models with experimental data on drop velocities and sizes, International Journal of Heat and Fluid Flow 17 (4) (1996) 424.

[13J] J.V. Putilin, V.L. Podberezny, V.G. Rifert, Evaporation heat transfer in liquid films flowing down horizontal smooth and longitudinally profiled tubes, Desalination 105 (12) (1996) 165.

[14J] Y.M. Qiao, S. Chandra, Boiling of droplets on a hot surface in low gravity, International Journal of Heat and Mass Transfer 39 (7) (1996) 1379.

[15J] J. Senda, M. Kobayashi, S. Iwashita, H. Fujimoto, Modeling of diesel spray impringing on flat wall, JSME International Journal Series B–Fluids and Thermal Engineering 39 (4) (1996) 859.

[16J] K. Takano, I. Tanasawa, S. Nishio, Enhancement of evaporation of a droplet using EHD effect (measurement of steady-state heat flux during evaporation of a single droplet), JSME International Journal Series B–Fluids and Thermal Engineering 39 (3) (1996) 583.

[17J] K. Takano, I. Tanasawa, S. Nishio, Enhancement of evaporation of a liquid droplet using EHD effect: criteria for instability of gas–liquid interface under electric field, Journal of Enhanced Heat Transfer 3 (1) (1996) 73.

[18J] G.R. Toker, J. Stricker, Holographic study of suspended vaporizing volatile liquid droplets in still air, International Journal of Heat and Mass Transfer 39 (16) (1996) 3475.

[19J] G.S. Zheng, W.M. Worek, Method of heat and mass transfer enhancement in film evaporation, International Journal of Heat and Mass Transfer 39 (1) (1996) 97.

Change of phase — boiling: bubble characteristics and boiling incipience

[20J] Y.A. Buyevich, B.W. Webbon, Dynamics of vapour bubbles in nucleate boiling, International Journal of Heat and Mass Transfer 39 (12) (1996) 2409.

[21J] P. Downar-Zapolski, Z. Bilicki, L. Bolle, J. Franco, Nonequilibrium relaxation model for one-dimensional flashing liquid flow, International Journal of Multiphase Flow 22 (3) (1996) 473.

[22J] V. Drach, N. Sack, J. Fricke, Transient heat transfer from surfaces of defined roughness into liquid nitrogen, International Journal of Heat and Mass Transfer 39 (9) (1996) 1953.

[23J] S.P. Fisenko, Homogeneous nucleation kinetics near a small evaporating drop, Journal of Aerosol Science 27 (suppl.) (1996) S257.

[24J] H.S. Lee, H.Jr Merte, Hemispherical vapor bubble growth in microgravity: experiments and model, International Journal of Heat and Mass Transfer 39 (12) (1996) 2449.

[25J] S.P. Levitskiy, B.M. Khusid, Z.P. Shulman, Growth of vapour bubbles in boiling polymer solutions — II. Nucleate boiling heat transfer, International Journal of Heat and Mass Transfer 39 (3) (1996) 639.

[26J] H.S. Liang, W.J. Yang, Remedy for hysteresis in nucleate boiling through application of micrographite-fiber nucleation activators, Experimental Heat Transfer 9 (4) (1996) 323.

[27J] M. Maeda, H. Takahashi, Y. Fujii, Z.M. Li, T. Shigematsu, T. Shigi, M. Yamaguchi, M. Nakamura, Heat transport in pool boiling liquid 3He below 1 K, Physica B: Condensed Matter 219 (22014) (1996) 672.

[28J] Y.F. Rao, K. Fukuda, H. Horie, Two-fluid-model analysis on transient, internal-convection heat transfer of He II in a vertical Gorter–Mellink duct heated at the bottom surface, Cryogenics 36 (6) (1996) 457.

[29J] A. Rinne, R. Loth, Development of local two-phase flow parameters for vertical bubbly flow in a pipe with sudden expansion, Experimental Thermal and Fluid Science 13 (2) (1996) 152.

[30J] A. Sakurai, M. Shiotsu, K. Hata, Boiling phenomenon due to quasi-steadily and rapidly increasing heat inputs in LN2 and LHe I, Cryogenics 36 (3) (1996) 189.

[31J] C. Satik, Y.C. Yortsos, Pore-network study of bubble growth in porous media driven by heat transfer, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 455.

[32J] Z.P. Shulman, S.P. Levitskiy, Growth of vapour bubbles in boiling polymer solutions — I. Rheological and diffusional effects, International Journal of Heat and Mass Transfer 39 (3) (1996) 631.

[33J] M. Tsubota, Y. Tomita, A. Shima, I. Kano, Dynamics of laser-induced bubble in pressurized liquid nitrogen, JSME International Journal Series B—Fluids and Thermal Engineering 39 (2) (1996) 257.

[34J] H. Turkoglu, B. Farouk, Phase-resolved measurements in a gas-injected liquid bath, International Journal of Heat and Mass Transfer 39 (16) (1996) 3401.

[35J] Q. Wang, X.J. Chen, S. Kakac, Y. Ding, Boiling onset oscillation: a new type of dynamic instability in a forced-convection upflow boiling system, International Journal of Heat and Fluid Flow 17 (4) (1996) 418.

[36J] O. Zeitoun, M. Shoukri, Bubble behavior and mean diameter in subcooled flow boiling, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 110.

Change of phase — boiling: pool boiling

[37J] C.N. Ammerman, S.M. You, Determination of the boiling enhancement mechanism caused by surfactant addition to water, Journal of Heat Transfer-Transactions of the ASME 118 (2) (1996) 429.

[38J] C.N. Ammerman, S.M. You, Y.S. Hong, Identification of pool boiling transfer mechnisms from a wire immersed in saturated FC-72 using a single-photo/LDA method, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 117.

[39J] R.J. Benjamin, A.R. Balakrishnan, Nucleate pool boiling heat transfer of pure liquids at low to moderate heat fluxes, International Journal of Heat and Mass Transfer 39 (12) (1996) 2495.

[40J] A.E. Bergles, Encouragement and accommodation of high heat fluxes, Heat and Technology 14 (2) (1996) 3.

[41J] J. Blum, W. Marquardt, H. Auracher, Stability of boiling systems, International Journal of Heat and Mass Transfer 39 (14) (1996) 3021.

[42J] Y.A. Buyevich, I.A. Natalukha, Self-oscillating regimes of nucleate, transition and film boiling, International Journal of Heat and Mass Transfer 39 (11) (1996) 2363.

[43J] P. Carrica, P. Di Marco, W. Grassi, Electric field effects on film boiling on a wire, Experimental Heat Transfer 9 (1) (1996) 11.

[44J] M.-H. Chun, M.-G. Kang, Effects of heat exchanger tube geometries on nucleate pool boiling heat transfer in a scaled in-containment refueling water storage tank, International Communications in Heat and Mass Transfer 23 (1) (1996) 23.

[45J] G.N. Danilova, A.V. Tikhonov, R113 boiling heat transfer modeling on porous metallic matrix surfaces, International Journal of Heat and Fluid Flow 17 (1) (1996) 45.

[46J] V. Drach, J. Fricke, Transient heat transfer from smooth surfaces into liquid nitrogen, Cryogenics 36 (4) (1996) 263.

[47J] M.C. Duluc, M.X. Francois, J.P. Brunet, Liquid nitrogen boiling around a temperature controlled heated wire, International Journal of Heat and Mass Transfer 39 (8) (1996) 1758.

[48J] M.S. El-Genk, Review of pool boiling from inclined and downward-facing flat surfaces, Heat and Technology 14 (2) (1996) 95.

[49J] M.S. El-Genk, A.G. Glebov, Film boiling from a downward-facing curved surface in saturated and subcooled water, International Journal of Heat and Mass Transfer 39 (2) (1996) 275.

[50J] L. Floquet-Muhr, N. Midoux, G. Wild, J.P. Saint, Some guidelines for improving the dehydration process during grease manufacture, Lubrication Engineering 52 (7) (1996) 559.

[51J] Y. Fujita, M. Tsutsui, Heat transfer in nucleate boiling of binary mixtures (development of a heat transfer correlation), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1906.

[52J] Y. Fujita, M. Tsutsui, Heat transfer in nucleate boiling of binary mixtures (heat transfer measurement and assessment of available correlations), JSME International Journal Series B—Fluids and Thermal Engineering 39 (2) (1996) 402.

[53J] D. Gentile, Analytical study of instabilities induced during nucleate boiling–film boiling transition, Heat and Technology 14 (2) (1996) 55.

[54J] G. Guglielmini, M. Misale, C. Schenone, Experiments on pool boiling of a dielectric fluid on extended surfaces, International Communications in Heat and Mass Transfer 23 (4) (1996) 451.

[55J] S.D. Houston, K. Cornwell, Heat transfer to sliding bubbles on a tube under evaporating and nonevaporating conditions, International Journal of Heat and Mass Transfer 39 (1) (1996) 211.

[56J] A. Iwamoto, T. Mito, K. Takahata, N. Yanagi, J. Yamamoto, Dependence of heat transfer from a wide copper plate to liquid helium on heat transfer surface orientation and treatment, Cryogenics 36 (3) (1996) 139.

[57J] T.C. Jen, A.S. Lavine, Variable heat flux model of heat transfer in grinding with boiling, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 463.

[58J] R. Jeschar, H. Kraushaar, H. Griebel, Influence of gases dissolved in cooling water on heat transfer during stable film boiling, Steel Research 67 (6) (1996) 227.

[59J] M. Kamil, S.S. Alam, Experimental study of heat transfer to boiling binaries in a reboiler tube, International Journal of Heat and Mass Transfer 39 (7) (1996) 1489.

[60J] D.B.R. Kenning, Y. Yan, Pool boiling heat transfer on a thin plate: features revealed by liquid crystal thermography, International Journal of Heat and Mass Transfer 39 (15) (1996) 3117.

[61J] W.W. Lin, D.J. Lee, Boiling on a straight pin fin, AIChE Journal 42 (10) (1996) 2721.

[62J] M.-H. Liu, Y.-M. Yang, J.-R. Maa, Mass diffusion effect on film boiling of saturated binary mixtures, Numerical Heat Transfer Part A—Applications 30 (8) (1996) 815.

[63J] M.P. Mughal, O.A. Plumb, Experimental study of boiling on a wicked surface, International Journal of Heat and Mass Transfer 39 (4) (1996) 771.

[64J] N. Nagai, S. Nishio, Leidenfrost temperature on an extremely smooth surface, Experimental Thermal and Fluid Science 12 (3) (1996) 373.

[65J] R.S. Neve, Y.Y. Yan, Enhancement of heat exchanger performance using combined electrohydrodynamic and passive methods, International Journal of Heat and Fluid Flow 17 (4) (1996) 403.

[66J] T. Oka, Y. Abe, Y.H. Mori, A. Nagashima, Pool boiling heat transfer in microgravity, JSME International Journal Series B—Fluids and Thermal Engineering 39 (4) (1996) 798.

[67J] J. Seyed-Yagoobi, C.A. Geppert, L.M. Geppert, Electrohydrodynamically enhanced heat transfer in pool boiling, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 233.

[68J] M.M. Shah, Survey of critical heat flux data for pool boiling of liquid metals and new correlations, Heat Transfer Engineering 17 (2) (1996) 54.

[69J] M. Shiotsu, K. Hata, Y. Takeuchi, K. Hama, A. Sakurai, Estimation of Kapitza conductance effect on steady and transient boiling heat transfer in He I based on

Kapitza conductance results in He II, Cryogenics 36 (3) (1996) 197.
[70J] N. Tengblad, B. Palm, External two phase thermosiphons for cooling of electronic components, International Journal of Microcircuits and Electronic Packaging 19 (1) (1996) 22.
[71J] J.Y. Tsay, Y.Y. Yan, T.F. Lin, Enhancement of pool boiling heat transfer in a horizontal water layer through surface roughness and screen coverage, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 17.
[72J] C. Xia, W. Hu, Z. Guo, Natural convective boiling in vertical rectangular narrow channels, Experimental Thermal and Fluid Science 12 (3) (1996) 313.
[73J] Y.Y. Yan, R.S. Neve, EHD augmentation of nucleate boiling at a Gewa-T surface, Journal of Enhanced Heat Transfer 3 (3) (1996) 211.
[74J] Y.Y. Yan, R.S. Neve, T.G. Karayiannis, M.W. Collins, P.H.G. Allen, EHD effects on nucleate boiling at passively enhanced surfaces, Experimental Heat Transfer 9 (3) (1996) 195.
[75J] S. Yanniotis, D. Kolokotsa, Boiling on the surface of a rotating disc, Journal of Food Engineering 30 (34) (1996) 313.
[76J] Y. Zhang, A. Faghri, Integral approximate solution of heat transfer in the grinding process, International Journal of Heat and Mass Transfer 39 (13) (1996) 2653.

Change of phase — boiling: flow boiling

[77J] M. Araki, M. Ogawa, T. Kunugi, K. Satoh, S. Suzuki, Experiments on heat transfer of smooth and swirl tubes under one-sided heating conditions, International Journal of Heat and Mass Transfer 39 (14) (1996) 3045.
[78J] R.D. Boyd, X. Meng, Local subcooled flow boiling model development, Fusion Technology 29 (4) (1996) 459.
[79J] G.P. Celata, M. Cumo, A. Mariani, Effect of the tube diameter on the critical heat flux in subcooled flow boiling, International Journal of Heat and Mass Transfer 39 (8) (1996) 1755.
[80J] K. Cheung, M.M. Ohadi, S.V. Dessiatoun, Boiling heat transfer enhancement of R-134a in a tube bundle utilizing the EHD technique, Journal of Enhanced Heat Transfer 3 (4) (1996) 301.
[81J] J.B. Chung, W.-P. Baek, S.H. Chang, Effects of the spacer and mixing vanes on critical heat flux for low-pressure water at low-velocities, International Communications in Heat and Mass Transfer 23 (6) (1996) 757.
[82J] D. Copeland, Single-phase and boiling cooling of small pin fin arrays by multiple nozzle jet impingement, Journal of Electronic Packaging 118 (1) (1996) 21.
[83J] V. Divavin, V. Tanchuk, A. Shrubok, R. Watson, J. Gonzalez, Experimental and numerical investigation of post-CHF heat transfer for one-sided heat load with highly sub-cooled flow boiling, Fusion Engineering and Design 31 (2) (1996) 189.
[84J] N.M. Dukle, D.K. Hollingsworth, Liquid crystal images of the transition from jet impingement convection to nucleate boiling. Part I: monotonic distribution of the convection coefficient, Experimental Thermal and Fluid Science 12 (3) (1996) 274.
[85J] N.M. Dukle, D.K. Hollingsworth, Liquid crystal images of the transition from jet impingement convection to nucleate boiling. Part II: nonmonotonic distribution of the convection coefficient, Experimental Thermal and Fluid Science 12 (3) (1996) 288.
[86J] G.N. Dulnev, V.A. Korablyev, A.V. Sharkov, Evaporation cooling of high power electronic devices, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (3) (1996) 431.
[87J] L.B. Fore, L.C. Witte, J.B. McQuillen, Heat transfer to annular gas–liquid mixtures at reduced gravity, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 633.
[88J] N. Hammouda, D.C. Groeneveld, S.C. Cheng, Experimental study of subcooled film boiling of refrigerants in vertical up-flow, International Journal of Heat and Mass Transfer 39 (18) (1996) 3799.
[89J] L. Huang, L.C. Witte, Experimental investigation of the effects of subcooling and velocity on boiling of Freon-113, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 436.
[90J] T. Iida, M. Murakami, T. Shimazaki, H. Nagai, Visualization study on the thermo-hydrodynamic phenomena induced by pulsative heating in He II by the use of a laser holographic interferometer, Cryogenics 36 (11) (1996) 943.
[91J] H.Y. Jeong, H.C. No, Modelling for post-dryout heat transfer and droplet sizes at low pressure and low flow conditions, International Communications in Heat and Mass Transfer 23 (6) (1996) 767.
[92J] M.E. Johns, I. Mudawar, Ultra-high power two-phase jet-impingement avionic clamshell module, Journal of Electronic Packaging 118 (4) (1996) 264.
[93J] A.A. Kendoush, Z.A. Sarkis, Nonintrusive auto-transformer technique for the measurement of void fraction, Experimental Thermal and Fluid Science 13 (2) (1996) 92.
[94J] Y.C. Kim, S. Nishio, H. Ohkubo, Heat transfer in high temperature region of spray cooling interacting with liquid film flow, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1991.
[95J] C.-S. Kuo, C.-c Wang, Horizontal flow boiling of R22 and R407C in a 9.52 mm micro-fin tube, Applied Thermal Engineering 16 (89) (1996) 719.
[96J] R. Mertz, A. Wein, M. Groll, Experimental investigation of flow boiling heat transfer in narrow channels, Heat and Technology 14 (2) (1996) 47.
[97J] K. Mishima, T. Hibiki, Quantitative limits of thermal and fluid phenomena measurements using the neutron attenuation characteristics of materials, Experimental Thermal and Fluid Science 12 (4) (1996) 461.
[98J] M. Monde, Analytical study of critical heat flux in two-phase thermosyphon: relationship between maximum falling liquid rate and critical heat flux, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 422.
[99J] M. Monde, Y. Mitsutake, Critical heat flux in forced convective subcooled boiling with multiple impinging jets, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 241.
[100J] S. Nair, S. Lele, M. Ishii, S.T. Revankar, Analysis of

flow instabilities and their role on critical heat flux for two-phase downflow and low pressure systems, International Journal of Heat and Mass Transfer 39 (1) (1996) 39.

[101J] S.H. Najibi, H. Muller-Steinhagen, M. Jamialahmadi, Boiling and nonboiling heat transfer to electrolyte solutions, Heat Transfer Engineering 17 (4) (1996) 46.

[102J] R.E. Nygren, J.D. Miller, How braze flaws affect the thermal-hydraulic performance of the Tore Supra Phase III outboard pump limiter. A case study of the effects of nonuniform thermal resistance on the peak heat flux to the coolant for tubes with one-sided heating, Fusion Technology 29 (4) (1996) 529.

[103J] C.H. Oh, J.C. Chapman, Two-phase flow instability for low-flow boiling in vertical uniformly heated thin rectangular channels, Nuclear Technology 113 (3) (1996) 327.

[104J] M.M. Ohadi, S.S. Li, R. Radermacher, S. Dessiatoun, Critical review of available correlations for two-phase flow heat transfer of ammonia, International Journal of Refrigeration—Revue Internationale du Froid 19 (4) (1996) 272.

[105J] X.F. Peng, G.P. Peterson, B.X. Wang, Flow boiling of binary mixtures in microchanneled plates, International Journal of Heat and Mass Transfer 39 (6) (1996) 1257.

[106J] M. Salehi, M.M. Ohadi, S. Dessiatoun, Applicability of the EHD technique for convective boiling of refrigerant blends — experiments with R-404A, ASHRAE Transactions 102 (1) (1996) 839.

[107J] S.M. Sami, B. Song, Heat transfer and pressure drop characteristics of HFC quarternary refrigerant mixtures inside horizontal enhanced surface tubing, Applied Thermal Engineering 16 (6) (1996) 461.

[108J] D.M. Schroeder-Richter, Analytical modeling of complete Nukiyama curves corresponding to expected low void fraction at high subcooling and flow rate, Fusion Technology 29 (4) (1996) 468.

[109J] D.P. Shatto, G.P. Peterson, Review of flow boiling heat transfer with twisted tape inserts, Journal of Enhanced Heat Transfer 3 (4) (1996) 233.

[110J] A. Singh, M. Ohadi, S. Dessiatoun, Flow boiling heat transfer coefficients of R-134a in a microfin tube, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 497.

[111J] G. Sun, G.F. Hewitt, Experimental studies on heat transfer in annular flow, Heat and Technology 14 (2) (1996) 87.

[112J] J.R. Thome, Boiling of new refrigerants: a state-of-the-art review, International Journal of Refrigeration—Revue Internationale du Froid 19 (7) (1996) 435.

[113J] W. Tong, A.E. Bergles, M.K. Jensen, Critical heat flux and pressure drop of subcooled flow boiling in small-diameter tubes with twisted-tape inserts, Journal of Enhanced Heat Transfer 3 (2) (1996) 95.

[114J] F. Topin, O. Rahli, L. Tadrist, J. Pantaloni, Experimental study of convective boiling in a porous medium: temperature field analysis, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 230.

[115J] T.N. Tran, M.W. Wambsganss, D.M. France, Small circular- and rectangular-channel boiling with two refrigerants, International Journal of Multiphase Flow 22 (3) (1996) 485.

[116J] H. Umekawa, M. Ozawa, A. Miyazaki, K. Mishima, T. Hibiki, Dryout in a boiling channel under oscillatory flow condition, JSME International Journal Series B—Fluids and Thermal Engineering 39 (2) (1996) 412.

[117J] M.J. Wang, F. Mayinger, Dispersed flow heat transfer in circular bends, Chemical Engineering Communications 1996 (1996) 331.

[118J] T.C. Wang, T.J. Snyder, J.N. Chung, Experimental examination of forced-convection subcooled nucleate boiling and its application in microgravity, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 237.

[119J] M.A. Weaver, K.C. Gramoll, Conjugate heat transfer analysis with subcooled boiling for an arc-heater wind tunnel nozzle, Heat Transfer Engineering 17 (4) (1996) 19.

[120J] J. Weisman, J. Lan, P. Disimile, Effect of fluid properties on two-phase (vapor–liquid) flow patterns in the presence of helical wire ribs, International Journal of Multiphase Flow 22 (3) (1996) 613.

[121J] D.H. Wolf, F.P. Incropera, R. Viskanta, Local jet impingement boiling heat transfer, International Journal of Heat and Mass Transfer 39 (7) (1996) 1395.

[122J] Y. Wu, Z. Yu, Study on multicomponent flow boiling heat transfer, Huaxue Gongcheng/Chemical Engineering 24 (5) (1996) 8.

Change of phase — condensation: surface geometry and material effects

[1JJ] H.J. Brouwers, Effect of fog formation on turbulent vapor condensation with noncondensable gases, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 243.

[2JJ] L.M. Chamra, R.L. Webb, M.R. Randlett, Advanced micro-fin tubes for condensation, International Journal of Heat and Mass Transfer 39 (9) (1996) 1839.

[3JJ] Y.-J. Chang, C.T. Hsu, C.-C. Wang, Single-tube performance of condensation of R-134a on horizontal enhanced tubes, ASHRAE Transactions 102 (1) (1996) 821.

[4JJ] H.T. Chen, S.M. Chang, Thermal interaction between laminar film condensation and forced convection along a conducting wall, Acta Mechanica 118 (1996) 1.

[5JJ] W.Y. Cheng, C.C. Wang, Y.Z.R. Hu, L.W. Huang, Film condensation of HCFC-22 on horizontal enhanced tubes, International Communications in Heat and Mass Transfer 23 (1) (1996) 79.

Change of phase — condensation: global geometry and thermal boundary condition effects

[6JJ] N. Adinarayana, V.M.K. Sastri, Estimation of convective heat transfer coefficients in industrial steam turbines, Journal of Pressure Vessel Technology—Transactions of the ASME 118 (2) (1996) 247.

[7JJ] N. Agoudjil, G. Avakian, Condensation of steam containing noncondensable gas on a single horizontal tube and a tube bank, Heat and Technology 14 (2) (1996) 71.

[8JJ] C.A.M. Brenninkmeijer, T. Rockmann, Russian doll type cryogenic traps: improved design and isotope separation effects, Analytical Chemistry 68 (17) (1996) 3050.
[9JJ] M.S. Chitti, N.K. Anand, Heat transfer correlation for condensation inside horizontal smooth tubes using the population balance approach, International Journal of Heat and Mass Transfer 39 (14) (1996) 2947.
[10JJ] A.T. Conlisk, J. Mao, Nonisothermal absorption on a horizontal cylindrical tube — 1. The film flow, Chemical Engineering Science 51 (8) (1996) 1275.
[11JJ] Gogonin II, O.A. Kabov, Experimentally study of R-11 and R-12 film condensation on horizontal integral-fin tubes, Journal of Enhanced Heat Transfer 3 (1) (1996) 43.
[12JJ] J. Green, K. Almenas, Overview of the primary parameters and methods for determining condensation heat transfer to containment structures, Nuclear Safety 37 (1) (1996) 26.
[13JJ] C.E. Hagentoft, E. Harderup, Moisture conditions in a north facing wall with cellulose loose fill insulation: constructions with and without vapor retarder and air leakage, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 228.
[14JJ] Jaber M. Hassib, R.L. Webb, Steam condensation on horizontal integral-fin tubes of low thermal conductivity, Journal of Enhanced Heat Transfer 3 (1) (1996) 55.
[15JJ] M.D. Kennedy, J. Woodcock, R.F. Wright, J.A. Gresham, Westinghouse–GOTHIC comparisons with passive containment cooling tests using a one-to-ten-scale test facility, Nuclear Technology 113 (1) (1996) 14.
[16JJ] S.Z. Kuhn, P.F. Peterson, V.E. Schrock, Determination of the local heat flux in condensation experiments, Experimental Heat Transfer 9 (2) (1996) 149.
[17JJ] E. Kumpinsky, Heat-transfer coefficients in agitated vessels. latent heat models, Industrial and Engineering Chemistry Research 35 (3) (1996) 938.
[18JJ] X. Li, J. Wen, Y. Shan, H. Huang, Condensing heat transfer in an advanced two-phase closed thermosyphon, Chinese Journal of Chemical Engineering 4 (1) (1996) 85.
[19JJ] J.L. Munoz-Cobo, L. Herranz, J. Sancho, I. Tkachenko, G. Verdu, Turbulent vapor condensation with noncondensable gases in vertical tubes, International Journal of Heat and Mass Transfer 39 (15) (1996) 3249.
[20JJ] T. Ojanen, K. Kumaran, Effect of exfiltration on the hygrothermal behaviour of a residential wall assembly, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 215.
[21JJ] J.G. Pieters, Influence of condensation and rain on the heat transfer coefficients of greenhouse claddings, International Agricultural Engineering Journal 5 (1996) 1.
[22JJ] J.G. Pieters, J.M. Deltour, M.J. Debruyckere, Condensation and dynamic heat transfer in greenhouses, Part I: theoretical model, International Agricultural Engineering Journal 5 (1996) 3.
[23JJ] J.G. Pieters, J.M. Deltour, M.J. Debruyckere, Condensation and dynamic heat transfer in greenhouses, Part II: results for a standard glasshouse, International Agricultural Engineering Journal 5 (1996) 3.
[24JJ] V.G. Rifert, Y.Y. Trokoz, Surface nonisothermness effect on profiled surface condensation enhancement, International Journal of Heat and Mass Transfer 39 (8) (1996) 1749.
[25JJ] V. Simon, Evaporative cooling of fibers by a low-Reynolds-number crossflow, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 246.
[26JJ] L.K. Sreepathi, S.L. Bapat, S.P. Sukhatme, Heat transfer during film condensation of R-123 vapour on horizontal integral-fin tubes, Journal of Enhanced Heat Transfer 3 (2) (1996) 147.
[27JJ] A. Stegou-Sagia, Properties of new refrigerants and predictions for condensation heat transfer enhancement with low-finned tubes, Energy 21 (12) (1996) 1189.
[28JJ] C. Trevino, F. Mendez, Transient conjugate condensation process on a vertical plate with finite thermal inertia, International Journal of Heat and Mass Transfer 39 (11) (1996) 2221.
[29JJ] M. Wawzyniak, J. Seyed-Yagoobi, Experimental study of electrohydrodynamically augmented condensation heat transfer on a smooth and an enhanced tube, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 499.
[30JJ] C.Y. Yang, R.L. Webb, Condensation of R-12 in small hydraulic diameter extruded aluminum tubes with and without micro-fins, International Journal of Heat and Mass Transfer 39 (4) (1996) 791.
[31JJ] C.Y. Yang, R.L. Webb, Friction pressure drop of R-12 in small hydraulic diameter extruded aluminum tubes with and without micro-fins, International Journal of Heat and Mass Transfer 39 (4) (1996) 801.
[32JJ] S. Yanniotis, D. Kolokotsa, Experimental study of water vapour condensation on a rotating disc, International Communications in Heat and Mass Transfer 23 (5) (1996) 721.
[33JJ] C. Zhang, Local and overall condensation heat transfer behavior in horizontal tube bundles, Heat Transfer Engineering 17 (1) (1996) 19.

Change of phase — condensation: modeling and analysis techniques

[34JJ] C.J. Choi, S.Y. Lee, Transient analysis of a condensation experiment in the noncondensable gas-filled closed loop using an inverted U-tube, Annals of Nuclear Energy 23 (14) (1996) 1179.
[35JJ] T. Fujii, J.B. Lee, Ke Shinzato, Laminar forced convection condensation of saturated vapors in the near-critical region, Numerical Heat Transfer Part A—Applications 30 (8) (1996) 799.
[36JJ] J.K. Jokiniemi, J. Pyykonen, P. Mikkanen, E.I. Kauppinen, Modeling fume formation and deposition in kraft recovery boilers, TAPPI Journal 79 (7) (1996) 171.
[37JJ] F. Mendez, C. Trevino, Longitudinal heat conduction effects on a vertical thin plate in a steady laminar condensation process, International Journal of Heat and Fluid Flow 17 (5) (1996) 517.
[38JJ] E.R. Perrell, W.D. Erickson, G.V. Candle, Numerical simulation of nonequilibrium condensation in a hypersonic wind tunnel, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 277.

[39JJ] G.F. Yao, S.M. Ghiaasiaan, Numerical modeling of condensing two-phase flows, Numerical Heat Transfer Part B—Fundamentals 30 (2) (1996) 137.

[40JJ] G.F. Yao, S.M. Ghiaasiaan, D.A. Eghbali, Semi-implicit modeling of condensation in the presence of noncondensables in the RELAP5/MOD3 computer code, Nuclear Engineering and Design 166 (2) (1996) 277.

[41JJ] Y.Q. Zhou, J.W. Rose, Effect of two-dimensional conduction in the condensate film on laminar film condensation on a horizontal tube with variable wall temperature, International Journal of Heat and Mass Transfer 39 (15) (1996) 3187.

Change of phase — condensation: free surface condensation

[42JJ] S.V. Alekseenko, V.E. Nakoryakov, B.G. Pokusaev, Wave effect on the transfer processes in liquid films, Chemical Engineering Communications 1996 (1996) 359.

[43JJ] E. Hontanon, L.E. Herranz, Steam condensation onto hygroscopic aerosols: validation of contain model, Journal of Aerosol Science 27 (suppl.) (1996) S463.

[44JJ] L.J. Huang, P.S. Ayyaswamy, S.S. Sripada, Condensation on a spray of water drops: a cell model study — II. Transport quantities, International Journal of Heat and Mass Transfer 39 (18) (1996) 3791.

[45JJ] T.D. Karapantsios, M. Kostoglou, A.J. Karabelas, Direct contact condensation of dilute steam/air mixtures on wavy falling films, Chemical Engineering Communications 1996 (1996) 261.

[46JJ] S.K. Park, M.H. Kim, K.J. Yoo, Condensation of pure steam and steam–air mixture with surface waves of condensate film on a vertical wall, International Journal of Multiphase Flow 22 (5) (1996) 893.

[47JJ] S.S. Sripada, P.S. Ayyswamy, L.J. Huang, Condensation on a spray of water drops: a cell model study — I. Flow description, International Journal of Heat and Mass Transfer 39 (18) (1996) 3781.

[48JJ] Q. Zhao, D.C. Zhang, J.F. Lin, G.M. Wang, Dropwise condensation on L–B film surface, Chemical Engineering and Processing 35 (6) (1996) 473.

Change of phase — condensation: unsteady effects

[49JJ] N.A. Gumerov, Heat and mass transfer of a vapor bubble with translatory motion at high nusselt numbers, International Journal of Multiphase Flow 22 (2) (1996) 259.

[50JJ] C.-i Hung, Co.-K Chen, J.-S. Tsai, Weakly nonlinear stability analysis of condensate film flow down a vertical cylinder, International Journal of Heat and Mass Transfer 39 (13) (1996) 2821.

[51JJ] B.E. Nemtsov, Coherent mechanism of sound generation in vapour condensation, Acustica 82 (1) (1996) 39.

[52JJ] W.K. Soh, A.A. Karimi, On the calculation of heat transfer in a pulsating bubble, Applied Mathematical Modelling 20 (9) (1996) 638.

[53JJ] M. Wilck, K. Haemeri, F. Stratmann, M. Kulmala, Experimental and theoretical examination of homogeneous nucleation in a laminar flow reactor (UCPC), Journal of Aerosol Science 27 (suppl.) (1996) S587.

Change of phase — condensation: binary mixtures

[54JJ] N. Berrada, C. Marvillet, A. Bontemps, S. Daoudi, Heat transfer in-tube condensation of a zeotropic mixture of HFC23/HFC134a in a horizontal smooth tube, International Journal of Refrigeration—Revue Internationale du Froid 19 (7) (1996) 463.

[55JJ] T.W. Botsch, K. Stephan, Condensation of multicomponent mixtures in a vertical tube theoretical analysis and numerical solution, Heat and Technology 14 (2) (1996) 79.

[56JJ] H.A. Hasanein, M.S. Kazimi, M.W. Golay, Forced convection in-tube steam condensation in the presence of noncondensable gases, International Journal of Heat and Mass Transfer 39 (13) (1996) 2625.

[57JJ] K. Hijikata, Y. Fukasaku, O. Nakabeppu, Theoretical and experimental studies on the pseudo-dropwise condensation of a binary vapor mixture, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 140.

[58JJ] Y.L. Tsay, Effects of binary mixture condensation on turbulent mixed convection heat and mass transfer in a vertical channel, Numerical Heat Transfer Part A—Applications 29 (6) (1996) 599.

Change of phase — freezing and melting: melting and freezing of spheres, cylinders and slabs

[1JM] J.K. Deporter, D.G. Baird, Simulation of the effects of thermal history on the morphology of thermoplastic composites, Polymer Composites 17 (2) (1996) 210.

[2JM] I. Dincer, Exact solution on the estimation of heat-transfer rates during deep-freezing of slab products, Journal of Food Engineering 30 (34) (1996) 417.

[3JM] H. Hu, S.A. Argyropoulos, Mathematical modeling and experimental measurements of moving boundary problems associated with exothermic heat of mixing, International Journal of Heat and Mass Transfer 39 (5) (1996) 1005.

[4JM] E.P. Lozowski, A.M. Kobos, L.G. Kachurin, Influence of the surface liquid film on cylinder icing under marine conditions, Journal of Offshore Mechanics and Arctic Engineering 118 (2) (1996) 158.

[5JM] M. Yamada, S. Fukusako, H. Morizane, M.-H. Kim, W. Schneider, Melting characteristics along a bundle of horizontal heated cylinders immersed in a liquid ice layer, Experimental Thermal and Fluid Science 12 (3) (1996) 305.

[6JM] M. Yamada, S. Fukusako, M.E.-B. Sayed, Free convection heat transfer around a horizontal ice cylinder formed through melting within an immiscible liquid, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 419.

Change of phase — freezing and melting: Stefan problems

[7JM] K.A. Fikiin, Generalized numerical modelling of unsteady heat transfer during cooling and freezing using an improved enthalpy method and quasi-one-dimensional formulation, International Journal of Refrigeration—Revue Internationale du Froid 19 (2) (1996) 132.

Change of phase — freezing and melting: ice formation/melting in porous materials

[8JM] W.-J. Chang, D.-F. Yang, Natural convection for the melting of ice in porous media in a rectangular enclosure, International Journal of Heat and Mass Transfer 39 (11) (1996) 2333.
[9JM] A.C.R. de Reinick, Average and center temperature vs time evaluation for freezing and thawing rectangular foods, Journal of Food Engineering 30 (34) (1996) 299.
[10JM] J.O.M. Karlsson, M. Toner, Long-term storage of tissues by cryopreservation: critical issues, Biomaterials 17 (3) (1996) 243.
[11JM] V.O. Salvadori, R.H. Mascheroni, A. De Michelis, Freezing of strawberry pulp in large containers: Experimental determination and prediction of freezing times, International Journal of Refrigeration—Revue Internationale du Froid 19 (2) (1996) 87.
[12JM] M. Stlahli, P.E. Jansson, L.C. Lundin, Preferential water flow in a frozen soil — a two-domain model approach, Hydrological Processes 10 (10) (1996) 1305.
[13JM] Y.X. Tao, Modeling of melting in heterogeneous snow cover on permeable frozen soil, Numerical Heat Transfer Part A—Applications 30 (2) (1996) 143.

Change of phase — freezing and melting: contact melting

[14JM] H.S. Kim, C.J. Kim, S.T. Ro, Heat transfer correlation for natural convection in a meniscus-shaped cavity and its application to contact melting process, International Journal of Heat and Mass Transfer 39 (11) (1996) 2267.

Change of phase — freezing and melting: melting and melt flows

[15JM] S.A. Argyropoulos, A.C. Mikrovas, Experimental investigation on natural and forced convection in liquid metals, International Journal of Heat and Mass Transfer 39 (3) (1996) 547.
[16JM] Y. Bayazitoglu, R. Shampine, Longitudinal electromagnetic levitator, Journal of Materials Processings and Manufacturing Science 5 (1) (1996) 79.
[17JM] T.D. Bennett, D.J. Krajnovich, C.P. Grigoropoulos, Separating thermal, electronic, and topographic effects in pulsed laser melting and sputtering of gold, Physical Review Letters 76 (10) (1996) 1659.
[18JM] T.L. Bergman, M.T. Hyun, Simulation of two-dimensional thermosolutal convection in liquid metals induced by horizontal temperature and species gradients, International Journal of Heat and Mass Transfer 39 (14) (1996) 2883.
[19JM] X. Bian, R.H. Rangel, Viscous stagnation-flow solidification problem, International Journal of Heat and Mass Transfer 39 (17) (1996) 3581.
[20JM] J.-C. Chen, H.-K. Wu, Numerical computation of heat flow, fluid flow and interface shapes in the float zone of lithium niobate during a melting process, International Journal of Heat and Mass Transfer 39 (17) (1996) 3707.
[21JM] S.C. Chen, K.F. Hsu, K.S. Hsu, Polymer melt growth and gas penetration in gas-assisted injection molding of a thin part with gas channel design, International Journal of Heat and Mass Transfer 39 (14) (1996) 2957.
[22JM] C. Damle, Y. Sahai, Criterion for water modeling of nonisothermal melt flows in continuous casting tundishes, ISIJ International 36 (6) (1996) 681.
[23JM] C. Hu, J.-C. Chen, Experimental observation of interface shapes in the float zone of lithium niobate during a CO_2 laser melting, International Journal of Heat and Mass Transfer 39 (16) (1996) 3347.
[24JM] M.J. Kim, P. Majumdar, Boundary element method in evaporative laser cutting, Applied Mathematical Modelling 20 (4) (1996) 274.
[25JM] N.I. Kolev, E. Hofer, Uncertainty and sensitivity analysis of a postexperiment simulation of nonexplosive melt–water interaction, Experimental Thermal and Fluid Science 13 (2) (1996) 98.
[26JM] J.Z. Liang, J.N. Ness, Calculation of cooling time in injection moulding, Journal of Materials Processing Technology 57 (12) (1996) 62.
[27JM] O.A. Louchev, S. Otani, Y. Ishizawa, Incorporation of convection in 1D models of float zone and traveling solvent techniques, Journal of Crystal Growth 167 (12) (1996) 333.
[28JM] G. Mladenov, V. Vassileva, K. Vutova, T. Nikolov, Investigations of refining processes during electron beam melting, Vacuum 47 (68) (1996) 825.
[29JM] D. Morvan, P. Bournot, Oscillatory flow convection in a melted pool, International Journal of Numerical Methods for Heat and Fluid Flow 6 (1) (1996) 13.
[30JM] S.J. Park, T.H. Kwon, Sensitivity analysis formulation for three-dimensional conduction heat transfer with complex geometries using a boundary element method, International Journal for Numerical Methods in Engineering 39 (16) (1996) 2837.
[31JM] M.A. Rady, A.K. Mohanty, Natural convection during melting and solidification of pure metals in a cavity, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 49.
[32JM] M. Sami, B.S. Yilbas, Kinetic theory approach for laser pulse heating process, Optics and Lasers in Engineering 24 (4) (1996) 319.
[33JM] S.L. Sobolev, Local-nonequilibrium temperature field around the melting and crystallization front induced by picosecond pulsed laser irradiation, International Journal of Thermophysics 17 (5) (1996) 1089.
[34JM] C.B. Solnordal, N.B. Gray, Heat-transfer and pressure-drop considerations in the design of sirosmelt lances,

Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (2) (1996) 221.
[35JM] V. Subramanian, M.G. Lakshmikantha, J.A. Sekhar, Modeling of sequential reactions during micropyretic synthesis, Metallurgical and Materials Transactions A—Physical Metallurgy and Materials Science 27A (4) (1996) 961.
[36JM] V.R. Voller, P. Felix, C.R. Swaminathan, Cyclic phase change with fluid flow, International Journal of Numerical Methods for Heat and Fluid Flow 6 (4) (1996) 57.
[37JM] B.S. Yilbas, M. Sami, Laser melting of Ti–15Al–20Nb alloy, Journal of Materials Engineering and Performance 5 (1) (1996) 124.
[38JM] M. Yoshii, H. Kuramoto, T. Kawana, K. Kato, Observation and origin of micro flow marks in the precision injection molding of polycarbonate, Polymer Engineering and Science 36 (6) (1996) 819.
[39JM] X. Zhang, J.R. Ho, C.P. Grigoropoulos, Ultra-shallow p plus -junction formation in silicon by excimer laser doping: a heat and mass transfer perspective, International Journal of Heat and Mass Transfer 39 (18) (1996) 3835.
[40JM] S. Zhong, H.E. Geotzman, R.L. Bleifuss, Reduction of iron ore with coal by microwave heating, Minerals and Metallurgical Processing 13 (4) (1996) 174.

Change of phase — freezing and melting: powders, films, emulsions, and particles in a melt

[41JM] K. Bauckhage, O. Andersen, S. Hansmann, W. Reich, P. Schreckenberg, Production of fine powders by ultrasonic standing wave atomization, Powder Technology 86 (1) (1996) 77.

Change of phase — freezing and melting: glass melting and formation

[42JM] P.B. Eleazer, S. Pastore, Burner development revolutionises oxy-fuel firing, Glass International 19 (1) (1996) 11.
[43JM] V.L. Halloin, S.J. Wajc, Physical and numerical simulations of creeping flow and heat transfer in forehearths, Chemical Engineering Communications 1996 (1996) 59.
[44JM] W.J. Horan, A.G. Slavejkov, L.L. Chang, Heat transfer optimization in TV glass furnaces, Ceramic Engineering and Science Proceedings 17 (2) (1996) 141.
[45JM] B. Jurcik, L. Philippe, S. Wayman, R. Ruiz, Particulate emissions in oxy-fuel fired glass furnaces, Ceramic Engineering and Science Proceedings 17 (2) (1996) 36.
[46JM] V.M. Olabin, L.S. Pioro, A.B. Maximuk, M.J. Khinkis, H.A. Abbasi, Submerged combustion furnace for glass melts, Ceramic Engineering and Science Proceedings 17 (2) (1996) 84.

Change of phase — freezing and melting: welding

[47JM] N.U. Ahmed, B.L. Jarvis, Thermal cycles in multiple electrode submerged arc welding, Welding Journal 75 (1) (1996) 15s.
[48JM] P.W. Fuerschbach, Measurement and prediction of energy transfer efficiency in laser beam welding, Welding Journal 75 (1) (1996) 24s.
[49JM] H. Herold, R. Probst, H. Zwickert, M. Streitenberger, G. Schafer, J. Schuster, R. Paschold, Fundamental materials research and developments in consumables, Welding Research Abroad 42 (1) (1996) 2.

Change of phase — freezing and melting: enclosures

[50JM] P.H. Oosthuizen, J.T. Paul, Numerical study of the steady state freezing of water in an open rectangular cavity, International Journal of Numerical Methods for Heat and Fluid Flow 6 (5) (1996) 3.
[51JM] F.L. Tan, K.C. Leong, Freezing inside an enclosure using n-paraffin materials: an experimental study, Journal of Materials Processings and Manufacturing Science 5 (1) (1996) 45.
[52JM] H. Zhang, V. Prasad, M.K. Moallemi, Numerical algorithm using multizone adaptive grid generation for multiphase transport processes with moving and free boundaries, Numerical Heat Transfer Part B—Fundamentals 29 (4) (1996) 399.

Change of phase — freezing and melting: nuclear reactors

[53JM] T.K. Blanchat, M.D. Allen, Experiments to investigate DCH phenomena with large-scale models of the Zion and Surry nuclear power plants, Nuclear Engineering and Design 164 (13) (1996) 147.
[54JM] R.J. Hammersley, C. Cirauqui, J. Faig, R.E. Henry, Direct containment heating experiments for Vandellos and ASCo nuclear power plants, Nuclear Engineering and Design 164 (13) (1996) 287.
[55JM] Lopez M. de Bertodano, A. Becker, A. Sharon, R. Schnider, DCH dispersal and entrainment experiment in a scaled annular cavity, Nuclear Engineering and Design 164 (13) (1996) 271.
[56JM] J.M. Seiler, Phase segregation model and molten pool thermal-hydraulics during molten core–concrete interaction, Nuclear Engineering and Design 166 (2) (1996) 259.
[57JM] Q. Wu, S. Kim, M. Ishii, S.T. Revankar, R.Y. Lee, High pressure simulation experiment on corium dispersion in direct containment heating, Nuclear Engineering and Design 164 (13) (1996) 257.
[58JM] H. Yan, T.G. Theofanous, Prediction of direct containment heating, Nuclear Engineering and Design 164 (13) (1996) 95.

Change of phase — freezing and melting: energy storage

[59JM] G.A. Adebiyi, B.K. Hodge, W.G. Steele, A. Jalalzadeh-Aza, E.C. Nsofor, Computer simulation of a

high-temperature thermal energy storage system employing multiple families of phase-change storage materials, Journal of Energy Resources Technology—Transactions of the ASME 118 (2) (1996) 102.
[60JM] J.C. Choi, S.D. Kim, G.Y. Han, Heat transfer characteristics in low-temperature latent heat storage system using salt-hydrates at heat recovery stage, Solar Energy Materials and Solar Cells 40 (1) (1996) 71.
[61JM] Z.-X. Gong, A.S. Mujumdar, Cyclic heat transfer in a novel storage unit of multiple phase change materials, Applied Thermal Engineering 16 (10) (1996) 807.
[62JM] Z.-X. Gong, A.S. Mujumdar, Enhancement of energy charge–discharge rates in composite slabs of different phase change materials, International Journal of Heat and Mass Transfer 39 (4) (1996) 725.
[63JM] Z.-X. Gong, A.S. Mujumdar, Finite element analysis of a multistage latent heat thermal storage system, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 669.
[64JM] Z.X. Gong, A.S. Mujumdar, Exergetic analysis of energy storage using multiple phase-change materials, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 242.
[65JM] M.A. Hamdan, F.A. Elwerr, Thermal energy storage using a phase change material, Solar Energy 56 (2) (1996) 183.
[66JM] C.J. Ho, C.H. Chu, Numerical simulation of heat penetration through a vertical rectangular phase change material/air composite cell, International Journal of Heat and Mass Transfer 39 (9) (1996) 1785.
[67JM] C.J. Ho, C.H. Chu, Thermal protection characteristics of a vertical rectangular cell filled with PCM/air layer, Warme und Stoffubertragung-Thermo and Fluid Dynamics 31 (3) (1996) 191.
[68JM] H. Inaba, S.-I. Morita, Cold heat-release characteristics of phase-change emulsion by air-emulsion direct-contact heat exchange method, International Journal of Heat and Mass Transfer 39 (9) (1996) 1797.
[69JM] D. Pal, Y. Joshi, Application of phase change materials for passive thermal control of plastic quad flat packages: a computational study, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 19.

Change of phase — freezing and melting: multiple PCM studies

[70JM] K. Sasaguchi, A. Ishihara, H. Zhang, Numerical study on utilization of melting of phase change material for cooling of a heated surface at a constant rate, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 19.
[71JM] X. Tong, J.A. Khan, Amin M. Ruhul, Enhancement of heat transfer by inserting a metal matrix into a phase change material, Numerical Heat Transfer Part A—Applications 30 (2) (1996) 125.
[72JM] B. Yimer, Thermal radiation effects in phase-change energy-storage systems, Energy 21 (12) (1996) 1277.
[73JM] Y. Zhang, A. Faghri, Heat transfer enhancement in latent heat thermal energy storage system by using an external radial finned tube, Journal of Enhanced Heat Transfer 3 (2) (1996) 119.
[74JM] Y. Zhang, A. Faghri, Heat transfer enhancement in latent heat thermal energy storage system by using the internally finned tube, International Journal of Heat and Mass Transfer 39 (15) (1996) 3165.
[75JM] Y. Zhang, A. Faghri, Semi-analytical solution of thermal energy storage system with conjugate laminar forced convection, International Journal of Heat and Mass Transfer 39 (4) (1996) 717.

Change of phase — freezing and melting: mushy zone — dendritic growth

[76JM] D.M. Anderson, M.G. Worster, New oscillatory instability in a mushy layer during the solidification of binary alloys, Journal of Fluid Mechanics 1996 (1996) 245.
[77JM] L. Hadji, X.-X. Jin, Penetrative convection induced by the freezing of seawater, International Journal of Heat and Mass Transfer 39 (18) (1996) 3823.
[78JM] A. Mackenbrock, K.H. Tacke, Generalized enthalpy method for multicomponent phase change, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (5) (1996) 871.

Change of phase — freezing and melting: metal solidification

[79JM] C. Beckermann, J. Ni, Simulations of sedimentation in globulitic alloy solidification, International Communications in Heat and Mass Transfer 23 (3) (1996) 315.
[80JM] N.A. El-Mahallawy, M.A. Taha, A.K. El-Kharbotly, E.A. Hakim, Svenson, Solidification simulation of equiaxed grains in Al–Si eutectic alloys, Materials Science Forum 217 (222pt) (1996) 347.
[81JM] I.A. Frigaard, Solidification of aluminum spray-formed billets: An analysis of thin layering effects, Journal of Engineering Mathematics 30 (4) (1996) 417.
[82JM] C.-C. Hwang, J.-Y. Hsieh, C.-C. Chuan, Thermal effects on the morphological stability in a directional solidification system with remote flow, International Journal of Heat and Mass Transfer 39 (16) (1996) 3417.
[83JM] J.J. Jou, K.Y. Kung, C.H. Hsu, Compositionally convective and morphological instabilities of a binary fluid layer under freezing with nonlinear analysis, International Journal of Heat and Mass Transfer 39 (2) (1996) 289.
[84JM] M.J.M. Krane, F.P. Incropera, Scaling analysis of the unidirectional solidification of a binary alloy, International Journal of Heat and Mass Transfer 39 (17) (1996) 3567.
[85JM] S.A. Kukushkin, V.V. Slyozov, Growth of island films from binary melts or a vapor phase at the Ostwald ripening stage under nonisothermal conditions, Journal of Physics and Chemistry of Solids 57 (5) (1996) 601.
[86JM] T. Ouyang, K.K. Tamma, On adaptive time stepping approaches for thermal solidification processes, International Journal of Numerical Methods for Heat and Fluid Flow 6 (2) (1996) 37.
[87JM] M. Yao, D.H. Matthiesen, A. Chait, Numerical simu-

lation of heat transport and fluid flow in directional crystal growth of GaAs, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 685.

Change of phase — freezing and melting: crystal growth from melt

[88JM] S. Brandon, D. Gazit, A. Horowitz, Interface shapes and thermal fields during the gradient solidification method growth of sapphire single crystals, Journal of Crystal Growth 167 (12) (1996) 190.
[89JM] E. Dornberger, W. von Ammon, N. Van den Bogaert, F. Dupret, Transient computer simulation of a CZ crystal growth process, Journal of Crystal Growth 166 (14) (1996) 452.
[90JM] S. Fujiwara, T. Araki, M. Tatsumi, M. Irikura, K. Matsumoto, S. Murai, T. Shirakawa, Effect of gravity on crystal growth of InGaAs by the Bridgman method, Journal of Crystal Growth 167 (12) (1996) 357.
[91JM] R. Irizzary-Rivera, W.D. Seider, Optimal interface for the Bridgman crystallization process, Numerical Heat Transfer Part A—Applications 29 (3) (1996) 227.
[92JM] T. Jung, G. Mueller, Effective segregation coefficients: a comparison of axial solute distributions predicted by analytical boundary layer models and numerical calculations, Journal of Crystal Growth 165 (4) (1996) 463.
[93JM] S. Kaddeche, J.P. Garandet, C. Barat, Hadid H. Ben, D. Henry, Interface curvature and convection related macrosegregation in the vertical Bridgman configuration, Journal of Crystal Growth 158 (12) (1996) 144.
[94JM] K. Kakimoto, K.-W. Yi, M. Eguchi, Oxygen transfer during single silicon crystal growth in Czochralski system with vertical magnetic fields, Journal of Crystal Growth 163 (3) (1996) 238.
[95JM] S.A. Korpela, J. Ni, A. Chait, M. Kassemi, Radiative heat transfer in fiber drawing and crystal pulling, Journal of Crystal Growth 165 (4) (1996) 455.
[96JM] K. Kuribayashi, Y. Inatomi, S. Endoh, H. Sakuta, Influence of release and transport of latent heat on solidification behavior in faceted crystal, Materials Science Forum 1996 (1996) 339.
[97JM] C.W. Lan, Effect of axisymmetric magnetic fields on radial dopant segregation of floating-zone silicon growth in a mirror furnace, Journal of Crystal Growth 169 (2) (1996) 269.
[98JM] C.W. Lan, C.C. Ting, Computer simulation of liquid encapsulated vertical Bridgman crystal growth: pseudo steady-state calculations, International Journal of Numerical Methods for Heat and Fluid Flow 6 (2) (1996) 3.
[99JM] C.W. Lan, D.T. Yang, Numerical investigation of heat flow and interfaces in the vertical zone-melting crystal growth, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 131.
[100JM] M. Louhi-Kultanen, Concentration and purification by crystallization, Acta Polytechnica Scandinavica Chemical Technology and Metallurgy Series 1996 (1996) 2.
[101JM] H. Ouyang, W. Shyy, Multi-zone simulation of the bridgman growth process of β-NiAl crystal, International Journal of Heat and Mass Transfer 39 (10) (1996) 2039.
[102JM] I. Raspo, J. Ouazzani, R. Peyret, Spectral multidomain technique for the computation of the Czochralski melt configuration, International Journal of Numerical Methods for Heat and Fluid Flow 6 (1) (1996) 31.
[103JM] P. Rudolph, Virtues of Fukuda Laboratory of crystal growth, III-Vs Review 9 (4) (1996) 27.
[104JM] P. Rudolph, F. Matsumoto, T. Fukuda, Studies on interface curvature during vertical Bridgman growth of InP in a flat-bottom container, Journal of Crystal Growth 158 (12) (1996) 43.
[105JM] V.L. Tassev, Research in real time of some thermal and mass growth parameters of BGO and BSO crystals during the Czochralski process with weight diameter control, Journal of Materials Science 31 (1) (1996) 209.

Change of phase — freezing and melting: casting

[106JM] C.H. Amon, K.S. Schmaltz, R. Merz, F.B. Prinz, Numerical and experimental investigation of interface bonding via substrate remelting of a impinging molten metal droplet, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 164.

Change of phase — freezing and melting: splat cooling

[107JM] G.X. Wang, E.F. Matthys, Experimental investigation of interfacial thermal conductance for molten solidification on a substrate, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 157.

Change of phase — freezing and melting: miscellaneous

[108JM] J.C. Arderius, M.A. Lara, D.A. Tarzia, Experimental–numerical determination of thermal coefficients through a phase-change process, International Communications in Heat and Mass Transfer 23 (5) (1996) 745.
[109JM] X. Fang, H.G. Stefan, Long-term lake water temperature and ice cover simulations/measurements, Cold Regions Science and Technology 24 (3) (1996) 289.
[110JM] P.K. Maciejewski, Evidence of a convective instability allowing warm water to freeze in less time than cold water, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 65.

Radiative heat transfer: influence of geometry

[1K] Z.I. Antoniak, B.J. Palmer, M.K. Drost, J.R. Welty, Parametric study of radiative heat transfer in arrays of fixed discrete surfaces, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 228.
[2K] S. Khoddam, Y.C. Lam, P.F. Thomson, Thermal analysis of the hot torsion test taking into account radiation, Mechanics of Materials 22 (1) (1996) 1.
[3K] W.M.G. Malalasekera, E.H. James, Radiative heat transfer calculations in three-dimensional complex geometries,

Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 225.
[4K] P.C. Miranda, Calculation and experimental verification of the infrared transmission coefficient of straight cylindrical metal tubes, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 495.
[5K] J.P. Moder, J.C. Chai, G. Parthasarathy, H.S. Lee, S.V. Patankar, Nonaxisymmetric radiative transfer in cylindrical enclosures, Numerical Heat Transfer Part B—Fundamentals 30 (4) (1996) 437.
[6K] B.J. Palmer, Drost M. Kevin, J.R. Welty, Monte Carlo simulation of radiative heat transfer in arrays of fixed discrete surfaces using cell-to-cell photon transport, International Journal of Heat and Mass Transfer 39 (13) (1996) 2811.
[7K] R. Srinivasan, A.C. White, Analytical expression for a concentric-cylinder radiation view factor, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 534.
[8K] D.J. Worth, A. Spence, P.I. Crumpton, S.T. Kolaczkowski, Radiative exchange between square parallel channels in a concentric monolith structure, International Journal of Heat and Mass Transfer 39 (7) (1996) 1463.

Radiative heat transfer: participating media

[9K] M.A. Al-Nimr, V.S. Arpaci, Y.S. Najjar, Temperature and soot concentration in a high soot density flame, International Journal of Heat and Mass Transfer 39 (6) (1996) 1235.
[10K] C. Argento, D. Bouvard, Ray tracing method for evaluating the radiative heat transfer in porous media, International Journal of Heat and Mass Transfer 39 (15) (1996) 3175.
[11K] S.W. Baek, Ignition of propane–air mixture by radiatively heated small particles, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 539.
[12K] A.K. Berghausen, J.C. Taylor, H.A. Hassan, Direct simulation of shock front radiation in air, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 413.
[13K] S. Bhattacharjee, R.A. Altenkirch, K. Sacksteder, Effect of ambient pressure on flame spread over thin cellulosic fuel in a quiescent, microgravity environment, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 181.
[14K] D.A. Blank, S.C. Mishra, Use of the 2-D collapsed dimension method in gray enclosures with absorbing–emitting–isotropic scattering media in radiative equilibrium, Numerical Heat Transfer Part B—Fundamentals 30 (4) (1996) 469.
[15K] N.W. Bressloff, J.B. Moss, P.A. Rubini, Assessment of a differential total absorptivity solution to the radiative transfer equation as applied in the discrete transfer radiation model, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 381.
[16K] M. Cherkaoui, J.L. Dufresne, R. Fournier, J.Y. Grandpeix, A. Lahellec, Monte Carlo simulation of radiation in gases with a narrow-band model and a net-exchange formulation, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 401.
[17K] C.A. Cook, V.A. Cundy, F.L. Larsen, J.S. Lighty, Comprehensive heat transfer model for rotary desorbers, Canadian Journal of Chemical Engineering 74 (1) (1996) 63.
[18K] G.R. Cunnington, S.C. Lee, Radiative properties of fibrous insulations: theory versus experiment, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 460.
[19K] K.T. Harris, J.A. Roux, T.A. McCarty, Substrate barrier effects on total heat transfer for a R-30 fibrous insulation batt, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 158.
[20K] T.J. Hendricks, J.R. Howell, Absorption/scattering coefficients and scattering phase functions in reticulated porous ceramics, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 79.
[21K] Z. Ivezic, M.P. Menguc, Investigation of dependent/independent scattering regimes using a discrete dipole approximation, International Journal of Heat and Mass Transfer 39 (4) (1996) 811.
[22K] K. Kamiuto, Combined conduction and nongray radiation heat transfer in carbon dioxide, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 701.
[23K] K. Kamiuto, K. Kanemaru, Approximate method for combined forced-convection and radiation heat transfer in absorbing and emitting gases flowing in a black, plane-parallel duct, International Journal of Heat and Mass Transfer 39 (10) (1996) 2191.
[24K] O.J. Kim, T.-H. Song, Implementation of the weighted sum of gray gases model to a narrow band: application and validity, Numerical Heat Transfer Part B—Fundamentals 30 (4) (1996) 453.
[25K] U.O. Koylu, G.M. Faeth, Spectral extinction coefficients of soot aggregates from turbulent diffusion flames, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 415.
[26K] L. Labracherie, M. Billiotte, L. Houas, Shock-tube analysis of argon influence in titan radiative environment, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 162.
[27K] N. Lallemant, R. Weber, Computationally efficient procedure for calculating gas radiative properties using the exponential wide band model, International Journal of Heat and Mass Transfer 39 (15) (1996) 3273.
[28K] P.Y.C. Lee, K.G.T. Hollands, G.D. Raithby, Reordering the absorption coefficient within the wide band for predicting gaseous radiant exchange, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 394.
[29K] D.A. Levin, R.J. Collins, G.V. Candler, M.J. Wright, P.W. Erdman, Examination of OH ultraviolet radiation from shock-heated air, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 200.
[30K] B.-T. Liou, C.-Y. Wu, Composite discrete–ordinate solutions for radiative transfer in a two-layer medium with Fresnel interfaces, Numerical Heat Transfer Part A—Applications 30 (7) (1996) 739.
[31K] B.T. Liou, C.Y. Wu, Radiative transfer in a multi-layer medium with Fresnel interfaces, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 103.
[32K] N.N. Markina, Peculiarities of descending radiation of

the middle atmosphere in the absorption band O2 around lambda equals 5 mm, Journal of Communications Technology and Electronics 41 (2) (1996) 157.
[33K] G.R. Mattocks, Further thoughts on 'synthetic air', Glass Technology 37 (6) (1996) 214.
[34K] S.S. Moiseev, V.A. Petrov, S.V. Stepanov, Use of a radiation diffusion model for determination of optical and thermal radiative properties of anisotropic silica fiber thermal insulation, International Journal of Thermophysics 17 (2) (1996) 515.
[35K] I. Nicoara, D. Vizman, D. Nicoara, Thermal stresses in shaped semi-transparent crystals, Journal of Crystal Growth 169 (1) (1996) 102.
[36K] M. Papini, Study of the radiative properties of powdered and fibrous polymers, Vibrational Spectroscopy 11 (1) (1996) 61.
[37K] C.S. Park, D. Bershader, C. Park, Radiative emission from the simulated shock layer of the Huygens probe, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 563.
[38K] G. Parthasarathy, J.C. Chai, S.V. Patankar, Simple approach to nongray gas modeling, Numerical Heat Transfer Part B—Fundamentals 29 (1) (1996) 113.
[39K] J.B. Pessoa-Filho, S.T. Thynell, Approximate solution to radiative transfer in two-dimensional cylindrical media, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 452.
[40K] S.P. Sharma, E.E. Whiting, Modeling of nonequilibrium radiation phenomena: an assessment, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 385.
[41K] R. Siegel, Internal radiation effects in zirconia thermal barrier coatings, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 707.
[42K] R. Siegel, Transient heat transfer in a semitransparent radiating layer with boundary convection and surface reflections, International Journal of Heat and Mass Transfer 39 (1) (1996) 69.
[43K] R. Siegel, Two-flux Green's function analysis for transient spectral radiation in a composite, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 681.
[44K] R. Siegel, Two-flux method for transient radiative transfer in a semitransparent layer, International Journal of Heat and Mass Transfer 39 (5) (1996) 1111.
[45K] R. Siegel, C.M. Spuckler, Temperature distributions in semitransparent coatings — a special two-flux solution, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 39.
[46K] C.M. Spuckler, R. Siegel, Two-flux and diffusion methods for radiative transfer in composite layers, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 218.
[47K] C.E. Treanor, I.V. Adamovich, M.J. Williams, J.W. Rich, Kinetics of nitric oxide formation behind shock waves, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 193.
[48K] C.-Y. Wu, B.-T. Liou, Radiative transfer in a two-layer slab with Fresnel interfaces, Journal of Quantitative Spectroscopy and Radiative Transfer 56 (4) (1996) 573.
[49K] J.-M. Zhang, W.H. Sutton, Predictions of radiative transfer in two-dimensional nonhomogeneous participating cylindrical media, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 47.

Radiative heat transfer: radiation combined with convection, conduction, or mass transfer

[50K] Y. Asako, Y. Yamaguchi, L. Chen, M. Faghri, Combined natural convection and radiation heat transfer in a vertical air cavity with hexagonal honeycomb core of negligible thickness, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 73.
[51K] C. Balaji, S.P. Ventateshan, Natural convection in L corners with surface radiation and conduction, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 222.
[52K] K.S. Chapman, P. Zhang, Energy transfer simulation for radiantly heated and cooled enclosures, ASHRAE Transactions 102 (1) (1996) 76.
[53K] H.-J. Chen, C.-Y. Chen, Mathematical model of an isobutane cracker, Journal of the Chinese Institute of Chemical Engineers 27 (2) (1996) 79.
[54K] A.A. Dehghan, M. Behnia, Combined natural convection–conduction and radiation heat transfer in a discretely heated open cavity, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 56.
[55K] C. Di Blasi, Heat, momentum and mass transport through a shrinking biomass particle exposed to thermal radiation, Chemical Engineering Science 51 (7) (1996) 1121.
[56K] I. Dincer, Y.A. Kilic, N. Kahveci, Heat transfer modelling of spherical particles subject to heating in a fluidized bed, International Communications in Heat and Mass Transfer 23 (5) (1996) 705.
[57K] D. Doermann, J.F. Sacadura, Heat transfer in open cell foam insulation, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 88.
[58K] L.A. Dombrovsky, Quartz-fiber thermal insulation: infrared radiative properties and calculation of radiative–conductive heat transfer, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 408.
[59K] P.S. Dutta, H.L. Bhat, V. Kumar, Modelling temperature distribution in cylindrical crystal growth furnaces, International Communications in Heat and Mass Transfer 23 (3) (1996) 377.
[60K] D.E. Hall, W.Z. Black, T.J. Parker, Transient thermal performance of line traps, IEEE Transactions on Power Delivery 11 (1) (1996) 197.
[61K] U. Heineman, R. Caps, J. Fricke, Radiation–conduction interaction: an investigation on silica aerogels, International Journal of Heat and Mass Transfer 39 (10) (1996) 2115.
[62K] M.A. Hossain, H.S. Takhar, Radiation effect on mixed convection along a vertical plate with uniform surface temperature, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 243.
[63K] J. Issa, Z. Yin, C.E. Polymeropoulos, Y. Jaluria, Temperature distribution in an optical fiber draw tower furnace, Journal of Materials Processings and Manufacturing Science 4 (3) (1996) 221.

[64K] A.A. Jalalzadeh-Azar, W.G. Steele, G.A. Adebiyi, Heat transfer in a high-temperature packed bed thermal energy storage system — roles of radiation and intraparticle conduction, Journal of Energy Resources Technology—Transactions of the ASME 118 (1) (1996) 50.

[65K] L. Kadinski, M. Peric, Numerical study of grey-body surface radiation coupled with fluid flow for general geometries using a finite volume multigrid solver, International Journal of Numerical Methods for Heat and Fluid Flow 6 (3) (1996) 3.

[66K] Y. Kamotani, A. Chang, Ostrach, Effects of heating mode on steady axisymmetric thermocapillary flows in microgravity, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 191.

[67K] M.Y. Kim, S.W. Baek, Numerical analysis of conduction, convection, and radiation in a gradually expanding channel, Numerical Heat Transfer Part A—Applications 29 (7) (1996) 725.

[68K] S.S. Kim, S.W. Baek, Radiation affected compressible turbulent flow over a backward facing step, International Journal of Heat and Mass Transfer 39 (16) (1996) 3325.

[69K] M.R. Kulkarni, R.E. Peck, Analysis of a bilayered porous radiant burner, Numerical Heat Transfer Part A—Applications 30 (3) (1996) 219.

[70K] K.H. Lee, J.S. Lee, M. Choi, Parametric analysis of radiative–convective heat transfer around a circular cylinder in a cross flow using the finite volume radiation solution method, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 181.

[71K] J. Liu, S.N. Tiwari, Radiative heat transfer effects in chemically reacting nozzle flows, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 436.

[72K] T.P. Merchant, J.V. Cole, K.L. Knutson, J.P. Hebb, K.F. Jensen, Systematic approach to simulating rapid thermal processing systems, Journal of the Electrochemical Society 143 (6) (1996) 2035.

[73K] C. Mesyngier, B. Farouk, Turbulent natural convection–nongray gas radiation analysis in a square enclosure, Numerical Heat Transfer Part A—Applications 29 (7) (1996) 671.

[74K] S. Moujaes, Use of passive radiation barriers in ventilated attics, ASHRAE Transactions 102 (1) (1996) 307.

[75K] D.C. Mueller, S.R. Turns, Theoretical effects of aluminum gel propellant secondary atomization on rocket engine performance, Journal of Propulsion and Power 12 (3) (1996) 591.

[76K] D.J. O'Connor, G.W.H. Silcock, B. Morris, Furnace heat transfer processes applied to a strategy for the fire testing of reduced scale structural models, Fire Safety Journal 27 (1) (1996) 1.

[77K] C. Perdikis, A. Raptis, Heat transfer of a micropolar fluid by the presence of radiation, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 381.

[78K] N.J. Ruperti, M.Jr Raynaud, J.F. Sacadura, Method for the solution of the coupled inverse heat conduction–radiation problem, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 10.

[79K] M. Sakami, A. Charette, V. Le Dez, Application of the discrete ordinates method to combined conductive and radiative heat transfer in a two-dimensional complex geometry, Journal of Quantitative Spectroscopy and Radiative Transfer 56 (4) (1996) 517.

[80K] L.C. Weng, H.S. Chu, Combined natural convection and radiation in a vertical annulus, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 371.

[81K] D.W. Winiarski, D.L. O'Neal, Quasi-steady-state model of attic heat transfer with radiant barriers, Energy and Buildings 24 (3) (1996) 183.

[82K] Y. Yongxiang, Computer simulation of gas flow and heat transfer in waste-heat boilers of the Outokumpu copper flash smelting process, Acta Polytechnica Scandinavica Chemical Technology and Metallurgy Series 1996 (1996) 2.

Radiative heat transfer: intensely irradiated materials

[83K] W.R. Foss, E.J. Davis, Transient laser heating of single solid microspheres, Chemical Engineering Communications 1996 (1996) 113.

[84K] K. Fushinobu, L.M. Phinney, N.C. Tien, Ultrashort-pulse laser heating of silicon to reduce microstructure adhesion, International Journal of Heat and Mass Transfer 39 (15) (1996) 3181.

[85K] M.A.F. Scarparo, Q.J. Chen, A.S. Miller, J.H. Zhang, S.D. Allen, Mechanisms of carbon dioxide laser stereolithography in epoxy-based materials, Journal of Applied Polymer Science 62 (3) (1996) 491.

Radiative heat transfer: experimental methods and properties

[86K] G. Eeckhaut, A. Cunningham, Elimination of radiative heat transfer in fine celled PU rigid foams, Journal of Cellular Plastics 32 (6) (1996) 528.

[87K] Y. Hamamoto, E. Tomita, M. Yamanaka, M. Kataoka, Heat transfer to the wall of end gas side during propagation of premixed flame in a closed vessel, JSME International Journal Series B—Fluids and Thermal Engineering 39 (4) (1996) 836.

[88K] M.A. Havstad, T. Qiu, Thermal radiative properties of liquid metal alloys from measurement data of Hall coefficients and DC resistivities, Experimental Heat Transfer 9 (1) (1996) 1.

[89K] P.D. Jones, D.E. Dorai-Raj, D.G. McLeod, Spectral–directional emittance of oxidized copper, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 343.

[90K] P.D. Jones, D.G. McLeod, D.E. Dorai-Raj, Correlation of measured and computed radiation intensity exiting a packed bed, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 94.

[91K] T. Ueda, M. Sato, K. Nakayama, Cooling characteristics of cutting grain in grinding, CIRP Annals 45 (1) (1996) 293.

[92K] A. Yoshida, T. Fujisaki, H. Tadokoro, S. Washio, Simultaneous measurement of thermophysical and radiative properties of semi-transparent liquids, Fluid Phase Equilibria 125 (12) (1996) 275.

[93K] J.R. Zaworski, J.R. Welty, Drost M. Kevin, Measurement and use of bi-directional reflectance, International Journal of Heat and Mass Transfer 39 (6) (1996) 1149.

Numerical methods: general techniques

[1N] A.R. Almeida, R.M. Cotta, Comparison of convergence acceleration schemes for eingenfunction expansions of partial differential equations, International Journal of Numerical Methods for Heat and Fluid Flow 6 (6) (1996) 85.
[2N] P. Donescu, ta Laursen, Generalized object-oriented approach to solving ordinary and partial differential equations using finite elements, Finite Elements in Analysis and Design 22 (1) (1996) 93.
[3N] T. Gjesdal, Note on the additive correction multigrid method, International Communications in Heat and Mass Transfer 23 (2) (1996) 293.
[4N] C.S. Ierotheou, S.P. Johnson, M. Cross, P.F. Leggett, Computer aided parallelization tools (CAPTools) — conceptual overview and performance on the parallelization of structured mesh codes, Parallel Computing 22 (2) (1996) 163.
[5N] P.L.C. Lage, Modified strong implicit procedure with adaptive optimization of its iteration parameter, Numerical Heat Transfer Part B—Fundamentals 30 (3) (1996) 255.
[6N] H.R. Thomas, C.L.W. Li, Parallel computing solution to heat and moisture transfer in unsaturated soil, International Journal for Numerical Methods in Engineering 39 (22) (1996) 3793.
[7N] H.R. Thomas, C.L.W. Li, Two-dimensional parallel computing solution of coupled heat and moisture flow in unsaturated soil, Journal of Computing in Civil Engineering 10 (3) (1996) 236.

Numerical methods: conduction

[8N] D. Feretic, N. Cavlina, N. Debrecin, Mathematical modelling of transient temperature fields in cylinders by transfer functions, Kerntechnik 61 (4) (1996) 161.
[9N] Y. Fujii, N. Lior, Conjugate heat and mass transfer in a desiccant-airflow system: a numerical solution method, Numerical Heat Transfer Part A—Applications 29 (7) (1996) 689.
[10N] C. Gao, Y. Wang, General formulation of Peaceman and Rachford ADI method for the N-dimensional heat diffusion equation, International Communications in Heat and Mass Transfer 23 (6) (1996) 845.
[11N] A.R.M. Witwit, S.H. Pulko, New boundary treatment for TLM diffusion models and its use with hexagonal meshes, Numerical Heat Transfer Part B—Fundamentals 30 (3) (1996) 371.

Numerical methods: buoyant convection

[12N] L.E. Howle, Comparison of the reduced Galerkin and pseudo-spectral methods for simulation of steady Rayleigh–Benard convection, International Journal of Heat and Mass Transfer 39 (12) (1996) 2401.
[13N] M.C. Liang, C.W. Lan, Three-dimensional convection and solute segregation in vertical Bridgman crystal growth, Journal of Crystal Growth 167 (12) (1996) 320.
[14N] T.F. Lin, C.J. Liau, C.H. Yu, H.L. Su, Evolution of roll patterns in Rayleigh–Benard convection in a rectangular layer: a numerical study, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 165.
[15N] M. Wanschura, H.C. Kuhlmann, H.J. Rath, Three-dimensional instability of axisymmetric buoyant convection in cylinders heated from below, Journal of Fluid Mechanics 1996 (1996) 399.

Numerical methods: phase change

[16N] D. Celentano, Perez E, Phase-change temperature-based formulation including general latent heat effects, International Journal of Numerical Methods for Heat and Fluid Flow 6 (8) (1996) 71.
[17N] S.Y. Hu, Y.P. Chang, W.R. Jong, S.C. Chen, Effect of mold heat transfer on the curing reaction of epoxy molding compound during transfer molding, International Communications in Heat and Mass Transfer 23 (6) (1996) 779.
[18N] H.W. Huang, J.C. Heinrich, D.R. Poirier, Technical note: numerical anomalies in simulating directional solidification of binary alloys, Numerical Heat Transfer Part A—Applications 29 (6) (1996) 639.
[19N] C.W. Lan, F.C. Chen, Finite volume method for solute segregation in directional solidification and comparison with a finite element method, Computer Methods in Applied Mechanics and Engineering 131 (12) (1996) 191.
[20N] H. Li, C.K. Hsieh, D.Y. Goswami, Conjugate heat transfer analysis of fluid flow in a phase-change energy storage unit, International Journal of Numerical Methods for Heat and Fluid Flow 6 (3) (1996) 77.
[21N] R.H. Rangel, X. Bian, Inviscid stagnation-flow solidification problem, International Journal of Heat and Mass Transfer 39 (8) (1996) 1591.

Numerical methods: convection and diffusion

[22N] M.S. Darwish, F. Moukalled, Normalized weighting factor method: a novel technique for accelerating the convergence of high-resolution convective schemes, Numerical Heat Transfer Part B—Fundamentals 30 (2) (1996) 217.
[23N] L. De Biase, F. Feraudi, V. Pennati, Finite volume method for the solution of convection–diffusion 2D problems by a quadratic profile with smoothing, International Journal of Numerical Methods for Heat and Fluid Flow 6 (4) (1996) 3.
[24N] R.V. Mohan, K.K. Tamma, A.F. Avila, Flux-based finite-volume formulations and adaptive time-stepping strategies for modeling of reentry thermal protection systems, Numerical Heat Transfer Part B—Fundamentals 30 (2) (1996) 117.
[25N] V. Pennati, M. Marelli, L.M. De Biase, Fast — a generalized FV solution of convection–diffusion problems by

means of monotonic ν-splines profiles, International Journal of Numerical Methods for Heat and Fluid Flow 6 (7) (1996) 3.

Numerical methods: flow equations

[26N] A.W. Date, Complete pressure correction algorithm for solution of incompressible Navier–Stokes equations on a nonstaggered grid, Numerical Heat Transfer Part B—Fundamentals 29 (4) (1996) 441.

[27N] A.S. Franca, K. Haghighi, Error estimation and adaptivity in finite element analysis of convective heat transfer problems, Part I: theoretical considerations, Numerical Heat Transfer Part B—Fundamentals 29 (4) (1996) 479.

[28N] A.S. Franca, K. Haghighi, Error estimation and adaptivity in finite element analysis of convective heat transfer problems, Part II: validation and applications, Numerical Heat Transfer Part B—Fundamentals 29 (4) (1996) 491.

[29N] T.M. Harms, T.W. Backstrom, J.P. Plessis, Simplified control-volume finite-element method, Numerical Heat Transfer Part B—Fundamentals 30 (2) (1996) 179.

[30N] K.C. Karki, P.S. Sathyamurthy, S.V. Patankar, Performance of a multigrid method with an improved discretization scheme for three-dimensional fluid flow calculations, Numerical Heat Transfer Part B—Fundamentals 29 (3) (1996) 275.

[31N] Y. Li, L. Fuchs, Anisotropic local grid refinement method for fluid flow simulation, Numerical Heat Transfer Part B—Fundamentals 30 (2) (1996) 195.

[32N] T.F. Miller, Fourier analysis of the simple algorithm formulated on a collocated grid, Numerical Heat Transfer Part B—Fundamentals 30 (1) (1996) 45.

[33N] P.D. Minev, F.N. Van de Vosse, L.J.P. Timmermans, A.A. Van Steenhoven, Second order splitting algorithm for thermally-driven flow problems, International Journal of Numerical Methods for Heat and Fluid Flow 6 (2) (1996) 51.

[34N] T.H. Ramin, R.H. Pletcher, Parallel implementation for solving the two-dimensional Navier–Stokes equations on a cell-centered, unstructured grid, Numerical Heat Transfer Part B—Fundamentals 30 (4) (1996) 387.

[35N] J. Shi, E.F. Toro, Riemann-problem-based approach for steady incompressible flows, International Journal of Numerical Methods for Heat and Fluid Flow 6 (7) (1996) 81.

[36N] F. Stella, E. Bucchignani, True transient vorticity-velocity method using preconditioned Bi-CGSTAB, Numerical Heat Transfer Part B—Fundamentals 30 (3) (1996) 315.

[37N] P.T. Williams, A.J. Baker, Incompressible computational fluid dynamics and the continuity constraint method for the three-dimensional Navier–Stokes equations, Numerical Heat Transfer Part B—Fundamentals 29 (2) (1996) 137.

Numerical methods: application to special problems

[38N] A.V. Bobylev, J. Struckmeier, Numerical simulation of the stationary one-dimensional Boltzmann equation by particle methods, European Journal of Mechanics B Fluids 15 (1) (1996) 103.

[39N] A. Campo, J.C. Morales, Boundary-fitted co-ordinates for the asymptotic friction factors and Nusselt numbers of laminar flows inside straight ducts with irregular, singly connected cross-sections, nternational Journal of Numerical Methods for Heat and Fluid Flow 6 (6) (1996) 105.

[40N] H.-P. Chen, K.-C. Huang, Convective transport phenomena in an impulsively started LID-driven open-cavity flow, Numerical Heat Transfer Part A—Applications 29 (5) (1996) 511.

[41N] K.J. Hammad, G.C. Vradis, Creeping flow of a Bingham plastic through axisymmetric sudden contractions with viscous dissipation, International Journal of Heat and Mass Transfer 39 (8) (1996) 1555.

[42N] S. Kadowaki, Numerical study on the instability of premixed plane flames in the three-dimensional field, International Journal of Heat and Fluid Flow 17 (6) (1996) 557.

[43N] J.H. Kim, S.H. Park, Numerical study on combustion of a liquid fuel droplet, Numerical Heat Transfer Part A—Applications 29 (8) (1996) 843.

[44N] J.R. Lopez, N.K. Anand, L.S. Fletcher, Heat transfer in a three-dimensional channel with baffles, Numerical Heat Transfer Part A—Applications 30 (2) (1996) 189.

[45N] K. Mundra, T. DebRoy, K.M. Kelkar, Numerical prediction of fluid flow and heat transfer in welding with a moving heat source, Numerical Heat Transfer Part A—Applications 29 (2) (1996) 115.

[46N] C.D. Rakopoulos, G.C. Mavropoulos, Study of the steady and transient temperature field and heat flow in the combustion chamber components of a medium speed diesel engine using finite element analyses, International Journal of Energy Research 20 (5) (1996) 437.

[47N] V. Sass, H.C. Kuhlmann, H.J. Rath, Investigation of three-dimensional thermocapillary convection in a cubic container by a multi-grid method, International Journal of Heat and Mass Transfer 39 (3) (1996) 603.

[48N] T. Shigechi, S. Momoki, Y. Lee, Fully developed laminar fluid flow and heat transfer in an eccentric annulus with an axially moving core, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 205.

[49N] G. Tanda, G. Vittori, Fluid flow and heat transfer in a two-dimensional wavy channel, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (6) (1996) 411.

[50N] J.A. Thomazin, L.G. Olson, J.W. Hirsch, Axisymmetric laser welding of ceramic and metallic materials: finite element modelling, International Journal of Numerical Methods for Heat and Fluid Flow 6 (3) (1996) 35.

[51N] Z. Zhao, D. Poulikakos, J. Fukai, Heat transfer and fluid dynamics during the collision of a liquid droplet on a substrate — I. Modeling, International Journal of Heat and Mass Transfer 39 (13) (1996) 2771.

Transport properties: transport properties

[1P] S.D. Dahl, T.H. Kuehn, J.W. Ramsey, C.-H. Yang, Moisture storage and nonisothermal transport properties of common building materials, Hvac&R Research 2 (1) (1996) 42.

[2P] M.M. Denn, Correlations for transport coefficients in textile fiber spinning, Industrial and Engineering Chemistry Research 35 (9) (1996) 2842.

[3P] R.E. Nettleton, S.L. Sobolev, Application of extended thermodynamics to chemical, rheological, and transport processes: a special survey. Part III. Wave phenomena, Journal of Non Equilibrium Thermodynamics 21 (1) (1996) 1.

[4P] G.D. Saravacos, A.E. Kostaropoulos, Engineering properties in food processing simulation, Computers and Chemical Engineering 20 (Suppl.) (1996) S461.

[5P] J.R. Stallcop, H. Partridge, E. Levin, Analytical fits for the determination of the transport properties of air, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 697.

Transport properties: thermal conductivity and thermal diffusivity

[6P] B.O. Aduda, Effective thermal conductivity of loose particulate systems, Journal of Materials Science 31 (24) (1996) 6441.

[7P] J.L. Bailleul, D. Delaunay, Y. Jarny, Determination of temperature variable properties of composite materials: methodology and experimental results, Journal of Reinforced Plastics and Composites 15 (5) (1996) 479.

[8P] V. Cermak, M. Kresl, L. Kucerova, J. Safanda, A. Frasheri, N. Kapedani, R. Lico, D. Cano, Heat flow in Albania, Geothermics 25 (1) (1996) 91.

[9P] A.A.A. El-Rahman, K.K. Tahoon, A. El-Salam, M. Abousehly, A. Elwahab, A. El-Sharkawy, Temperature dependence of the thermophysical properties of polycrystalline chalcogenide glasses mercury and antimony sulphides, Journal of Thermal Analysis 47 (6) (1996) 1719.

[10P] A.J. Fletcher, A. Fioravanti, Polishing and honing processes: an investigation of the thermal properties of mixtures of polyborosiloxane and silicon carbide abrasive, Proceedings of the Institution of Mechanical Engineers Part C, Journal of Mechanical Engineering Science 210 (3) (1996) 255.

[11P] G. Grazzini, C. Balocco, U. Lucia, Measuring thermal properties with the parallel wire method: a comparison of mathematical models, International Journal of Heat and Mass Transfer 39 (10) (1996) 2009.

[12P] U.B. Holeschovsky, G.T. Martin, J.W. Tester, Transient spherical source method to determine thermal conductivity of liquids and gels, International Journal of Heat and Mass Transfer 39 (6) (1996) 1135.

[13P] J.R. Infante, L.A. Villarreal, A. Cisneros, R.D. Peralta, R.G. Lopez, M.E. Trevino, J. Wisniak, Integration of hardware and software in a high-performance laboratory reactor, Journal of Applied Polymer Science 62 (13) (1996) 2311.

[14P] M.B.S. Osman, A.Z. Dakroury, M.T. Dessouky, M.A. Kenawy, A.A. El-Sharkawy, Measurement of thermophysical properties of ammonium salts in the solid and molten states, Journal of Thermal Analysis 46 (6) (1996) 1697.

[15P] R. Poprawski, A.A. Belov, S. Matyjasik, Spontaneous polarization and heat transport anomaly at the overcritical state of ferroelectric MAPCB crystal, Ferroelectrics 186 (14) (1996) 333.

[16P] N.S. Sundarmurti, V. Rao, Effect of firing temperature and porosity on thermal conductivity and diffusivity of iron ore pellets, ISIJ International 36 (8) (1996) 991.

[17P] D.K. Wagh, A. Avashia, On the thermal conductivity of magnetic fluid, Japanese Journal of Applied Physics Part 1—Regular Papers Short Notes and Review Papers 35 (6A) (1996) 3518.

[18P] J. Wang, M. Fiebig, Determination of the thermal diffusivity of aqueous solutions of methanol in an extended range of temperature by a laser-induced thermal grating technique, Experimental Thermal and Fluid Science 13 (1) (1996) 38.

Transport properties: diffusion, surface tension, viscosity and radiation properties

[19P] S. Barta, Thermodiffusion and thermo-electric phenomena in condensed systems, International Journal of Heat and Mass Transfer 39 (16) (1996) 3531.

[20P] K. Ishida, Y.H. Mori, Surface tension of aqueous lithium bromide solutions containing 1-octanol as a 'heat-transfer additive', International Communications in Heat and Mass Transfer 23 (7) (1996) 907.

[21P] J. Marciak-Kozlowska, M. Kozlowski, Quantum heat transport equation for femtosecond laser pulses, Lasers in Engineering 5 (2) (1996) 79.

[22P] O. Marin, R.O. Buckius, Wideband correlated-k method applied to absorbing emitting, and scattering media, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 364.

[23P] R. Mital, J.P. Gore, R. Viskanta, Measurements of radiative properties of cellular ceramics at high temperatures, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 33.

[24P] J. Mitrovic, Remarks upon the contribution of J. Stefan to the understanding of diffusion processes, International Journal of Heat and Mass Transfer 39 (1) (1996) 218.

[25P] Y. Yue, R. Brueckner, On the different descriptions of the nonNewtonian viscosity (shear-thinning effect) of glass melts with respect to heat dissipation, Glass Science and Technology 69 (6) (1996) 179.

Transport properties: thermodynamics

[26P] M.E. Gurtin, P.W. Voorhees, Thermodynamics of evolving interfaces far from equilibrium, Acta Materialia 44 (1) (1996) 235.

[27P] W. Muschik, R. Dominguez-Cascante, On extended thermodynamics of discrete systems, Physica A 233 (12) (1996) 523.

[28P] S. Ozkaynak, Optimum operation of irreversible Carnot heat engines of finite size at maximum power output, Energy Sources 18 (3) (1996) 323.

[29P] J.E. Parrott, Thermodynamic theory of transport processes in semiconductors, IEEE Transactions on Electron Devices 43 (5) (1996) 809.
[30P] M. Pons, Second law analysis of adsorption cycles with thermal regeneration, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 229.
[31P] A. Sandoval-Villalbazo, L.S. Garcia-Colin, Meixner–Prigogine scheme in relativistic transport theory, Physica A 234 (12) (1996) 358.
[32P] S. Sieniutycz, S.K. Ratkje, Perturbational thermodynamics of coupled electrochemical heat and mass transfer, International Journal of Heat and Mass Transfer 39 (15) (1996) 3293.
[33P] Z. Yan, L. Chen, Optimization of the rate of exergy output for an endoreversible Carnot refrigerator, Journal of Physics D—Applied Physics 29 (12) (1996) 3017.
[34P] A. Yokozeki, Thermodynamic properties of mixtures based on van der Waals equation of state: R-32/125 binary system, HVAC&R Research 2 (4) (1996) 284.

Heat transfer applications — heat exchangers and heat pipes: heat exchangers

[1Q] Comparing plate and tubular exchangers, Refrigeration Service and Contracting, 1996, 64(9), 25.
[2Q] Solution heating and cooling showcase, Products Finishing, 1996, 60(8).
[3Q] M.K. Abu-Qudais, M.A. Al-Nimr, Theoretical and experimental study of matrix solar air heater under transient condition, International Journal of Solar Energy 18 (3) (1996) 137.
[4Q] V.M. Balasubramaniam, S.K. Sastry, Fluid to particle convective heat transfer coefficient in a horizontal scraped surface heat exchanger determined from relative velocity measurement, Journal of Food Process Engineering 19 (1) (1996) 75.
[5Q] D.A. Bartlett, Fundamentals of heat exchangers, Industrial Physicist 2 (4) (1996) 18.
[6Q] T. Bes, Thermal performances of codirected cross-flow heat exchangers, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 215.
[7Q] V. Briones, A. Kokossis, New approach for the optimal retrofit of heat exchanger networks, Computers and Chemical Engineering 20 (suppl.) (1996) S43.
[8Q] J. Buzek, J. Podkanski, Minimization of total costs of application of heat exchangers, Chemical Engineering and Processing 35 (3) (1996) 181.
[9Q] P.H. Chen, Z.C. Chang, Measurements of thermal performance of the regenerator of a cryocooler with a high number of transfer units value, Proceedings of the Institution of Mechanical Engineers Part C Journal of Mechanical Engineering Science 210 (4) (1996) 341.
[10Q] Y.M. Chen, C.Y. Sun, Heat and mass transfer characteristics of a new combined absorber–evaporator exchanger operating near the triple point of water, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (5) (1996) 291.
[11Q] S.K. Das, T.K. Dan, Transient response of a parallel flow shell-and-tube heat exchanger and its control, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 231.
[12Q] M. Drela, Aerodynamics of heat exchangers for high-altitude aircraft, Journal of Aircraft 33 (1) (1996) 176.
[13Q] A.R. Figueiredo, A.M. Raimundo, Analysis of the performances of heat exchangers used in hot-water stores, Applied Thermal Engineering 16 (7) (1996) 605.
[14Q] S.X. Gao, J.P. Hartnett, Heat transfer behavior of Reiner–Rivlin fluids in rectangular ducts, International Journal of Heat and Mass Transfer 39 (6) (1996) 1317.
[15Q] D. Gulley, Troubleshooting shell-and-tube heat exchangers, Hydrocarbon Processing 75 (9) (1996) 91.
[16Q] T. Gundersen, S. Duvold, A. Hashemi-Ahmady, Extended vertical MILP model for heat exchanger network synthesis, Computers and Chemical Engineering 20 (suppl.) (1996) S97.
[17Q] G.-Y. Han, K. Tuzla, J.C. Chen, Performance of an entrained-particle heat exchanger, Heat Transfer Engineering 17 (4) (1996) 64.
[18Q] R. Hashimoto, K. Yanagi, T. Fujii, Condensation of organic binary mixtures flowing horizontally in horizontal tube bundle, Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 1913.
[19Q] J.C. Ho, N.E. Wijeysundera, Study of a compact spiral-coil cooling and dehumidifying heat exchanger, Applied Thermal Engineering 16 (10) (1996) 777.
[20Q] Y. Huang, S.W. Van Sciver, Forced flow He II heat exchangers, Cryogenics 36 (7) (1996) 535.
[21Q] A.I. Karamavruc, N.N. Clark, Application of deterministic chaos theory to local instantaneous temperature, pressure, and heat transfer coefficients in a gas fluidized bed, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 214.
[22Q] T. Karlsson, Numerical evaluation of plate heat exchanger performance in geothermal district heating systems, Proceedings of the Institution of Mechanical Engineers A (1996).
[23Q] D. Kral, P. Stehlik, H.J. van der Ploeg, B.I. Master, Helical baffles in shell-and-tube heat exchangers, Part I: experimental verification, Heat Transfer Engineering 17 (1) (1996) 93.
[24Q] J.L. Lage, A.K. Weinert, D.C. Price, R.M. Weber, Numerical study of a low permeability microporous heat sink for cooling phased-array radar systems, International Journal of Heat and Mass Transfer 39 (17) (1996) 3633.
[25Q] E.A. Levitskij, Y.I. Aristov, M.M. Tokarev, V.N. Parmon, 'Chemical heat accumulators': a new approach to accumulating low potential heat, Solar Energy Materials and Solar Cells 44 (3) (1996) 219.
[26Q] A. Lozano, V. Henriquez, A.M. Machin, Modelling of a new crossflow moving-bed heat-exchanger/filter (MHEF), Filtration and Separation 33 (1) (1996) 69.
[27Q] P.A. Nawrocki, K.T. Chuang, Carbon dioxide absorption into a stable liquid rivulet, Canadian Journal of Chemical Engineering 74 (2) (1996) 247.
[28Q] S. Ouyang, X.G. Li, G. Davies, O.E. Potter, Heat transfer between a vertical tube bundle and fine particles in a CFB downcomer with and without circulation of

solids, Chemical Engineering and Processing 35 (1) (1996) 21.
[29Q] Rao K. Ramananda, U. Shrinivasa, J. Srinivasan, Constrained optimization of heat exchangers, Chemical Engineering 103 (6) (1996) 112.
[30Q] M.A.S.S. Ravagnani, A.N. Modenes, Heat exchanger networks with multiple periods of operation, Brazilian Journal of Chemical Engineering 13 (2) (1996) 71.
[31Q] J.I. Rodriquez, A.F. Mills, Heat transfer and flow friction characteristics of perforated-plate heat exchangers, Experimental Heat Transfer 9 (4) (1996) 335.
[32Q] J. Sannervik, U. Bolmstedt, C. Tragardh, Heat transfer in tubular heat exchangers for particulate containing liquid foods, Journal of Food Engineering 29 (1) (1996) 63.
[33Q] T.S. Schmit, A.K. Dhingra, F. Landis, G. Kojasoy, Genetic algorithm optimization technique for compact high intensity cooler design, Journal of Enhanced Heat Transfer 3 (4) (1996) 281.
[34Q] L. Trom, Heat exchangers: is it time for a change?, Chemical Engineering 103 (2) (1996) 70.
[35Q] A.S. Tucker, LMTD correction factor for single-pass crossflow heat exchangers with both fluids unmixed, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 488.
[36Q] G. Venkatarathnam, Effectiveness–Ntu relationship in perforated plate matrix heat exchangers, Cryogenics 36 (4) (1996) 235.
[37Q] V.V. Wadekar, Improving industrial heat transfer. Compact and not-so-compact heat exchangers, Heat and Technology 14 (2) (1996) 35.
[38Q] Y. Xuan, Transient analysis of multipass crossflow heat exchangers, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 223.
[39Q] C. Yildiz, Y. Bicer, D. Pehlivan, Influence of fluid rotation on the heat transfer and pressure drop in double-pipe heat exchangers, Applied Energy 54 (1) (1996) 49.
[40Q] D.L. Youchison, M. Izenson, C.B. Baxi, J.H. Rosenfeld, High-heat-flux testing of helium-cooled heat exchangers for fusion applications, Fusion Technology 29 (4) (1996) 559.

Heat transfer applications — heat exchangers and heat pipes: design/materials

[41Q] Radiator manufacturer girds for 21st century with new facilities, capabilities, Diesel Progress: Engines and Drives, 1996, 62(8).
[42Q] B.V. Antohe, J.L. Lage, D.C. Price, R.M. Weber, Numerical characterization of micro heat exchangers using experimentally tested porous aluminum layers, International Journal of Heat and Fluid Flow 17 (6) (1996) 594.
[43Q] A. Bejan, G.A. Ledezma, Thermodynamic optimization of cooling techniques for electronic packages, International Journal of Heat and Mass Transfer 39 (6) (1996) 1213.
[44Q] H.J.H. Brouwers, C.W.M. Van Der Geld, Heat transfer, condensation and fog formation in crossflow plastic heat exchangers, International Journal of Heat and Mass Transfer 39 (2) (1996) 391.
[45Q] Y.-J. Chang, C.-C. Wang, Air side performance of brazed aluminum heat exchangers, Journal of Enhanced Heat Transfer 3 (1) (1996) 15.
[46Q] G.T. Fenwick, Generator air cooler design for a power-plant refurbishment, International Journal on Hydropower and Dams 3 (5) (1996) 58.
[47Q] L. Fradette, P.A. Tanguy, P. Hurez, D. Blouin, On the determination of heat transfer coefficient between PVC and steel in vacuum extrusion calibrators, International Journal of Numerical Methods for Heat and Fluid Flow 6 (1) (1996) 3.
[48Q] R.H. Green, L. Roberts, Effect of air-coil design on the performance of heat pumps and air conditioners, ASHRAE Transactions 102 (1) (1996) 257.
[49Q] H. Ishikawa, P.A. Hobson, Optimisation of heat exchanger design in a thermoacoustic engine using a second law analysis, International Communications in Heat and Mass Transfer 23 (3) (1996) 325.
[50Q] M.G. Izenson, J.L. Martin, Optimal thermal-hydraulic performance for helium-cooled divertors, Fusion Technology 29 (4) (1996) 545.
[51Q] Y. Kaji, I. Ioka, K. Fukaya, Structural integrity test of helical-type intermediate heat exchanger, Journal of the Atomic Energy Society of Japan 38 (10) (1996) 845.
[52Q] Y.T. Kang, W. Chen, R.N. Christensen, Development of design model for a rectifier in GAX absorption heat pump systems, ASHRAE Transactions 102 (1) (1996) 963.
[53Q] M. Katsuta, M. Matsushita, M. Murase, K. Nagata, K. Tanaka, Study on capillary pump loop (CPL) for space use (characteristics and performance test of CPL using two flat-plate-type evaporators), Nippon Kikai Gakkai Ronbunshu, B Hen 62 (597) (1996) 2021.
[54Q] N. Kayansayan, Thermal design method of bayonet-tube evaporators and condensers, International Journal of Refrigeration—Revue Internationale du Froid 19 (3) (1996) 197.
[55Q] K.M. Lunsford, Advantages of brazed aluminum heat exchangers, Hydrocarbon Processing 75 (7) (1996) 55.
[56Q] J.W. Palen, On the road to understanding heat exchangers: A few stops along the way, Heat Transfer Engineering 17 (2) (1996) 41.
[57Q] S.K. Roy, B.L. Avanic, Very high heat flux microchannel heat exchanger for cooling of semiconductor laser diode arrays, IEEE Transactions on Components Packaging and Manufacturing Technology Part B—Advanced Packaging 19 (2) (1996) 444.
[58Q] P.K. Sahoo, S. Sarangi, New technique for the analysis of torque tube heat exchangers of superconducting generators, Cryogenics 36 (5) (1996) 343.
[59Q] F. Staine, D. Favrat, Energy integration of industrial processes based on the pinch analysis method extended to include exergy factors, Applied Thermal Engineering 16 (6) (1996) 497.
[60Q] K.K. Trivedi, K.H. Pang, D.L. O'Young, H.W. Klavers, B. Linnhoff, Optimize a licensor's design using pinch technology, Hydrocarbon Processing 75 (5) (1996) 113.
[61Q] T.A. Wang, R.L. Reid, Surface wettability effect on an

indirect evaporative cooling system, ASHRAE Transactions 102 (1) (1996) 427.

[62Q] D.R. Webb, M. Fahrner, R. Schwaab, Relationship between the Colburn and Silver methods of condenser design, International Journal of Heat and Mass Transfer 39 (15) (1996) 3147.

[63Q] S.R. Wharry Jr, Transfer heat in a resin sheath, Chemical Engineering 103 (2) (1996) 74.

[64Q] G.H. Willett, Noncorrosive flux brazing utilized to process automotive aluminum heat exchangers, Industrial Heating 63 (8) (1996) 33.

Heat transfer applications — heat exchangers and heat pipes: direct contact exchangers/cooling towers

[65Q] R. Burger, Gaining energy efficiencies in cooling tower operations, AIPE Facilities Management, Operations and Engineering 23 (3) (1996) 37.

[66Q] M. Crunden, Cooling towers a safe means of heat transfer, Heating and Air Conditioning Journal (1996) 32.

[67Q] M.C. De Andres, E. Hoo, F. Zangrando, Performance of direct-contact heat and mass exchangers with steam–gas mixtures at subatmospheric pressures, International Journal of Heat and Mass Transfer 39 (5) (1996) 965.

[68Q] A.A. Dreyer, P.J. Erens, Modelling of cooling tower splash pack, International Journal of Heat and Mass Transfer 39 (1) (1996) 109.

[69Q] H. El-Dessouky, Enhancement of the thermal performance of a wet cooling tower, Canadian Journal of Chemical Engineering 74 (3) (1996) 331.

[70Q] K. Gill, T.L. Kallmer, Heating up cooling-tower performance, Consulting Specifying Engineer 20 (3) (1996).

[71Q] A.K.M. Mohiuddin, K. Kant, Knowledge base for the systematic design of wet cooling towers. Part I: selection and tower characteristics, International Journal of Refrigeration—Revue Internationale du Froid 19 (1) (1996) 43.

[72Q] A.K.M. Mohiuddin, K. Kant, Knowledge base for the systematic design of wet cooling towers. Part II: fill and other design parameters, International Journal of Refrigeration—Revue Internationale du Froid 19 (1) (1996) 52.

[73Q] M. Monjoie, F. Bouton, K. Demoor, G. Moulu, G. Mirsky, Cross to counter-flow repack on an induced draft operating cooling tower, Journal of the Cooling Tower Institute 17 (2) (1996) 34.

[74Q] T. Pannkoke, Cooling tower basics, Heating, Piping and Air Conditioning 68 (2) (1996) 137.

[75Q] D.M. Suptic, Innovative application of film fill in large industrial crossflow cooling towers, Journal of the Cooling Tower Institute 17 (1) (1996).

[76Q] C.A. Wilsey, Alternative cooling tower water treatment methods, ASHRAE Transactions 102 (1) (1996) 60076.

Heat transfer applications — heat exchangers and heat pipes: enhancement

[77Q] S.K. Agarwal, Rao M. Raja, Heat transfer augmentation for the flow of a viscous liquid in circular tubes using twisted tape inserts, International Journal of Heat and Mass Transfer 39 (17) (1996) 3547.

[78Q] J.-Y. Chang, C.-J. Ho, C.-S. Hu, Analysis of cooling characteristics of discrete heaters attached with horizontal fins in a tall vertical enclosure, Chung-Kuo Chi Hsueh Kung Ch'Eng Hsueh Pao/Journal of the Chinese Society of Mechanical Engineers 17 (3) (1996) 261.

[79Q] A.T. Conlisk, Prediction of the performance of a spined-tube absorber — Part 1: governing equations and dimensional analysis, ASHRAE Transactions 102 (1) (1996) 110.

[80Q] J.S. Currie, R.E. Low, C.L. Pritchard, Performance of novel compact heat exchangers with highly extended surfaces, Applied Thermal Engineering 16 (3) (1996) 245.

[81Q] M. Fujii, Y. Seshimo, T. Yoshida, Perforated trapezoidal fins for tube-in-fin heat exchangers: heat transfer and pressure drop characteristics, Journal of Enhanced Heat Transfer 3 (2) (1996) 109.

[82Q] V. Ganapathy, Design and evaluate finned tube bundles, Hydrocarbon Processing 75 (9) (1996) 103.

[83Q] A. Hajji, S. Khalloufi, Improving the performance of adsorption heat exchangers using a finned structure, International Journal of Heat and Mass Transfer 39 (8) (1996) 1677.

[84Q] L. Hoffmann, I. Greiter, A. Wagner, V. Weiss, G. Alefeld, Etude experimentale du transfert de chaleur dans un absorbeur a film tombant et tubes horizontaux, avec des solutions aqueuses de bromure de lithium, et avec ou sans agents tensio-actifs, International Journal of Refrigeration—Revue Internationale du Froid 19 (5) (1996) 331.

[85Q] H. Honda, H. Takamatsu, N. Takada, O. Makishi, Condensation of HCFC123 in bundles of horizontal finned tubes: effects of fin geometry and tube arrangement, International Journal of Refrigeration—Revue Internationale du Froid 19 (1) (1996) 1.

[86Q] J.-Y. Jang, M.-C. Wu, W.-J. Chang, Numerical and experimental studies of three-dimensional plate-fin and tube heat exchangers, International Journal of Heat and Mass Transfer 39 (14) (1996) 3057.

[87Q] D. Khrustalev, A. Faghri, High flux evaporative mini-channel heat sink with axial capillary grooves, Journal of Enhanced Heat Transfer 3 (3) (1996) 221.

[88Q] C.K. Krishnaprakas, Optimum design of radiating rectangular plate fin array extending from a plane wall, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 490.

[89Q] G. Ledezma, A. Bejan, Heat sinks with sloped plate fins in natural and forced convection, International Journal of Heat and Mass Transfer 39 (9) (1996) 1773.

[90Q] R. Moeller, K.F. Knoche, Surfacteurs avec NH_3–H_2O, International Journal of Refrigeration—Revue Internationale du Froid 19 (5) (1996) 317.

[91Q] F. Moukalled, M. Darwish, S. Acharya, Laminar mixed convection heat transfer in externally finned pipes, Journal of Enhanced Heat Transfer 3 (1) (1996) 29.

[92Q] J.C. Mulligan, D.P. Colvin, Y.G. Bryant, Microencapsulated phase-change material suspensions for heat transfer in spacecraft thermal systems, Journal of Spacecraft and Rockets 33 (2) (1996) 278.

[93Q] G.K.Sr Pase, Closer look at integrally finned-tube heat exchangers, Chemical Engineering 103 (2) (1996) 76.
[94Q] B.S.V. Prasad, Sizing and passage arrangement of multistream plate-fin heat exchangers, Heat Transfer Engineering 17 (3) (1996) 35.
[95Q] T.J. Rabas, J. Taborek, Heat-rate improvements obtained by retubing condensers with new, enhanced tube types, Journal of Enhanced Heat Transfer 3 (2) (1996) 83.
[96Q] V.R. Rao, S.P. Venkateshan, Experimental study of free convection and radiation in horizontal fin arrays, International Journal of Heat and Mass Transfer 39 (4) (1996) 779.
[97Q] K.J. Renken, M.R. Raich, Forced convection steam condensation experiments within thin porous coatings, International Journal of Heat and Mass Transfer 39 (14) (1996) 2937.
[98Q] D. Schroeder-Richter, S. Yildiz, Effect of porous coating on critical heat flux removed by subcooled water at low flow rates, Fusion Technology 29 (4) (1996) 512.
[99Q] D. Schroeder-Richter, S. Yildiz, G. Bartsch, Effect of porous coating on critical heat flux, International Communications in Heat and Mass Transfer 23 (4) (1996) 463.
[100Q] M. Sozen, T.M. Kuzay, Enhanced heat transfer in round tubes with porous inserts, International Journal of Heat and Fluid Flow 17 (2) (1996) 124.
[101Q] A.H. Taki, D.L. Loveday, Surface convection coefficients for building facades with vertical mullion-type protrusions, Proceedings of the Institution of Mechanical Engineers A (1996).
[102Q] A. Valencia, M. Fiebig, N.K. Mitra, Heat transfer enchancement by longitudinal vortices in a fin-tube heat exchanger with flat tubes, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 209.
[103Q] N.E. Wijeysundera, J.C. Ho, S. Rajasekar, Effectiveness of a spiral coil heat exchanger, International Communications in Heat and Mass Transfer 23 (5) (1996) 623.
[104Q] F. Ziegler, G. Grossman, Amelioration du transfert de chaleur grace aux additifs, International Journal of Refrigeration—Revue Internationale du Froid 19 (5) (1996) 301.

Heat transfer applications — heat exchangers and heat pipes: fouling/deposits/surface effects

[105Q] N. Afgan, M.G. Carvalho, P. Coelho, Concept of expert system for boiler fouling assessment, Applied Thermal Engineering 16 (10) (1996) 835.
[106Q] N.H. Afgan, M.G. Carvalho, Knowledge-based expert system for fouling assessment of industrial heat exchangers, Applied Thermal Engineering 16 (3) (1996) 203.
[107Q] S.L. Blohm, Monitoring, control of cooling water treatment, AIPE Facilities Management, Operations and Engineering 23 (6) (1996) 16.
[108Q] R.W. Bryers, Fireside slagging, fouling, and high-temperature corrosion of heat-transfer surface due to impurities in steam-raising fuels, Progress in Energy and Combustion Science 22 (1) (1996) 29.
[109Q] I.O.B. Ewa, S.B. Elegbe, J. Adetunji, Sodium and oxygen in Nigerian coals: possible effects on ash fouling, Journal of Environmental Science and Health, Part A: Environmental Science and Engineering and Toxic and Hazardous Substance Control 31 (8) (1996) 2071.
[110Q] M.S. Khan, S.M. Zubair, M.O. Budair, A.K. Sheikh, A. Quddus, Fouling resistance model for prediction of $CaCO_3$ scaling in AISI 316 tubes, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 73.
[111Q] W.J. Marner, Progress in gas-side fouling of heat-transfer surfaces: 1989–1995, Applied Mechanics Reviews 49 (10) (1996) S161.
[112Q] M.A. Masri, K.R. Cliffe, Study of the deposition of fine particles in compact plate fin heat exchangers, Journal of Enhanced Heat Transfer 3 (4) (1996) 259.
[113Q] M. Osakabe, M. Isono, Effect of valve lift and disk surface on two-phase critical flow at hot water relief valve, International Journal of Heat and Mass Transfer 39 (8) (1996) 1617.
[114Q] I. Owen, E. Buyruk, H. Barrow, Theoretical analysis of the thermal resistance of nonuniform fouling on cross-flow heat exchanger tubes, Applied Thermal Engineering 16 (1) (1996) 43.
[115Q] A.K. Sheikh, S.M. Zubair, M.U. Haq, M.O. Budair, Reliability-based maintenance strategies for heat exchangers subject to fouling, Journal of Energy Resources Technology—Transactions of the ASME 118 (4) (1996) 306.
[116Q] C. Spurrell, A.M. Harris, New approach to detect and identify hydrocarbon leaks in refinery cooling systems, Materials Performance 35 (8) (1996) 46.
[117Q] A. Valero, C. Cortes, Ash fouling in coal-fired utility boilers. Monitoring and optimization of on-load cleaning, Progress in Energy and Combustion Science 22 (2) (1996) 189.
[118Q] D.I. Wilson, A.P. Watkinson, Study of autoxidation reaction fouling in heat exchangers, Canadian Journal of Chemical Engineering 74 (2) (1996) 236.
[119Q] P.S. Zisson, J.M. Whitaker, H.L. Neilson, L.L. Mayne, Monitoring and controlling microbiological growth in a standby service water system, Materials Performance 35 (3) (1996) 53.

Heat transfer applications — heat exchangers and heat pipes: reactors — chemical/nuclear

[120Q] Z.-M. Cheng, W.-K. Yuan, Simultaneous estimation of kinetic and heat transfer parameters of a wall-cooled fixed-bed reactor, Chemical Engineering Science 51 (21) (1996) 4791.
[121Q] M.R. Golriz, Suspension-to-wall heat transfer in a 12-MWth circulating fluidized-bed combustor, International Journal of Energy Research 20 (7) (1996) 569.
[122Q] W.-Y. Lin, G. Agarwal, R.F. Speyer, Effect of flame support layer geometry and materials on the radiant efficiency of gas radiant burners, Experimental Heat Transfer 9 (3) (1996) 247.

Heat transfer applications — heat exchangers and heat pipes: thermosyphons — heat pipes

[123Q] El.-Nasr A. Abo, S.M. El-Haggar, Effective thermal conductivity of heat pipes, Warme und Stoffubertragung—Thermo and Fluid Dynamics 32 (12) (1996) 97.
[124Q] Y. Cao, J.E. Beam, B. Donovan, Air-cooling system for metal oxide semiconductor controlled thyristors employing miniature heat pipes, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 484.
[125Q] J.H. Chung, D.K. Edwards, Moving gas front effects on heat pipe transient behavior, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 76.
[126Q] S. Cosgrove, Improving air conditioning with heat pipes, Plant Engineering (Barrington, Illinois) 50 (6) (1996) 64.
[127Q] R.E. Critoph, M.K. Holland, L. Turner, Contact resistance in air-cooled plate fin-tube air-conditioning condensers, International Journal of Refrigeration—Revue Internationale du Froid 19 (6) (1996) 400.
[128Q] B. Horbaniuc, A. Popescu, G. Dumitrascu, Correlation between the number of fins and the discharge time for a finned heat pipe latent heat storage system, Renewable Energy 9 (14) (1996) 604.
[129Q] X.Y. Huang, C.Y. Liu, Pressure and velocity fields in the wick structure of a localized heated flat plate heat pipe, International Journal of Heat and Mass Transfer 39 (6) (1996) 1325.
[130Q] N.F. Huber, W.J. Bowman, Longitudinal vibration effects on a copper/water heat pipe's capillary limit, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 90.
[131Q] D. Khrustalev, A. Faghri, Enhanced flat miniature axially grooved heat pipe, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 261.
[132Q] D. Khrustalev, A. Faghri, Estimation of the maximum heat flux in the inverted meniscus type evaporator of a flat miniature heat pipe, International Journal of Heat and Mass Transfer 39 (9) (1996) 1899.
[133Q] Y. Kobayashi, S. Ikeda, M. Iwasa, Evaporative heat transfer at the evaporative section of a grooved heat pipe, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 83.
[134Q] K.C. Leong, C.Y. Liu, K.H. Sun, Vapor pressure distribution of a flat plate heat pipe, International Communications in Heat and Mass Transfer 23 (6) (1996) 789.
[135Q] J. Ling, Y. Cao, Q. Wang, Experimental investigations and correlations for the performance of reciprocating heat pipes, Heat Transfer Engineering 17 (4) (1996) 34.
[136Q] M.J. McGuinness, Steady solution selection and existence in geothermal heat pipes — I. The convective case, International Journal of Heat and Mass Transfer 39 (2) (1996) 259.
[137Q] T. Ochi, T. Ogushi, R. Aoki, Development of a heat-pipe thermal diode and its heat transport performance, JSME International Journal Series B—Fluids and Thermal Engineering 39 (2) (1996) 419.
[138Q] M. Stock, J. Fischer, R. Friedrich, H.J. Jung, B. Wende, Double-heatpipe black body: a high-accuracy standard source of spectral irradiance for measurements of T−T90, Metrologia 32 (6) (1996) 441.
[139Q] J.M. Tournier, M.S. El-Genk, Vapor flow model for analysis of liquid-metal heat pipe startup from a frozen state, International Journal of Heat and Mass Transfer 39 (18) (1996) 3767.
[140Q] P.J. Wirsch, S.K. Thomas, Performance characteristics of a stainless steel/ammonia loop heat pipe, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 326.
[141Q] N. Zhu, K. Vafai, Effects of liquid–vapor coupling and nonDarcian transport on asymmetrical disk-shaped heat pipes, International Journal of Heat and Mass Transfer 39 (10) (1996) 2095.
[142Q] N. Zhu, K. Vafai, Optimization analysis of a disk-shaped heat pipe, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 179.

Heat transfer applications — heat exchangers and heat pipes: miscellaneous — thermodynamic analysis/energy conservation/storage

[143Q] M.A. Ait-Ali, Maximum coefficient of performance of internally irreversible refrigerators and heat pumps, Journal of Physics D—Applied Physics 29 (4) (1996) 975.
[144Q] A.A. Al-Haddad, E. Enaya, M.A. Fahim, Performance of a thermodynamic water pump, Applied Thermal Engineering 16 (4) (1996) 321.
[145Q] C. Bosman, O.C. Jadayel, Quantified study of rothalpy conservation in turbomachines, International Journal of Heat and Fluid Flow 17 (4) (1996) 410.
[146Q] Y. Hirayama, B. Batty, Radiating cool, Heating and Air Conditioning Journal (1996) 22.
[147Q] K.O. Homan, C.W. Sohn, S.L. Soo, Thermal performance of stratified chilled water storage tanks, Hvac&R Research 2 (2) (1996) 158.
[148Q] Y.L. Huang, L.T. Fan, Analysis of a work exchanger network, Industrial and Engineering Chemistry Research 35 (10) (1996) 3528.
[149Q] B.H. Kang, A. Yabe, Performance analysis of a metal-hydride heat transformer for waste heat recovery, Applied Thermal Engineering 16 (89) (1996) 677.
[150Q] F. Marechal, B. Kalitventzeff, Targeting the minimum cost of energy requirements: a new graphical technique for evaluating the integration of utility systems, Computers and Chemical Engineering 20 (Suppl.) (1996) S225.
[151Q] A.R. Martin, C. Saltiel, Three-dimensional fluid flow and heat transfer analysis of grate blocks in a waste-to-energy power plant, Numerical Heat Transfer Part A—Applications 29 (8) (1996) 795.
[152Q] J.G. Maveety, A. Razani, Two-dimensional numerical investigation of the optimal removal time and entropy production rate for a sensible thermal storage system, Energy 21 (12) (1996) 1265.
[153Q] Y. Rabin, E. Korin, Thermal analysis of a helical heat exchanger for ground thermal energy storage in arid zones, International Journal of Heat and Mass Transfer 39 (5) (1996) 1051.
[154Q] N. Rhodes, K. Else, Predicting the performance of

water and air cooled condensers, International Journal of Pressure Vessels and Piping 66 (1996) 1.
[155Q] Q. Si, C. Liu, H. Huang, Methods for calculating shell-side condensation heat transfer and pressure drop of Rodbaffle condenser, Chinese Journal of Chemical Engineering 4 (1) (1996) 90.
[156Q] W.F. Stoecker, Reclaiming heat in industrial refrigeration, Engineered Systems 13 (3) (1996) 68.
[157Q] G. Venkatarathnam, G. Mokashi, S. Srinivasa Murthy, Occurrence of pinch points in condensers and evaporators for zeotropic refrigerant mixtures, International Journal of Refrigeration—Revue Internationale du Froid 19 (6) (1996) 361.
[158Q] G.P. Xu, Y.Q. Dai, K.W. Tou, C.P. Tso, Theoretical analysis and optimization of a double-effect series-flow-type absorption chiller, Applied Thermal Engineering 16 (12) (1996) 975.

Heat transfer applications — general: aeronautics

[1S] A.Z. Al-Garni, Aerospace plane cooling with H_2, CH_4, He, Ne, N_2 and Ar, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 119.
[2S] J.J. Bertin, S.A. Bouslog, K.-C. Wang, C.H. Campbell, Recent aerothermodynamic flight measurements during shuttle orbiter re-entry, Journal of Spacecraft and Rockets 33 (4) (1996) 457.
[3S] V. Hopfe, R. Jaeckel, K. Schoenfeld, Laser based coating and modification of carbon fibres: application of industrial lasers to manufacturing of composite materials, Applied Surface Science 1996 (1996) 60.
[4S] M.B.H. Mantelli, M.M. Yovanovich, Experimental determination of overall thermal resistances of satellite bolted joints, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 177.
[5S] F. Nasuti, M. Barbato, C. Bruno, Material-dependent catalytic recombination modeling for hypersonic flows, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 131.
[6S] K.R. Sridhar, M. Gottmann, Thermal control system for lunar base cooling, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 490.
[7S] K.J.L. Stone, C.C. Smith, A.N. Schofield, Thermally controlled test chamber for centrifuge and laboratory experiments, Geotechnical Testing Journal 19 (4) (1996) 441.

Heat transfer applications — general: bioengineering

[8S] J.D. Daudin, A. Kuitche, Modelling of temperature and weight loss kinetics during meat chilling for time variable conditions using an analytical based method — III. Calculations versus measurements on pork carcass hindquarters, Journal of Food Engineering 29 (1) (1996) 39.
[9S] H.W. Huang, Z.P. Chen, R.B. Roemer, Counter current vascular network model of heat transfer in tissues, Journal of Biomechanical Engineering 118 (1) (1996) 120.
[10S] J. Liu, Z. Ren, C. Wang, Technique for identifying the total space or temperature dependent thermal parameters (TITP) of biological materials in vivo, IEEE Transactions on Biomedical Engineering 43 (8) (1996) 847.
[11S] J.I. Lombrana, M.C. Villaran, Interaction of kinetic and quality aspects during freeze drying in an adsorbent medium, Industrial and Engineering Chemistry Research 35 (6) (1996) 1967.
[12S] P. Mallikarjunan, Y.C. Hung, S. Gundavarapu, Modeling microwave cooking of cocktail shrimp, Journal of Food Process Engineering 19 (1) (1996) 97.
[13S] J.F. Nastaj, Some aspects of freeze drying of dairy biomaterials, Drying Technology 14 (9) (1996) 1967.
[14S] N.N. Petrishchev, I. Mikhailova, Analysis of the heating process in experimental laser-induced thrombosis of microvessels, Proceedings of SPIE the International Society for Optical Engineering 1996 (1996) 100.
[15S] G. Polacco, D. Semino, M. Palla, Temperature profiles in batch methyl methacrylate polymerization in gelled suspension, Polymer Engineering and Science 36 (16) (1996) 2088.
[16S] K. Thorvaldsson, C. Skjoldebrand, Water transport in meat during reheating, Journal of Food Engineering 29 (1) (1996) 13.
[17S] N. Tsuda, K. Kuroda, Y. Suzuki, Inverse method to optimize heating conditions in RF-capacitive hyperthermia, IEEE Transactions on Biomedical Engineering 43 (10) (1996) 1029.
[18S] R.A. Vertrees, W. Tao, S.D. Pencil, J.P. Sites, D.P. Althoff, J.B. Zwischenberger, Induction of whole body hyperthemia with venovenous perfusion, ASAIO Journal 42 (4) (1996) 250.

Heat transfer applications — general: digital data processing/electronics

[19S] C.L. Belady, Design considerations for air cooling electronic systems in high altitude conditions, IEEE Transactions on Components Packaging and Manufacturing Technology Part A 19 (4) (1996) 495.
[20S] M.A. Lambert, L.S. Fletcher, Thermal conductivity of graphite/aluminum and graphite/copper composites, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 478.
[21S] H.W. Markstein, Cold plate heat sinking for PCBs, Electronic Packaging and Production 36 (8) (1996).
[22S] W. Nakayama, Thermal management of electronic equipment: Research needs in the mid-1990s and beyond, Applied Mechanics Reviews 49 (10) (1996) S167.

Heat transfer applications — general: energy

[23S] M. Araki, K. Sato, S. Suzuki, M. Akiba, Critical-heat-flux experiment on the screw tube under one sided heating conditions, Fusion Technology 29 (4) (1996) 519.
[24S] J.P. Bedecarrats, F. Strub, B. Falcon, J.P. Dumas, Phase-change thermal energy storage using spherical capsules: performance of a test plant, International Journal of Refrigeration—Revue Internationale du Froid 19 (3) (1996) 187.
[25S] B.C.M. Chen, Cargo oil heating requirements for an

FSO vessel conversion, Marine Technology and Sname News 33 (1) (1996) 58.
[26S] A.E. Conradie, D.G. Kroger, Performance evaluation of dry-cooling systems for power plant applications, Applied Thermal Engineering 16 (3) (1996) 219.
[27S] S.M. Correa, A.J. Dean, I.Z. Hu, Combustion technology for low-emissions gas-turbines: selected phenomena beyond NOx, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 193.
[28S] S.M. Correa, I.Z. Hu, A.K. Tolpadi, Combustion technology for low-emissions gas-turbines: some recent modeling results, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 201.
[29S] A.S. Dorfman, Advanced calculation method for the surface temperature distribution of turbine blades, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 18.
[30S] C.W. Forsberg, J.C. Conklin, Passive cooling system with temperature control for reactor containments, Nuclear Technology 116 (1) (1996) 55.
[31S] T. Fujii, Y. Kataoka, M. Murase, Evaporation and condensation heat transfer in a suppression chamber of the water wall type passive containment cooling system, Journal of Nuclear Science and Technology 33 (5) (1996) 374.
[32S] L. Galbiati, L. Mazzocchi, P. Vanini, Passive system for long-term heat removal in advanced light water reactors: prototype test results and analysis, Nuclear Technology 113 (3) (1996) 338.
[33S] R.S.R. Gorla, T.A. Bartrand, Couette flow heat loss model for the rotary combustion engine, Proceedings of the Institution of Mechanical Engineers Part C, Journal of Mechanical Engineering Science 210 (6) (1996) 587.
[34S] M. Laughton, Combined heat and power: executive summary, Applied Energy 53 (1996) 1.
[35S] I.C. Lim, H.C. No, Boiloff pattern transition during core uncovery in a small break LOCA, Annals of Nuclear Energy 23 (18) (1996) 1459.
[36S] E.W. Spence, D.A. Kaminski, Thermal evaluation of a dry nonrotating thin section contact bearing, Journal of Manufacturing Science and Engineering, Transactions of the ASME 118 (4) (1996) 610.
[37S] M.C. Spencer, T.V. Jones, G.D. Lock, Endwall heat transfer measurements in an annular cascade of nozzle guide vanes at engine representative Reynolds and Mach numbers, International Journal of Heat and Fluid Flow 17 (2) (1996) 139.
[38S] R.F. Speyer, W.-Y. Lin, G. Agarwal, Radiant efficiencies and performance considerations of commercially manufactured gas radiant burners, Experimental Heat Transfer 9 (3) (1996) 213.
[39S] K. Takase, T. Kunugi, Y. Seki, R. Kurihara, S. Ueda, Fundamental study of a water jet injected into a vacuum vessel of fusion reactor under the ingress of coolant event, Fusion Technology 30 (3) (1996) 1453.
[40S] M. Xu, Y. He, P. Wu, Z. Chen, Experimental research of a miniature coaxial pulse tube refrigerator using nylon tube, Cryogenics 36 (2) (1996) 131.

Heat transfer applications — general: environment

[41S] O.A. Abdou, K. Murali, A. Morsi, Thermal performance evaluation of a prefabricated fiber-reinforced plastic building envelope system, Energy and Buildings 24 (1) (1996) 77.
[42S] R.F. Babus'Haq, M.A.A. Hiasat, S.D. Probert, Thermally insulating behaviour of single and multiple layers of textiles under wind assault, Applied Energy 54 (4) (1996) 375.
[43S] S. Dilmac, C. Tiris, M. Tiris, A.J. Wetherilt, Effect of exterior wall systems on energy consumption: case study for Gebze, Turkey, Energy Sources 18 (4) (1996) 375.
[44S] M.T. Kangas, Thermohydraulic analysis of ground as a heat source for heat pumps using vertical pipes, Journal of Energy Resources Technology—Transactions of the ASME 118 (4) (1996) 300.
[45S] A. Mahdavi, R. Brahme, P. Mathew, The "LEK"-concept and its applicability for the energy analysis of commercial buildings, Building and Environment 31 (5) (1996) 409.
[46S] M. Pons, D. Laurent, F. Meunier, Experimental temperature fronts for adsorptive heat pump applications, Applied Thermal Engineering 16 (5) (1996) 395.
[47S] K. Rafferty, Unearthing the facts on ground-source heat pumps, Consulting Specifying Engineer 19 (4) (1996) 34.
[48S] C.F. Rogers, Effective thermal wellbore model for well intervention treatments coupled to reservoir flow, Erdoel Erdgas Kohle 112 (12) (1996) 505.
[49S] C.K. Rogers, G.A. Lawrence, P.F. Hamblin, Thermal impact of artificial circulation on an ice-covered mid-latitude lake, Canadian Journal of Civil Engineering 23 (5) (1996) 1081.
[50S] B. Williams, Heat transfer savings on a plate, Heating and Air Conditioning Journal (1996) 29.
[51S] J.L. Wright, Correlation to quantify convective heat transfer between vertical window glazings, ASHRAE Transactions 102 (1) (1996) 940.
[52S] G.E. Zaikov, S.M. Lomakin, New aspects of ecologically friendly polymer flame retardant systems, Polymer Degradation and Stability 54 (23) (1996) 223.

Heat transfer applications — general: manufacturing

[53S] H. Abratis, F. Hofer, M. Junemann, J. Sardemann, H. Stoffel, Heat transfer in continuous casting moulds when using different mould powders, Stahl und Eisen 116 (9) (1996) 73.
[54S] H. Abratis, F. Hofer, M. Junemann, J. Sardemann, H. Stoffel, Use of different mould powders for the continuous casting of blooms and billets, Stahl und Eisen 116 (4) (1996) 178.
[55S] M. Bellet, F. Decultieux, M. Menai, F. Bay, C. Levaillant, J.L. Chenot, P. Schmidt, I.L. Svensson, Thermomechanics of the cooling stage in casting processes: three-dimensional finite element analysis and experimental validation, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (1) (1996) 81.

[56S] H. Braun, H.-P. Heller, D. Janke, B. Seher, Computer simulation of thermal and mechanical processes during continuous casting of steel slabs, Stahl und Eisen 116 (9) (1996) 79.

[57S] R.V. Chiruvella, Y. Jaluria, M.V. Karwe, V. Sernas, Transport in a twin-screw extruder for the processing of polymers, Polymer Engineering and Science 36 (11) (1996) 1531.

[58S] P. Darling, Clinker coolers examined, Rock Products Cement Edition (1996) 21.

[59S] J.P. Delplanque, E.J. Lavernia, R.H. Rangel, Multidirectional solidification model for the description of micropore formation in spray deposition processes, Numerical Heat Transfer Part A—Applications 30 (1) (1996) 1.

[60S] Z. Ding, J.E. Spruiell, Experimental method for studying nonisothermal crystallization of polymers at very high cooling rates, Journal of Polymer Science Part B—Polymer Physics 34 (16) (1996) 2783.

[61S] Z. Feng, Computational analysis of thermal and mechanical conditions for weld metal solidification cracking, Welding Research Abroad 42 (1) (1996) 34.

[62S] C. Guo, S. Malkin, Inverse heat transfer analysis of grinding, part 1: methods, Journal of Engineering for Industry—Transactions of the ASME 118 (1) (1996) 137.

[63S] C. Guo, S. Malkin, Inverse heat transfer analysis of grinding, part 2: applications, Journal of Engineering for Industry—Transactions of the ASME 118 (1) (1996) 143.

[64S] R.M. Guo, S.T. Hwang, Investigation of strip cooling behavior in the run-out section of hot strip mills, Journal of Materials Processings and Manufacturing Science 4 (4) (1996) 339.

[65S] F. Klein, E. Pokora, J. Dul, Numerical simulation of the solidification of zinc die castings, Materials Science Forum 1996 (1996) 415.

[66S] R. Kopp, E. Doege, Process time reduction by means of integrated casting and rolling, CIRP Annals 45 (1) (1996) 221.

[67S] G. Li, B.G. Thomas, Transient thermal model of the continuous single-wheel thin-strip casting process, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (3) (1996) 509.

[68S] Z.-C. Lin, C.-C. Liu, Analysis of orthogonal finish machining using tungsten carbide and diamond tools of different heat transfer coefficients, International Journal of Machine Tools and Manufacture 36 (1) (1996) 73.

[69S] F. Liu, I. Turner, E. Siores, P. Groombridge, Numerical and experimental investigation of the microwave heating of polymer materials inside a ridge waveguide, Journal of Microwave Power and Electromagnetic Energy 31 (2) (1996) 71.

[70S] K. Maekawa, Y. Nakano, T. Kitagawa, Finite element analysis of thermal behaviour in metal machining (1st Report, influence of thermophysical properties on cutting temperature), JSME International Journal Series C—Dynamics Control Robotics Design and Manufacturing 39 (4) (1996) 857.

[71S] E.E. Marotta, L.S. Fletcher, Thermal contact conductance of selected polymeric materials, Journal of Thermophysics and Heat Transfer 10 (2) (1996) 334.

[72S] L. Nastac, D.M. Stefanescu, Macrotransport-solidification kinetics modeling of equiaxed dendritic growth: Part II. Computation problems and validation on INCONEL 718 superalloy castings, Metallurgical and Materials Transactions A—Physical Metallurgy and Materials Science 27A (12) (1996) 4075.

[73S] C.A. Pinheiro, I.V. Samarasekera, J.K. Brimacombe, Mold flux for continuous casting of steel, Iron and Steelmaker 23 (3) (1996) 85.

[74S] W.B. Rowe, S.C.E. Black, B. Mills, H.S. Qi, Analysis of grinding temperatures by energy partitioning, Proceedings of the Institution of Mechanical Engineers Part B, Journal of Engineering Manufacture 210 (B6) (1996) 579.

[75S] W.B. Rowe, M.N. Morgan, S.C.E. Black, B. Mills, Simplified approach to control of thermal damage in grinding, CIRP Annals 45 (1) (1996) 299.

[76S] M.C. Shaw, Energy conversion in cutting and grinding, CIRP Annals 45 (1) (1996) 101.

[77S] B.G. Thomas, B. Ho, Spread sheet model of continuous casting, Journal of Engineering for Industry—Transactions of the ASME 118 (1) (1996) 37.

[78S] P. Wang, J.H. Meldon, N. Sung, Heat effect in sorption of organic vapors in rubbery polymers, Journal of Applied Polymer Science 59 (6) (1996) 937.

[79S] J.B. Wiskel, S.L. Cockcroft, Heat-flow-based analysis of surface crack formation during the start-up of the direct chill casting process: Part I. Development of the inverse heat-transfer model, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (1) (1996) 119.

[80S] J.B. Wiskel, S.L. Cockcroft, Heat-flow-based analysis of surface crack formation during the start-up of the direct chill casting process: Part II. Experimental study of an AA5182 rolling ingot, Metallurgical and Materials Transactions B—Process Metallurgy and Materials Processing Science 27 (1) (1996) 129.

Heat transfer applications — general: processing

[81S] C.E. Baukal, B. Gebhart, Review of semi-analytical solutions for flame impingement heat transfer, International Journal of Heat and Mass Transfer 39 (14) (1996) 2989.

[82S] A.A. Boateng, P.V. Barr, Thermal model for the rotary kiln including heat transfer within the bed, International Journal of Heat and Mass Transfer 39 (10) (1996) 2131.

[83S] M.C. Chiou, J.W. Cleaver, Effect of thermophoresis on sub-micron particle deposition from a laminar forced convection boundary layer flow onto an isothermal cylinder, Journal of Aerosol Science 27 (8) (1996) 1155.

[84S] C.J. Davenport, Method of measuring heat transfer between rotating roll and cooling spray, Ironmaking and Steelmaking 23 (1) (1996) 92.

[85S] I. Dincer, Transient temperature distributions in canned products during heat sterilization and cooling, International Journal of Energy Research 20 (7) (1996) 643.

[86S] M. Fackeldey, A. Ludwig, P.R. Sahm, Coupled model-

ling of the solidification process predicting temperatures, stresses and microstructures, Computational Materials Science 7 (12) (1996) 194.
[87S] P.S. Ghoshdastidar, Unni V.K. Anandan, Heat transfer in the nonreacting zone of a cement rotary kiln, Journal of Engineering for Industry—Transactions of the ASME 118 (1) (1996) 169.
[88S] M. Giot, Some thermal and fluid flow aspects of process safety, Heat and Technology 14 (2) (1996) 13.
[89S] M. Hasatani, Y. Itaya, Drying-induced strain and stress: a review, Drying Technology 14 (5) (1996) 1011.
[90S] N.M. Khattab, Optimization of the drying process in batch dryers, Energy Sources 18 (3) (1996) 269.
[91S] Konovalov II, V.A. Komissarov, A.A. Maslov, V.K. Orlov, Bulk amorphous plate production by a casting process, Journal of NonCrystalline Solids 205 (207pt) (1996) 536.
[92S] S.H.K. Lee, Y. Jaluria, Effects of variables properties and viscous dissipation during optical fiber drawing, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 350.
[93S] S.-T. Lee, N.S. Ramesh, G.A. Campbell, Study of thermoplastic foam sheet formation, Polymer Engineering and Science 36 (19) (1996) 2477.
[94S] P. Lin, Y. Jaluria, Numerical approach to model heat transfer in polymer melts flowing in constricted channels, Numerical Heat Transfer Part A—Applications 30 (2) (1996) 103.
[95S] T. Nakamura, J.P. Smart, W.L. Van De Kamp, Effects of fuel/air mixing on NOx reduction and heat-transfer in high-temperature gas-fired glass-melting furnaces, Journal of the Institute of Energy 69 (478) (1996) 39.
[96S] H.J. O'Donnell, D.G. Baird, Effect of injection molding conditions on the mechanical properties of an in situ composite. I: polypropylene and a liquid crystalline copolyester based on hydroxynaphthoic acid, Polymer Engineering and Science 36 (7) (1996) 963.
[97S] D.C. Panigrahi, P. Dutta, S.P. Banerjee, Simulation of heat load in mine ventilation network with variation in geothermal parameters, Journal of Mines, Metals and Fuels 44 (5) (1996) 167.
[98S] J.D. Phillips, M.W. Lund, J.K. Shurtleff, W.P. Allred, Advancements in platelet growth, Nuclear Instruments and Methods in Physics Research, Section A: Accelerators, Spectrometers, Detectors and Associated Equipment 380 (12) (1996) 50.
[99S] A.P. Prishivalko, L.G. Astafieva, S.T. Leiko, Heating and destruction of metallic particles exposed to intense laser radiation, Applied Optics 35 (6) (1996) 965.
[100S] N.I. Robinson, F.R. de Hoog, Angularly averaged heat transfer for a roller used in strip rolling, Mathematical Engineering in Industry 5 (4) (1996) 281.
[101S] Y. Ruan, Steady-state thermomechanical analysis of continuously quenched materials, Journal of Thermal Stresses 19 (4) (1996) 395.
[102S] S.S. Sablani, H.S. Ramaswamy, Particle heat transfer coefficients under various retort operating conditions with end-over-end rotation, Journal of Food Process Engineering 19 (4) (1996) 403.
[103S] P. Stehlik, J. Kohoutek, V. Jebacek, Simple mathematical model of furnaces and its possible applications, Computers and Chemical Engineering 20 (11) (1996) 1369.
[104S] A. Sverdlin, A. Ness, A. Drits, 'Aerodynamic' furnaces, Advanced Materials and Processes 149 (4) (1996) 40Y.
[105S] A. Tietze, I. Luedke, K.H. Reichert, Temperature oscillation calorimetry in stirred tank reactors, Chemical Engineering Science 51 (11) (1996) 3131.
[106S] C.K. Wu, R. Greif, Thermophoretic deposition including an application to the outside vapor deposition process, International Journal of Heat and Mass Transfer 39 (7) (1996) 1429.
[107S] B.S. Yilbas, Numerical approach to pulsed laser heating of semi-infinite aluminum substance, Warme und Stoffubertragung—Thermo and Fluid Dynamics 31 (4) (1996) 279.
[108S] B.S. Yilbas, A.Z. Al-Garni, Some aspects of laser heating of engineering materials, Journal of Laser Applications 8 (4) (1996) 197.

Solar energy: radiation characteristics and related effects

[1T] A.G. Barr, S.M. McGinn, B.C. Si, A comparison of methods to estimate daily global solar irradiation from other climatic variables on the Canadian prairies, Solar Energy 56 (3) (1996) 213.
[2T] H.G. Beyer, C. Costanzo, D. Heinemann, Modifications of the Heliosat procedure for irradiance estimates from satellite images, Solar Energy 56 (3) (1996) 207.
[3T] G.N. Flerchinger, J.M. Baker, E.J.A. Spaans, Test of the radiative energy balance of the SHAW model for snowcover, Hydrological Processes 10 (10) (1996) 1359.
[4T] M.R. Islam, R.H.B. Exell, Solar radiation mapping from satellite image using a low cost system, Solar Energy 56 (3) (1996) 225.
[5T] F. Kasten, The Linke turbidity factor based on improved values of the integral Rayleigh optical thickness, Solar Energy 56 (3) (1996) 239.
[6T] K. Klysik, Spatial and seasonal distribution of anthropogenic heat emissions in Lodz, Poland, Atmospheric Environment 30 (20) (1996) 3397.
[7T] J.R. Markham, W.W. Smith, J.R. Haigis, M.D. Carangelo, J.E. Cosgrove, K. Kinsella, P.R. Solomon, P.E. Best, A. Lewandowski, C.E. Bingham, J.R. Pitts, FT-IR measurements of emissivity and temperature during high flux solar processing, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 20.
[8T] A. Panek, Y. Lee, H. Tanaka, Simulation of solar radiation heat flux data for energy calculation, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 58.
[9T] B.E. Psiloglou, C.A. Balaras, M. Santamouris, D.N. Asimakopoulos, Evaluation of different radiator and albedo models for the prediction of solar radiation incident on tilted surfaces, for four European locations, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 183.

Solar energy: non-concentrating collectors

[10T] P. Avanti, M. Arulanantham, N.D. Kaushika, Solar thermal analysis of transparent-honeycomb-insulated ground collector-storage system, Applied Thermal Engineering 16 (11) (1996) 863.

[11T] T. Beikircher, W. Spirkl, Analysis of gas heat conduction in evacuated tube solar collectors, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 156.

[12T] A.A. Hegazy, Optimization of flow-channel depth for conventional flat-plate solar air heaters, Renewable Energy 7 (1) (1996) 15.

[13T] S. Noorshahi, C.A.I.I.I. Hall, E.K. Glakpe, Natural convection in a corrugated enclosure with mixed boundary conditions, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 50.

[14T] E.N. Soubassakis, J.G. Martin, Analysis of the thermal performance of dynamic solar systems, Numerical Heat Transfer Part A—Applications 29 (4) (1996) 357.

[15T] K. Sumathy, A. Venkatesh, V. Sriramulu, Experimental studies on heat transfer in the flat-plate collector of a solar pump, Renewable Energy 9 (14) (1996) 645.

[16T] N.E. Wijeysundera, M.N.A. Hawlader, K.Y. Foong, Estimation of collector performance parameters from daily system tests, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 30.

Solar energy: concentrating collectors and systems

[17T] M. Brunotte, A. Goetzberger, U. Blieske, Two-stage concentrator permitting concentration factors up to 300X with one-axis tracking, Solar Energy 56 (3) (1996) 285.

[18T] Y. Demirel, S.C. Saxena, Heat transfer through a low-pressure gas enclosure as a thermal insulator: design considerations, International Journal of Energy Research 20 (4) (1996) 327.

[19T] P.C. Eames, B. Norton, A.F. Kothdiwala, State of the art in modelling line-axis concentrating solar energy collectors, Renewable Energy 9 (14) (1996) 562.

[20T] M. Elsayed, K.A. Fathalah, Solar flux-density distribution due to partially shaded/blocked mirrors using the separation of variables/superposition technique with polynomial and Gaussian sunshapes, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 107.

[21T] J.M. Gordon, Simple string construction method for tailored edge-ray contractors in maximum-flux solar energy collectors, Solar Energy 56 (3) (1996) 279.

[22T] D. Jenkins, R. Winston, J. Bliss, J. O'Gallagher, A. Lewandowski, C. Bingham, Solar concentration of 50,000 achieved with output power approaching 1 kW, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 141.

[23T] P.D. Jones, Correlation of combined radiation and conduction in evacuated honeycomb-cored panels, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 97.

[24T] A. Kribus, H. Ries, W. Spirkl, Inherent limitations of volumetric solar receivers, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 151.

[25T] B.J. Palmer, M.K. Drost, J.R. Welty, Comparison of equation of transfer with simulations on large arrays of cylindrical reflector elements, Numerical Heat Transfer Part B—Fundamentals 30 (3) (1996) 271.

[26T] J.L. Richter, Optics of a two-trough solar concentrator, Solar Energy 56 (2) (1996) 191.

[27T] M.R. Shortis, G.H.G. Johnston, Photogrammetry: an available surface characterization tool for solar concentrators. Part I. Measurements of surfaces, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 146.

Solar energy: buildings

[28T] H.R. Al-Asmar, B.W. Jones, D.K. Matteson, Experimental evaluation of attic radiant barriers, ASHRAE Transactions 102 (1) (1996) 297.

[29T] M. Arulanantham, N.D. Kaushika, Coupled radiative and conductive thermal transfers across transparent honeycomb insulation materials, Applied Thermal Engineering 16 (3) (1996) 209.

[30T] S.K. Chou, W.L. Chang, Generalized methodology for determining the total heat gain through building envelopes, International Journal of Energy Research 20 (10) (1996) 887.

[31T] W.K. Chow, S.K. Fong, Simulating of energy use in a building with three weather files of Hong Kong, Energy Engineering: Journal of the Association of Energy Engineers 93 (2) (1996) 30.

[32T] D.E. Claridge, M. Liu, Measured energy impact of infiltration in an outdoor test cell, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 162.

[33T] A.G. Ehrlemark, K.G. Sallvik, Model of heat and moisture dissipation from cattle based on thermal properties, Transactions of the ASAE 39 (1) (1996) 187.

[34T] F. Fucci, F.G. La, Climate effect on the evaluation of the heat transfer through the perimetral structures of refrigerating stores, Solar Energy 56 (2) (1996) 133.

[35T] M. Gorgolewski, Transparent insulating materials: steady-state model for assessing thermal performance, Building Services Engineering Research and Technology 17 (3) (1996) 141.

[36T] H. Hens, K.U. Leuven, Hygrothermal performance of protected membrane roof systems: Part 2: experimental verification, Journal of Thermal Insulation and Building Envelopes 1996 (1996) 314.

[37T] I. Ioslovich, P.-O. Gutman, I. Seginer, Nonlinear optimal greenhouse control problem with heating and ventilation, Optimal Control Applications and Methods 17 (3) (1996) 157.

[38T] J. Klainsek, C. Bedoya, J. Neila, Effect of glazing shape upon the thermal performance of buildings, Renewable Energy 8 (14) (1996) 182.

[39T] J.H. Klems, G.O. Kelley, Calorimetric measurements of

inward-flowing fraction for complex glazing and shading systems, ASHRAE Transactions 102 (1) (1996) 947.
[40T] J.H. Klems, J.L. Warner, G.O. Kelley, Comparison between calculated and measured SHGC for complex fenestration systems, ASHRAE Transactions 102 (1) (1996) 931.
[41T] S.N.G. Lo, B. Norton, The effect of occupancy patterns on the long-term performance of roof-space solar-energy collectors on domestic dwellings in a Northern European climate, Solar Energy 56 (2) (1996) 143.
[42T] K.J. Lomas, U.K. applicability study: an evaluation of thermal simulation programs for passive solar house design, Building and Environment 31 (3) (1996) 197.
[43T] T. Muneer, B. Han, Multiple glazed windows: Design charts, Building Services Engineering Research and Technology 17 (4) (1996) 223.
[44T] L.-O. Nilsson, Interaction between microclimate and concrete — a prerequisite for deterioration, Construction and Building Materials 10 (5) (1996) 301.
[45T] A. Okumura, Passive solar system in Japan, Renewable Energy 8 (14) (1996) 66.
[46T] A.A. Rousan, A. Shariah, Solar and thermal energy gain through windows in Jordan, Renewable Energy 7 (3) (1996) 251.
[47T] Y. Takemasa, S. Togari, Y. Arai, Application of an unsteady-state model for predicting vertical temperature distribution to an existing atrium, ASHRAE Transactions 102 (1) (1996) 239.
[48T] G.N. Tiwari, A.K. Singh, Comparative studies of different heating techniques of a nonair conditioned building, Building and Environment 31 (3) (1996) 215.
[49T] L. Westerlund, J. Dahl, L. Johansson, Theoretical investigation of the heat demand for public baths, Energy 21 (78) (1996) 731.

Solar energy: water and space heating

[50T] M. Benmadda, M. Lacroix, Transient natural convection from a finned surface for thermal storage in an enclosure, Numerical Heat Transfer Part A—Applications 29 (1) (1996) 103.
[51T] D. Chwieduk, Analysis of utilisation of renewable energies as heat sources for heat pumps in building sector in Poland, Renewable Energy 9 (14) (1996) 720.
[52T] A.H. Fanney, B.P. Dougherty, Thermal performance of residential electric water heaters subjected to various off-peak schedules, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 73.

Solar energy: cooling and refrigeration

[53T] T.A. Ameel, H.M. Habib, B.D. Wood, Effects of a nonabsorbable gas on interfacial heat and mass transfer for the entrance region of a falling film absorber, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 45.
[54T] R.E. Critoph, Towards a one tonne per day solar ice maker, Renewable Energy 9 (14) (1996) 626.
[55T] J.V.C. Vargas, M. Sokolov, A. Bejan, Thermodynamic optimization of solar-driven refrigerators, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 130.
[56T] B. Wardono, R.M. Nelson, Simulation of a 20-ton LiBr/H_2O absorption cooling system, ASHRAE Transactions 102 (1) (1996) 96.
[57T] B. Wardono, R.M. Nelson, Simulation of a double-effect LiBr/H_2O absorption cooling system, ASHRAE Journal 38 (10) (1996) 32.
[58T] B. Wardono, R.M. Nelson, Simulation of a solar-assisted LiBr/H_2O cooling system,, ASHRAE Transactions 102 (1) (1996) 104.

Solar energy: storage

[59T] G. Bisio, Exergy analysis of thermal energy storage with specific remarks on the variation of the environmental temperature, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 81.
[60T] M. Conti, C. Bellecci, C. Charach, Thermodynamic design of a phase change thermal storage module, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 89.
[61T] M.A. Hamdan, F.A. Elwerr, Thermal energy storage using a phase change material, Solar Energy 56 (2) (1996) 183.
[62T] J.G. Maveety, A. Razani, Transient exergy analysis and optimal removal time of a cylindrical storage system, Journal of Propulsion and Power 12 (2) (1996) 420.
[63T] Y. Rabin, E. Korin, Incorporation of phase-change materials into a ground thermal energy storage system: theoretical study, Journal of Energy Resources Technology—Transactions of the ASME 118 (3) (1996) 237.
[64T] B. Vick, D.J. Nelson, X. Yu, Model of an ice-on-pipe brine thermal storage component, ASHRAE Transactions 102 (1) (1996) 45.

Solar energy: stills and desalination

[65T] E. Korngold, E. Korin, I. Ladizhensky, Water desalination by pervaporation with hollow fiber membranes, Desalination 107 (2) (1996) 121.
[66T] H.S. Kwatra, Performance of a solar still: Predicted effect of enhanced evaporation area on yield and evaporation temperature, Solar Energy 56 (3) (1996) 261.
[67T] D. Njomo, R. Tchinda, E. Kaptouom, Heat and mass transfer from a streaming hot saline water in an enclosure partitioned by an active baffle, Journal of Solar Energy Engineering—Transactions of the ASME 118 (3) (1996) 177.
[68T] B. Prasad, G.N. Tiwari, Effect of glass cover inclination and parametric studies of concentrator-assisted solar distillation system, International Journal of Energy Research 20 (6) (1996) 495.
[69T] E. Sartori, Solar still versus solar evaporator: a comparative study between their thermal behaviors, Solar Energy 56 (2) (1996) 199.
[70T] G.N. Tiwari, S. Kumar, P.B. Sharma, M.E. Khan,

Instantaneous thermal efficiency of an active solar still, Applied Thermal Engineering 16 (2) (1996) 189.
[71T] G.N. Tiwari, M.A. Noor, Characterisation of solar stills, International Journal of Solar Energy 18 (3) (1996) 147.
[72T] G.N. Tiwari, B. Prasad, Thermal modelling of concentrator assisted solar distillation with water flow over the glass cover, International Journal of Solar Energy 18 (3) (1996) 173.
[73T] H.S. Varol, A. Yazar, Hybrid high efficiency single-basin solar still, International Journal of Energy Research 20 (6) (1996) 541.
[74T] M.A. Yaghoubi, A. Sabzevari, Calculation of the hourly output of a solar still for various cities in Iran, Renewable Energy 7 (4) (1996) 427.

Solar energy: ponds

[75T] F.B. Alagao, Simulation of the transient behavior of a closed-cycle salt-gradient solar pond, Solar Energy 56 (3) (1996) 245.
[76T] G.A. Eghneim, S.J. Kleis, Two-region model for gradient modification of salt-gradient solar ponds by radial injection, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 37.
[77T] M. Giestas, H. Pina, A. Joyce, Influence of radiation absorption on solar pond stability, International Journal of Heat and Mass Transfer 39 (18) (1996) 3873.
[78T] R. Prasad, D.P. Rao, Theoretical performance of a solar pond with enhanced ground energy storage, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 101.
[79T] M. Taga, K. Fujimoto, T. Ochi, Field testing on nonsalt solar ponds, Solar Energy 56 (3) (1996) 267.

Solar energy: cooking and drying

[80T] I. Haraksingh, I.A. McDoom, O.S.C. Headley, Natural convection flat-plate collector solar cooker with short term storage, Renewable Energy 9 (14) (1996) 729.
[81T] M.Y.H. Othman, B. Yatim, M.H. Ruslan, Preliminary results of a V-groove back-pass solar collector, Renewable Energy 9 (14) (1996) 622.

Solar energy: solar chemistry

[82T] M. Anheden, D.Y. Goswami, G. Svedberg, Photocatalytic treatment of wastewater from 5-fluorouracil manufacturing, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 2.
[83T] Y. Zhang, J.C. Crittenden, D.W. Hand, D.L. Perram, Destruction of organic compounds in water using supported photocatalysts, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 123.

Solar energy: power generation and industrial applications

[84T] T. Akiyama, T. Fukutani, R. Takahashi, J.-i Yagi, Heat storage rate of magnesium nickel hydride, Materials Transactions JIM 37 (5) (1996) 1014.
[85T] J. Chen, Thermodynamic analysis of a solar-driven thermoelectric generator, Journal of Applied Physics 79 (5) (1996) 2717.
[86T] O.M. Ibrahim, S.A. Klein, Absorption power cycles, Energy 21 (1) (1996) 21.
[87T] R. Kohne, K. Oertel, S. Zunft, Investigation of control and simulation of solar process heat plants using a flexible test facility, Solar Energy 56 (2) (1996) 169.
[88T] F. Lippke, Direct steam generation in parabolic trough solar power plants: numerical investigation of the transients and the control of a once-through system, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 9.
[89T] K.O. Lund, Direct-heating energy-storage receiver for dish-Stirling solar energy systems, Journal of Solar Energy Engineering—Transactions of the ASME 118 (1) (1996) 15.
[90T] A.A. Madani, Analysis of a new combined desalination-power generation plant, Desalination 105 (3) (1996) 199.
[91T] H. Uehara, A. Miyara, Y. Ikegami, T. Nakaoka, Performance analysis of an OTEC plant and a desalination plant using an integrated hybrid cycle, Journal of Solar Energy Engineering—Transactions of the ASME 118 (2) (1996) 115.
[92T] J.P. Vanhanen, P.D. Lund, M.T. Hagstrom, Feasibility study of a metal hydride hydrogen store for a self-sufficient solar hydrogen energy system, International Journal of Hydrogen Energy 21 (3) (1996) 213.

Plasma heat transfer and magnetohydrodynamics: plasma characterization

[1U] K. Chen, T.L. Eddy, Thermodynamic charts for nonequilibrium plasma flow in a supersonic nozzle, Journal of Thermophysics and Heat Transfer 10 (1) (1996) 155.
[2U] B. Chervy, Influence of the presence of tungsten on SF6 arc plasmas, Journal of Physics D—Applied Physics 29 (8) (1996) 2156.
[3U] T.W. Megli, H. Krier, R.L. Burton, Plasmadynamics model for nonequilibrium processes in N_2H_2 arcjets, Journal of Thermophysics and Heat Transfer 10 (4) (1996) 554.
[4U] R.C. Mehta, S. Andrews, P.V. Ramachandran, Thermal erosion of magnetoplasmadynamic thruster cathode, International Journal of Heat and Mass Transfer 39 (8) (1996) 1767.
[5U] S.A. Miller, M. Martinez-Sanchez, Two-fluid nonequilibrium simulation of hydrogen arcjet thrusters, Journal of Propulsion and Power 12 (1) (1996) 112.
[6U] A.T. Schonemann, V. Lago, M. Dudeck, Mass spectrometry and optical spectroscopy in N_2–CO_2 and N_2–CH_4 plasma jets, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 419.

[7U] C.D. Scott, M. Lefebvre, Determining electron temperature and density in a hydrogen microwave plasma, Journal of Thermophysics and Heat Transfer 10 (3) (1996) 426.

[8U] G. Speckhofer, H.-P. Schmidt, Experimental and theoretical investigation of high-pressure arcs — Part II: the magnetically deflected arc (three-dimensional modeling), IEEE Transactions on Plasma Science 24 (4) (1996) 1239.

[9U] L.N. Tsintsadze, D.K. Callebaut, N.L. Tsintsadze, Black-body radiation in plasmas, Journal of Plasma Physics 55 (pt) (1996) 407.

[10U] M.F. Zhukov, Electric arc generators of thermal plasma (Review), Plasma Devices and Operations 5 (1) (1996) 1.

Plasma heat transfer and magnetohydrodynamics: laser — plasma interaction

[11U] V.I. Mazhukin, I. Smurov, G. Flamant, 2D-simulation of the system: laser beam plus laser plasma plus target, Applied Surface Science 1996 (1996) 89.

[12U] W. Rozmus, V.T. Tikhonchuk, R. Cauble, Model of ultrashort laser pulse absorption in solid targets, Physics of Plasmas 3 (1) (1996) 360.

Plasma heat transfer and magnetohydrodynamics: applications

[13U] JdJ Barreto-Sandoval, A.W.D. Hills, M.A. Barron-Meza, R.D. Morales, Physical modelling of tundish plasma heating and its mathematical interpretation, ISIJ International 36 (9) (1996) 1174.

[14U] R.S. Bes, C. Coste, J.C. Mora, S. Okazaki, J.M. Benas, A. Ouederni, J. Sheng, E. Qadeer, Practical heat transfer model for oxygen-fed ozone generators, Ozone-Science and Engineering 18 (5) (1996) 461.

[15U] M. Creutz, D. Mewes, J. Bartzsch, U. Draugelates, H. Steinkamp, Local pressure reduction by pump impeller for underwater welding, Schweissen und Schneiden 48 (10) (1996) 200.

[16U] H.G. Fan, Y.W. Shi, Numerical simulation of the arc pressure in gas tungsten arc welding, Journal of Materials Processing Technology 61 (3) (1996) 302.

[17U] Y. Fan, L. Fu, J. Xiao, J. Yang, Preparation of nanosize WC-Co composite powders by plasma, Journal of Materials Science Letters 15 (24) (1996) 2184.

[18U] T. Ishigaki, Y. Moriyoshi, T. Watanabe, A. Kanzawa, Thermal plasma treatment of titanium carbide powders: Part II. In-flight formation of carbon-site vacancies and subsequent nitridation in titanium carbide powders during induction plasma treatment, Journal of Materials Research 11 (11) (1996) 2811.

[19U] M.A. Jog, L. Huang, Transient heating and melting of particles in plasma spray coating process, Journal of Heat Transfer—Transactions of the ASME 118 (2) (1996) 471.

[20U] M. Kryzhanovski, Validation of thermal-kinetic-diffusion model for arc plasma surface hardening of steel, Steel Research 67 (6) (1996) 247.

[21U] K.I. Matsuyama, M. Moriyasu, K. Nishiguchi, Estimation of radial heat flux distribution in plasma arc cutting with a least squares-collocation method on the boundary, Welding in the World, Le Soudage Dans Le Monde 37 (6) (1996) 301.

[22U] M. Mozetic, A. Zalar, I. Arcon, B. Pracek, M. Drobnic, P. Panjan, H plus processing of Ni/Al multilayer structures, Surface and Coatings Technology 83 (13) (1996) 45.

[23U] S.W. Nam, H. Nishiyama, S.-i Kamiyama, Numerical analysis on plasma spraying in a DC-RF hybrid plasma reactor, JSME International Journal Series B—Fluids and Thermal Engineering 39 (1) (1996) 134.

[24U] V.A. Nemchinsky, Liquid metal movement during plasma arc cutting, Welding Journal 75 (12) (1996) 388.

[25U] D. Neuschuetz, A. Stueber, Power increase of plasma heating systems by CO_2 addition into the furnace atmosphere: investigations in view of the plasma ladle furnace, Steel Research 67 (7) (1996) 273.

[26U] M. Pietrzyk, M. Kryzhanovski, S. Okara, V. Parchomenko, Thermal-diffusion finite element analysis of nitriding process for arc plasma surface hardening of steel, Journal of Materials Processing Technology 56 (14) (1996) 412.

[27U] K. Ramachandran, V. Selvarajan, Trajectory and temperature history of the particles of different sizes and their injection velocities in a thermal plasma, Computational Materials Science 6 (1) (1996) 81.

[28U] D. Tretheway, E.S. Aydil, Modeling of heat transport and wafer heating effects during plasma etching, Journal of the Electrochemical Society 143 (11) (1996) 3674.

[29U] T. Watanabe, A. Kanzawa, T. Ishigaki, Y. Moriyoshi, Thermal plasma treatment of titanium carbide powders: Part I. Numerical analysis of powder behavior in argon–hydrogen and argon–nitrogen radio frequency plasmas, Journal of Materials Research 11 (10) (1996) 2598.

Plasma heat transfer and magnetohydrodynamics: magnetohydrodynamics

[30U] T.K. Aldoss, MHD mixed convection from a vertical cylinder embedded in a porous medium, International Communications in Heat and Mass Transfer 23 (4) (1996) 517.

[31U] T.K. Aldoss, Y.D. Ali, M.A. Al-Nimr, MHD mixed convection from a horizontal circular cylinder, Numerical Heat Transfer Part A—Applications 30 (4) (1996) 379.

[32U] H.A. Attia, N.A. Kotb, MHD flow between two parallel plates with heat transfer, Acta Mechanica 117 (1996) 1.

[33U] S. Bhattacharyya, Combined effects of rotation and translation on a MHD flow due to compressible viscous fluid, Archive of Applied Mechanics 67 (12) (1996) 62.

[34U] W. Bian, P. Vasseur, E. Bilgen, Effect of an external magnetic field on buoyancy-driven flow in a shallow porous cavity, Numerical Heat Transfer Part A—Applications 29 (6) (1996) 625.

[35U] W. Bian, P. Vasseur, E. Bilgen, F. Meng, Effect of an electromagnetic field on natural convection in an inclined

porous layer, International Journal of Heat and Fluid Flow 17 (1) (1996) 36.
[36U] A.J. Chamkha, Non-Darcy hydromagnetic free convection from a cone and a wedge in porous media, International Communications in Heat and Mass Transfer 23 (6) (1996) 875.
[37U] P. Chandran, N.C. Sacheti, A.K. Singh, Hydromagnetic flow and heat transfer past a continuously moving porous boundary, International Communications in Heat and Mass Transfer 23 (6) (1996) 889.
[38U] C.-I. Hung, J.-S. Tsai, C.O.K. Chen, Nonlinear stability analysis of magnetohydrodynamic condensate film flow down a vertical plate with constant heat flux, International Journal of Heat and Mass Transfer 39 (4) (1996) 877.
[39U] P.S. Lykoudis, Natural convection in a cubic enclosure in the presence of a horizontal magnetic field, Journal of Heat Transfer—Transactions of the ASME 118 (1) (1996) 215.
[40U] B. Sahin, A. Kodal, H. Yavuz, Performance analysis for MHD power cycles operating at maximum power density, Journal of Physics D—Applied Physics 29 (6) (1996) 1473.
[41U] H.S. Takhar, R.S.R. Gorla, V.M. Soundalgekar, Radiation effects of MHD free convection flow of a gas past a semi-infinite vertical plate, International Journal of Numerical Methods for Heat and Fluid Flow 6 (2) (1996) 77.