

HEAT TRANSFER BIBLIOGRAPHY

E. R. G. ECKERT, E. M. SPARROW, W. E. IBELE and R. J. GOLDSTEIN

Heat Transfer Laboratory, Department of Mechanical Engineering University of Minnesota,
Minneapolis, Minnesota

(Received 6 January 1965)

APPLICATIONS

- H. J. ALLEN and N. A. JAMES, Prospects for obtaining aerodynamic heating results from analysis of meteor flight data, *NASA TN D-2069* (1964).
- P. BERLINER, A new method for the calculation of the performance of cooling towers (in German), *Kältetechnik* **16**, No. 4, 103 (1964).
- D. J. CARLSON and R. F. HOGLUND, Particle drag and heat transfer in rocket nozzles, *AIAA J.* **2**, No. 11, 1980 (1964).
- G. T. Y. CHAO, J. A. JACOBSEN and J. T. ANDERSON, Methods for calculation of inside wall surface transient temperatures for solid propellant rocket nozzles, *ABL/Z-73*; *AD-446669*, Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md. (1964).
- A. J. CHAPMAN, Effect of weight, density, and heat load on thermal-shielding performance of phenolic nylon, *NASA TN D-2196* (1964).
- N. K. D. CHOUDHURY and Z. U. A. WARSİ, Weighting function and transient thermal response of buildings. Part I. Homogeneous structure, *Int. J. Heat Mass Transfer* **7**, No. 11, 1309 (1964).
- L. G. DESMON and G. B. AVIS, *Cylheat Handbook*, Volume I, *ABL/X-123*; *AD-446659*, Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md. (1964).
- L. DESMON, G. T. Y. CHAO and D. J. SINE, Heat transfer in nozzle systems, *ABL/ARPA/QTER-7*; *AD-444816*, Allegany Ballistics Lab., Hercules Powder Co., Cumberland, Md. (1964).
- S. ELKIND, Cooled solid propellant rocket nozzles, Volume II, *A-PFR-5601*; *AD-602806*, Arde-Portland, Inc., Paramus, N.J. (1964).
- J. A. FAY, Entry heat transfer at super-orbital speeds, Fluid Mechanics Lab., Publ. No. 64-7, Department of Mechanical Engineering, Massachusetts Institute of Technology (1964).
- R. J. FLAHERTY, Heat-transfer and weight analysis of a moving-belt radiator system for waste heat rejection in space, *NASA TN D-1990* (1964).
- A. P. GAGGE, G. M. RAPP and J. D. HARDY, Mean radiant and operative temperature for high-temperature sources of radiant heat, *ASHRAE J.* **6**, No. 10, 67 (1964).
- C. GAZLEY JR., Deceleration and mass change of an ablating body during high velocity motion in the atmosphere, *Int. J. Heat Mass Transfer* **7**, No. 12, 1405 (1964).
- R. A. GRAVES and T. E. WALTON JR., Free-flight test results on the performance of cork as a thermal protection material, *NASA TN D-2438* (1964).
- J. S. GRUSZCZYNSKI and W. R. WARREN JR., Experimental heat-transfer studies of hypervelocity flight in planetary atmospheres, *AIAA J.* **2**, No. 9, 1542 (1964).
- S. R. GUNN, Note concerning an electrical heater error in the rocking-bomb solution calorimeters, *UCRL-7992*, Lawrence Radiation Lab., California University, Livermore (1964).
- E. L. HAAK and R. J. NICCUM, Pressure distribution measurements of conventional ribbon parachutes in supersonic flow, *RTD-TDR-63-662*, AF Flight Dynamics Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- R. L. HOUGH, Refractory reinforcements for ablative plastic. Part III. Pyrolytic boride reinforcing agents, *ASD-TDR-62-260*, AF Materials Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- C. P. HOWARD, Heat transfer and flow friction characteristics of skewed and glass-ceramic heat transfer surfaces, *TR-59*, Stanford University, Calif. (1964).
- F. G. HOWARD, Heat transfer on unswept and 38° swept cylindrically blunted wedge fins in free flight to Mach number 4.11, *NASA TN D-2386* (1964).
- J. T. LEONARD and R. N. HAZLETT, Supercooling of hydrazine, *NRL-6130*; *AD-605166*, Fuels Branch, Naval Research Lab., Washington, D.C. (1964).
- W. E. NICKEL and L. W. SIMS, Study and exploratory free-flight investigation of deployable aerodynamic decelerators operating at high altitudes and at high Mach numbers, *FDL-TDR-64-35*, Air Flight-Dynamics Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- W. A. PAGE and J. O. ARNOLD, Shock-layer radiation of blunt bodies at re-entry velocities, *NASA TR R-193* (1964).
- F. E. PAPALEGIS and R. G. BOURDEAU, Pyrolytic reinforcements for ablative plastic composites, Tech. Doc. Rept. No. *ML-TDR-64*, AF Materials Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- P. F. PIRRUNG, Erosion resistant pyrolyzed ablative plastics. Part I. Precursory materials and vapor plating apparatus, *RTD-TDR-63-4261*, Air Force Materials Lab., Research and Technology Div., Air Force

- Systems Command, Wright-Patterson AFB, Ohio (1964).
- Re-entry heating experiment to be flown by Scout, News Release No. 64-202, NASA, Washington, D.C. (1964).
- E. A. REINIKKA and P. B. WELLS, Charring ablators on lifting entry vehicles, *J. Spacecr. Rockets* **1**, No. 1, 73 (1964).
- B. J. REITZER, Rate of scale formation in tubular heat exchangers. Mathematical analysis of factors influencing rate of decline of over-all heat-transfer coefficients, *I & EC (Process Design & Development)* **3**, No. 4, 345 (1964).
- P. N. ROMANENKO, A. I. LEONT'YEV and A. N. OBLIVIN, A study of resistance and heat-exchange in the motion of heated air in diffusors and mixers, *AID-T-64-25; AD-601244*, Aerospace Information Div., Library of Congress, Washington, D.C. (1964).
- J. M. SMITH, B. CASWELL and P. V. SHAW, Thermodynamics, *Industr. Engng Chem.* **56**, No. 9, 41 (1964).
- R. SPEED and A. FILICE, Quartz glass pressure vessels for hydrothermal studies, *Amer. Mineral.* **49**, 1114 (1964).
- P. C. STAINBACK, Heat-transfer measurements at Mach number of 8 in the vicinity of a 90° interior corner with the free-stream velocity, *NASA TN D-2383* (1964).
- R. L. STALLINGS JR., P. B. BURBANK and D. T. HOWELL, Heat-transfer and pressure measurements on delta wings at Mach numbers of 3.51 and 4.65 and angles of attack from -45° to 45°, *NASA TN D-2387* (1964).
- F. J. STERNMOLE and M. A. LARSON, The dynamics of flow distributed parameter heat exchangers, *J. Amer. Inst. Chem. Engrs* **10**, No. 688 (1964).
- J. SZEKELY, Advances in heat transfer, *Chem. Industry*, No. 36, 1538 (1964).
- M. R. VANCO and A. J. GLASSMAN, Analytical investigation of the radiator area characteristics of out-of-pile thermionic gas cycle space power systems, *NASA TN D-2429* (1964).
- J. J. VOLKOFF, Protection requirements for the resistance of meteoroid penetration damage of interplanetary spacecraft systems, Tech. Rept. No. 32-410, Jet Propulsion Lab., California Institute of Technology, Pasadena (1964).
- Z. U. A. WARSI and N. K. D. CHOUDHURY, Weighting function and transient thermal response of buildings. Part II. Composite structure, *Int. J. Heat Mass Transfer* **7**, No. 11, 1323 (1964).
- B. H. WICK, Radiative heating of vehicles entering the Earth's atmosphere, Ames Research Center, NASA, Moffett Field, Calif. (1964).
- J. A. WIEBELT and J. F. PARMER, Spacecraft temperature control by thermostatic fin-analysis, *NASA CR-91*, Oklahoma State University, Stillwater (1964).
- A. J. WILLMOTT, Digital computer simulation of a thermal regenerator, *Int. J. Heat Mass Transfer* **7**, No. 11, 1291 (1964).
- C. W. WINTERS, Heat-transfer rates and ablation on a blunted cylinder-flare configuration in free flight up to a Mach number of 8.98, *NASA TN D-2383* (1964).
- H. WOLF, Heat transfer phenomena in rocket engines, College of Engineering, Arkansas University, Fayetteville (1964).
- R. Y. WONG, A fiber optical system for space application, Tech. Rept. No. 32-646, Jet Propulsion Lab., California Institute of Technology, Pasadena (1964).
- J. I. YELLOTT, Solar energy progress report, *J. Engng Power* **A86**, No. 4, 475 (1964).
- H. ZIEBLAND, Heat transfer in rocket thrust chambers, Explosives Research and Development Establishment, Waltham Abbey, Great Britain (1964).

BOOKS

- J. F. CLARKE and M. MCCHESENEY, *The Dynamics of Real Gases*, Butterworth's, Washington, D.C. (1964).
- H. L. DRYDEN, TH. VON KÁRMÁN and G. KUERTI, editors, *Advances in Applied Mechanics*, Volume 8, Academic Press, New York, N.Y. (1964).
- U. GRIGULL, *Temperaturlausgleich in einfachen Körpern ebene Platte, Zylinder, Kugel, halbinendlicher Körper*, Springer-Verlag, Berlin (1964).
- I. I. NOVIKOV and K. D. NOVOKRESENSKIY, *Applied Thermodynamics and Heat Transfer, FTD-TT-63-17/1 + 2; AD-417207*, Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- L. I. SEDOV, editor, *Proceedings of the All-Union Conference on Theoretical and Applied Mechanics, FTD-TT-63-471/1 + 2; AD-602320*, Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- M. SITTING, *Cryogenics Research and Applications*, D. van Nostrand, Princeton, N.J. (1963).

BOUNDARY-LAYER FLOW

- I. E. BECKWORTH, Experimental investigation of heat transfer and pressures on a swept cylinder in the vicinity of its intersection with a wedge and flat plate at Mach number 4.15 and high Reynolds numbers, *NASA TN D-2020* (1964).
- J. R. BUSING, The effect of catalytic surfaces on stagnation point heat transfer in partially dissociated flows, College of Aeronautics, Cranfield, Great Britain (1964).
- A. R. BÜYÜKTÜR, J. KESTIN and P. F. MAEDER, Influence of combined pressure gradient and turbulence on the transfer of heat from a plate, *Int. J. Heat Mass Transfer* **7**, No. 11, 1175 (1964).
- G. T. CHAPMAN, Theoretical laminar convection heat transfer and boundary-layer characteristics on cones at speeds to 24 km/sec, *NASA TN D-2463* (1964).
- D. COLES, The turbulent boundary layer in a compressible fluid, *Phys. Fluids* **7**, No. 9, 1403 (1964).
- D. J. COLLINS and T. E. HORTON, Experimental convective heat-transfer measurements, *AIAA J.* **2**, No. 11, 2046 (1964).
- K. R. CZARNECKI and W. J. MONTA, Effects of compressibility and heat transfer on the laminar sublayer of the turbulent boundary layer, *NASA TN D-1998* (1964).
- S. ELKIND, Cooled solid propellant rocket nozzles. Volume I, *A-P-FR-5601; AD-602805*, Arde-Portland, Inc., Paramus, N.J. (1964).
- J. A. FAY, Hypersonic heat transfer in the air laminar boundary layer, AVCO-Everett Research Lab., Everett, Mass. (1964).

- A. L. FEILD JR., Analytical studies of beryllium ablation and dispersion during re-entry, *J. Spacecr. Rockets* 1, No. 1, 31 (1964).
- H. FERNHOLZ, Three-dimensional disturbances in a two-dimensional incompressible turbulent boundary layer, *ARC-R & M-3368*, Engineering Lab., Aeronautical Research Council, Great Britain (1964).
- P. D. FISHER, Charts of equilibrium real-gas stagnation point conditions on a sphere for altitudes to 200 000 ft and velocities to 15 000 ft/s, *NOLTR* 64-41, United States Naval Ordnance Lab., White Oak, Md. (1964).
- H. FOX, Laminar boundary layers with chemical reactions, *AFOSR-64-1394*, Dept. of Aerospace Engineering and Applied Mechanics, Polytechnic Institute of Brooklyn (1964).
- S. A. HARTOFILIS, Pressure and heat transfer measurements at Mach 13 and 19 for flows ahead of ramps, over expansion corners, and past fin-plate combinations, *FDL-TDR-64-144*, Air Force Flight Dynamics Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- D. HECKMAN, Heat transfer to spheres and cones in equilibrium air, *CARDE-TR-479/64*, Canadian Armament Research and Development Establishment, Valcartier (1964).
- F. G. HOWARD, Heat transfer on unswept and 38° swept cylindrically blunted wedge fins in free flight to Mach number 4, 11, *NASA TN D-2386* (1964).
- J. L. HUDSON and S. G. BANKOFF, An exact solution of unsteady heat transfer to a shear flow, *Chem. Engng Sci.* 14, No. 9, 591 (1964).
- G. R. INGER, Highly nonequilibrium boundary-layer flows of a multicomponent dissociated gas mixture, *Int. J. Heat Mass Transfer* 7, No. 11, 1151 (1964).
- R. A. JONES, Heat-transfer and pressure investigation of a fin-plate interference model at a Mach number of 6, *NASA TN D-2028* (1964).
- J. N. KAPUR and R. C. SRIVASTAVA, Similar solutions of boundary-layer equations for power-law fluids, *J. Amer. Inst. Chem. Engrs* 10, No. 5, 775 (1964).
- L. G. KAUFMAN, II, Pressure and heat-transfer measurements for Mach 21 flows over a blunt pyramidal configuration with aerodynamic controls, *FDL-TDR-64-120*, AF Flight Dynamics Laboratory, Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- L. G. KAUFMAN, II, Pressure and heat-transfer measurements for Mach 8 flows over a blunt pyramidal configuration with aerodynamic controls. Part II. Pressure data for dihedral surfaces part of an investigation of hypersonic flow separation and control characteristics, *FDL-TDR-64-2*, Air Force Flight Dynamics Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- L. G. KAUFMAN, II, Pressure and heat-transfer measurements for hypersonic flows over expansion corners and ahead of ramps. Part IV. Mach 8 heat-transfer data for flows ahead of ramps, *ASD-TDR-63-679*, Air Force Flight Dynamics Lab., Research and Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- N. H. KEMP, Approximate analytical solution of similarity boundary-layer equations with variable fluid properties, Fluid Mechanics Lab. Publ. No. 64-6, Department of Mechanical Engineering, Massachusetts Institute of Technology (1964).
- L. G. LOYTSYANSKIY, Laminar boundary layer, *FTD-TT-63-749/1 + 2*; *HD-601756*, Foreign Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- B. R. LUTHRA, Possible similarity solutions of unsteady boundary layer equations in certain three-dimensional orthogonal curvilinear coordinates, *J. Phys. Soc. Japan* 19, No. 7, 1226 (1964).
- B. J. NOONAN and J. L. RAND, High temperature turbulent heat-transfer measurements, *NOLTR-63-276*; *AD-445121*, Naval Ordnance Lab., White Oak, Md. (1964).
- R. L. O'BRIEN and P. E. DEMAREST, Laminarization of nozzle wall boundary layers as a means of reducing heat flux, *C-910100-11*; *AD-448619*, Research Labs., United Aircraft Corp., East Hartford, Conn. (1964).
- Y. S. PAN and R. F. PROBSTEIN, Rarefied flow transition at a leading edge, Fluid Mechanics Lab. Publication No. 64-8, Department of Mechanical Engineering, Massachusetts Institute of Technology (1964).
- R. F. PARISSÉ, Ablation of a solid sphere of a low conductivity material, *PIBAL-683*; *AD-600173*, Polytechnic Institute of Brooklyn, N.Y. (1964).
- S. R. PATE, Investigation of drag reduction by boundary-layer suction on a 50-deg swept tapered wing at $M_\infty = 2.5$ to 4, *AEDC-TDR-64-221*, Air Force Systems Command, United States Air Force, Arnold Air Force Station, Tenn. (1964).
- P. H. ROSE and J. O. STANKEVICS, Heat-transfer measurements in partially ionized gases, Research Rept. 196, NASA, Offices of Advanced Research and Technology, Washington, D.C. (1964).
- R. J. SARTELL and G. C. LORENZ, A new technique for measurement of aerodynamic heating distributions on models of hypersonic vehicles, *Proceedings 1964 Heat Transfer Fluid Mechanics Institute*, University of California, Berkeley, 10-12 June (1964).
- K. S. SASTRI, The effect of suction for heat transfer with temperature dependent heat sources or sinks in stagnation point flow, *J. Phys. Soc. Japan* 19, No. 8, 1385 (1964).
- L. G. SILER and H. E. DESKINS, Effect of shock impingement on the heat-transfer and pressure distributions on a cylindrical-leading-edge model at Mach number 19, *AEDC-TDR-64-228*, Air Force Systems Command, United States Air Force, Arnold Air Force Station, Tenn. (1964).
- D. B. SPALDING, D. M. AUSLANDER and T. R. SUNDARAM, The calculation of heat and mass transfer through the turbulent boundary layer on a flat plate at high Mach numbers, with and without chemical reaction, Northern Research and Engineering Corp., Cambridge, Mass. (1964).

- P. C. STAINBACK, Heat-transfer measurements at a Mach number of 8 in the vicinity of a 90° interior corner aligned with the free-stream velocity, *NASA TN D-2417* (1964).
- R. L. STALLINGS JR. and IDA K. COLLINS, Heat-transfer measurements on a flat plate and attached protuberances in a turbulent boundary layer at Mach numbers of 2.65, 3.51 and 4.44, *NASA TN D-2428* (1964).
- L. STEG and H. LEW, Hypersonic ablation, Missile and Space Div., General Electric Co., Philadelphia, Pa. (1964).
- S. P. SUTERA, Vorticity amplification in stagnation-point and its effect on heat transfer, *ARL-64-91; AD-603503*, Brown University, Providence, R.I. (1964).
- R. T. SWANN, M. B. DOW and S. S. TOMPKINS, Analysis of the effects of environmental conditions on the performance of charring ablaters, *NASA-TM-X-51959*, NASA, Langley Research Center, Langley Station, Va. (1964).
- C. L. TIEN, A note on distributions of temperature and eddy diffusivity for heat in turbulent flow near a wall, *Z. Angew. Math. Phys.* **15**, No. 1, 63 (1964).
- G. A. TIRSKII, Determination of the effective coefficients of diffusion in the laminar multi-component boundary layer, *Sov. Phys. Dokl.* **9**, No. 4, 275 (1964).
- W. TOLLE, Theoretical boundary-layer research on the problem of heat transfer through steady and counter flows (in German), Ph.D. Thesis, Technische Hochschule Fridericiana, Karlsruhe, West Germany (1964).
- H. TONG and B. H. SUZUKI, Stagnation-point heat transfer to surfaces of arbitrary catalyticity, *AIAA J.* **2**, No. 11, 2051 (1964).
- ### CHANGE OF PHASE
- A. ACRIVOS, J. E. AHERN and A. R. NAGY JR., Research investigation of two-component heat transfer, *ARL 64-116*, Office of Aerospace Research, United States Air Force, Wright-Patterson AFB, Ohio (1964).
- K. M. BECKER and P. PERSSON, An analysis of burnout conditions for flow of boiling water in vertical round ducts, *J. Heat Transfer* **C86**, No. 4, 515 (1964).
- M. BENTWICH and S. SIDEMAN, Temperature distribution in concurrent two-phase (liquid-liquid) laminar flow on inclined surfaces, *J. Heat Transfer* **C86**, No. 4, 476 (1964).
- A. E. BERGLES, The influence of flow vibrations on forced-convection heat transfer, *J. Heat Transfer* **C86**, No. 4, 559 (1964).
- A. L. BERLAD, Steady-state crystallization in supercooled liquids, *Proceedings 1964 Heat Transfer Fluid Mechanics Institute*, University of California, Berkeley, 10-12 June (1964).
- L. D. BERMAN and Y. A. TUMANOV, Study of heat emission during the condensation of moving steam in a horizontal pipe, *FTD-TT-64-301/1 + 2; AD-602374*, Foreign Technology Div., Air Force Systems Command, Wright-Patterson AFB, Ohio (1964).
- L. BERNATH, P. D. COHN and T. J. SADOWSKI, Forced convection burnout for water in rod bundles at high pressures, *Int. J. Heat Mass Transfer* **7**, No. 12, 1385 (1964).
- C. BEURTHÉRET, Vaporisation en régime complexe d'un liquide baignant une paroi chaude essentiellement anisotherme, *C.R. Hebd. Seances Acad. Sci.* **259**, No. 3, 519 (1964).
- B. A. BOLEY, Upper and lower bounds in problems of melting or solidifying slabs, *Quart. J. Mech. & Appl. Math.* **17**, Part 3, 253 (1964).
- C. A. DEPEW and R. L. REISBIG, Vapor condensation on a horizontal tube using Teflon to promote dropwise condensation, *I & EC (Process Design & Development)* **3**, No. 4, 365 (1964).
- T. DORMER JR. and A. E. BERGLES, Pressure drop with surface boiling in small-diameter tubes, Rept. No. 8767-31, Department of Mechanical Engineering Massachusetts Institute of Technology (1964).
- Experimental results of forced convection boiling potassium heat transfer and pressure drop tests, *PWAC-429*, Pratt and Whitney Aircraft, Middletown, Conn. (1964).
- D. E. FITZSIMMONS, Two-phase pressure drop in piping components, *HW-80970*, Rev. 1, Hanford Atomic Products Operation, Richland, Wash. (1964).
- T. W. GARRETT and J. L. WIGHTON, The effect of inclination on the heat-transfer coefficients for film condensation of steam on an inclined cylinder, *Int. J. Heat Mass Transfer* **7**, No. 11, 1235 (1964).
- J. B. GAYLE, C. T. EGGER and J. W. BRANSFORD, Freezing of liquids on sudden exposure to vacuum, *NASA-RDRP-249*, Marshall Space Flight Center, National Aeronautics and Space Administration, Huntsville, Ala. (1964).
- J. P. GLAS and J. W. WESTWATER, Measurements of the growth of electrolytic bubbles, *Int. J. Heat Mass Transfer* **7**, No. 12, 1427 (1964).
- R. W. GRAHAM, R. C. HENDRICKS and R. C. EHLERS, An experimental study of the pool heating of liquid hydrogen in the subcritical and supercritical pressure regimes over a range of accelerations, *NASA-TM-X-52039*, Lewis Research Center, NASA, Cleveland, Ohio (1964).
- R. E. HOLTZ, Application of electron-bombardment heating for boiling liquid metals, *ANL-6869*, Reactor Engineering Div., Argonne National Lab., Ill. (1964).
- R. K. IREY, P. W. MCFADDEN and R. A. MADSEN, Heat transfer to a saturated bath of liquid helium II, Paper No. p-5, School of Mechanical Engineering, Purdue University, West Lafayette, Ind. (1964).
- K. C. JAIN and S. G. BANKOFF, Laminar film condensation on a porous vertical wall with uniform suction velocity, *J. Heat Transfer* **C86**, No. 4, 490 (1964).
- E. G. KESHOCK and R. SIEGEL, Forces acting on bubbles in nucleate boiling under normal and reduced gravity conditions, *NASA TN D-2299* (1964).
- J. J. KOWALCZEWSKI, Two-phase flow in an unheated and heated tube, Thesis presented to Swiss Federal Institute of Technology, Zürich (1964).
- A. A. KUDIRKA, Two-phase heat transfer with gas

- injection through a porous boundary surface, ANL-6862, Argonne National Lab., Illinois (1964).
- L. S. LANGSTON and R. H. EUSTIS, Heat transfer from a nonspherical bubble rising in an isothermal liquid, Department of Mechanical Engineering, Stanford University, Calif. (1964).
- M. LEDINEGG, Die Filmverdampfung, *Forsch. Ing.-Wes.* **30**, No. 4, 97 (1964).
- J. LONGO JR., editor, Alkali metals boiling and condensing investigations, Volume 1, NASA-CR-54037, Missile and Space Div., General Electric Co., Cincinnati, Ohio (1964).
- D. N. LYON, Peak nucleate-boiling heat fluxes and nucleate-boiling heat-transfer coefficients for liquid N₂, liquid O₂, and their mixture in pool boiling at atmospheric pressure, *Int. J. Heat Mass Transfer* **7**, No. 10, 1097 (1964).
- M. MARKELS, JR. and R. L. DURFEE, The effect of applied voltage on boiling heat transfer, *J. Amer. Inst. Chem. Engrs* **10**, No. 1, 106 (1964).
- L. A. NEWBERY, Effects of temperature rise on the flow of a viscous liquid through a concentric annulus with an inner cylinder rotating, *Mech. Engng Sci.* **6**, No. 3, 258 (1964).
- D. R. OLIVER and S. J. WRIGHT, Pressure drop and heat transfer in gas-liquid slug flow in horizontal tubes, *Brit. Chem. Engng* **9**, No. 9, 590 (1964).
- C. J. RALLIS and H. H. JAWUREK, Latent heat transport in saturated nucleate boiling, *Int. J. Heat Mass Transfer* **7**, No. 10, 1051 (1964).
- T. F. ROGERS and R. B. MESLER, An experimental study of surface cooling by bubbles during nucleate boiling of water, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 656 (1964).
- J. D. SEADER, W. S. MILLER and L. A. KALVINSKAS, Boiling heat transfer for cryogenics, R-5598, NASA, George C. Marshall Space Flight Center, Huntsville, Ala. (1964).
- G. T. SERGEYEV, Investigation of heat and mass transfer in the evaporation of liquid in a forced gas stream, AID-T-64-29; AD-601778, Aerospace Information Div., Library of Congress, Washington, D.C. (1964).
- S. SIDEMAN and Y. TAITEL, Direct-contact heat transfer with change of phase: Evaporation of drops in an immiscible liquid medium, *Int. J. Heat Mass Transfer* **7**, No. 11, 1273 (1964).
- C. E. SIEGERT, D. A. PETRASH and E. W. OTTO, Time response of liquid-vapor interface after entering weightlessness, NASA TN D-2458 (1964).
- K. H. SPILLER and D. PERSCHKE, Level indication measurements, wetting and bubble indication of liquid sodium in a stainless steel container (in German), EUR-1823.d, European Atomic Energy Community, Brussels, Belgium (1964).
- P. B. STEWART, J. L. CLAYTON, B. LOGA and S. E. HURD, Condensing heat transfer in steam-air mixture in turbulent flow, *I & EC (Process Design & Development)* **3**, No. 1, 48 (1964).
- M. SUO and P. GRIFFITH, Two-phase flow in capillary tubes, *J. Basic Engng* **D86**, No. 3, 576 (1964).
- F. E. TIPPETS, editor, Alkali metals boiling and condensing Investigations, NASA-CR-54038, Missile and Space Div., General Electric Co., Cincinnati, Ohio (1964).
- A. VAN HOOGSTRATEN, Research on boiling (a bibliography), Rept. 19, Witwatersrand University, Johannesburg, Union of South Africa (1964).
- C. C. WEI and G. W. PRECKSHOT, Photographic evidence of bubble departure from capillaries during boiling, *Chem. Engng Sci.* **4**, No. 10, 838 (1964).

CHANNEL FLOW

- F. K. BANNISTER, Influence of pipe friction and heat transfer on pressure waves in gases: Effects in a shock tube, *Mech. Engng Sci.* **6**, No. 3, 278 (1964).
- N. M. BELYANIN, On gas motion with friction and heat transfer in a channel of a uniform cross section (in Russian), *Inzh.-Fiz. Zh.* **7**, No. 3, 82 (1964).
- A. W. BENNETT and H. A. KEARSEY, Heat transfer and pressure drop for superheated steam flowing through an annulus with one roughened surface, AERE-R 4350, Chemical Engineering Div., Atomic Energy Research Establishment, Harwell, Berkshire, England (1964).
- G. BÜKI, Thermodynamic principles for the geometric establishment of a cooling system of cylindrical nuclear reactors (in Russian), *Periodica Polytechnica-Engng* **8**, No. 1, 43 (1964).
- F. W. CHANG and A. E. DUKLER, The influence of a wavy, moving interface on pressure drop for flow in conduits, *Int. J. Heat Mass Transfer* **7**, No. 12, 1395 (1964).
- A. P. COLBURN, A method of correlating forced convection heat-transfer data and a comparison with fluid friction, *Int. J. Heat Mass Transfer* **7**, No. 12, 1359 (1964).
- M. J. CALLAGHAN and D. M. MASON, Reynolds analogy in reacting systems, heat transfer to turbulently flowing nitrogen dioxide gas, *Chem. Engng Sci.* **4**, No. 10, 763 (1964).
- L. E. ERICKSON, C. S. WANG, C. L. HWANG and L. T. FANG, Heat transfer to magnetohydrodynamics flow in a flat duct, *Z. Angew. Math. Phys.* **15**, No. 4, 408 (1964).
- D. M. EISENBERG and D. C. BOGUE, Velocity profiles of thoria suspensions in turbulent pipe flow, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 723 (1964).
- W. B. HALL and S. A. KHAN, Experimental investigation into the effect of the thermal boundary condition on heat transfer in the entrance region of a pipe, *Mech. Engng Sci.* **6**, No. 3, 250 (1964).
- J. L. HUDSON and S. G. BANKOFF, Asymptotic solutions for the unsteady Graetz problem, *Int. J. Heat Mass Transfer* **7**, No. 11, 1303 (1964).
- W. B. HALL and S. A. KHAN, Experimental investigation into the effect of the thermal boundary condition on heat transfer in the entrance region of a pipe, *Mech. Engng Sci.* **6**, No. 3, 250 (Z964).
- B. H. LIEU, Air-film cooling of a supersonic nozzle, NOLTR-64-65, United States Ordnance Lab., White Oak, Md. (1964).

- C. V. LINDERSTRØM-LANG, Gas separation in the Ranque-Hilsch vortex tube, *Int. J. Heat Mass Transfer* **7**, No. 11, 1195 (1964).
- T. S. LUNDGREN, E. M. SPARROW and J. B. STARR, Pressure drop due to the entrance region in ducts of arbitrary cross section, *J. Basic Engng* **D86**, No. 3, 620 (1964).
- N. MADSEN, Comments on the effect of axially varying and non-symmetrical boundary conditions on heat transfer with turbulent flow between parallel plates, *Int. J. Heat Transfer* **7**, No. 10, 1143 (1964).
- G. W. MAURER and B. W. LETOURNEAU, Friction factors for fully-developed turbulent flow in ducts with and without heat transfer, *J. Basic Engng* **D86**, No. 3, 627 (1964).
- R. A. PAWLEK and C. TIEN, Laminar heat transfer to non-Newtonian fluids in the entrance region of a circular conduit, *Canad. J. Chem. Engng* **42**, No. 5, 222 (1964).
- D. PNUELI, Lower bounds to thermal instability criteria of completely confined fluids inside cylinders of arbitrary cross section, *J. Appl. Mech.* **31**, No. 3, 376 (1964).
- P. N. ROMANENKO and N. V. KRYLOVA, A study of the effects of inlet conditions on heat transfer in the entry region of a tube, *Int. Chem. Engng* **4**, No. 4, 587 (1964).
- G. F. C. ROGERS and Y. R. MAYHEW, Heat transfer and pressure loss in helically coiled tubes with turbulent flow, *Int. J. Heat Mass Transfer* **7**, No. 11, 1207 (1964).
- J. SAVINO, R. SIEGEL and E. C. BITTNER, Analysis of fully developed laminar heat transfer in thin rectangular channels with heating on the broad walls except near the corners, NASA TN D-2411 (1964).
- J. G. SLABY, W. L. MAAG and B. L. SIEGEL, Laminar and turbulent hydrogen heat transfer and friction coefficients over parallel plates at 5000°R, NASA TN D-2435 (1964).
- W. STREWE, Velocity field, temperature field, and heat transfer in laminar channel flow of water of temperature viscosity (in German), *VDI-Z.* **106**, No. 26, 1322 (1964).
- B. STURIEVANT and E. SLACHMUYLDERS, End-wall heat-transfer effects on the trajectory of a reflected shock wave, *Phys. Fluids* **7**, No. 8, 1201 (1964).
- W. SQUIRE, Turbulent heat and mass transfer in smooth pipes, *Int. J. Heat Mass Transfer* **7**, No. 10, 1069 (1964).
- G. SCHUTZ, Untersuchung des Stoffaustausch-Anlaufgebietes in einem Rohr bei vollausgebildeter Hydrodynamischer Stromung mit einer elektrochemischen Methode, *Int. J. Heat Mass Transfer* **7**, No. 10, 1077 (1964).
- A. M. SYCHEVA and N. N. EGOROV, Heat transfer from a liquid stream in tubes containing coarse packing, *Int. Chem. Engng* **4**, No. 4, 606 (1964).
- W. A. SUTHERLAND and W. M. KAYS, Heat transfer in an annulus with variable circumferential heat flux, *Int. J. Heat Mass Transfer* **7**, No. 11, 1187 (1964).
- R. SANI, Note on flow instability in heated ducts, *Z. Angew. Math. Phys.* **15**, No. 4, 381 (1964).
- W. T. SNYDER, The influence of wall conductance on magnetohydrodynamic channel-flow heat transfer, *J. Heat Transfer* **C86**, No. 4, 552 (1964).
- R. M. TERRILL, Laminar flow in a uniformly porous channel, *Aero. Quart.* **15**, Part 3, 299 (1964).

CONDUCTION

- J. FAURE, Determination of the heat diffusion rate in insulating materials using a very short impulse (in French), EUR-1822.f, European Atomic Energy Community, Brussels, Belgium (1964).
- M. A. HEASLET and F. B. FULLER, Temperature distribution on conducting cylindrical shells including the effects of thermal radiation, NASA-RP-264, Ames Research Center, NASA, Moffett Field, Calif. (1964).
- J. J. HENRY and H. FENECH, The use of analog computers for determining surface parameters required for prediction of thermal contact conductance, *J. Heat Transfer* **C86**, No. 4, 543 (1964).
- R. HOYLE and D. H. MATTHEWS, The effect of diameter size and speed of rotation on the heat transfer from steam to cooled cylinders, *Int. J. Heat Mass Transfer* **7**, No. 11, 1223 (1964).
- A. KARDAS, Errors in a finite-difference solution of the heat flow equation, *J. Heat Transfer* **C86**, No. 4, 561 (1964).
- J. C. M. LI, Thermokinetic analysis of heat conduction, *Int. J. Heat Mass Transfer* **7**, No. 11, 1335 (1964).
- S. LIN, The calculatory treatment of one-dimensional nonsteady heat conduction processes with simultaneous phase change on bodies with cylindrical or spherical symmetry (in German), *Z. Ver. Dtsch. Ing.* **106**, No. 28, 1379 (1964).
- V. S. MILLER, Results of the experimental investigation of contract heating-exchange between plane metal surfaces, TIL/T-5407, Ministry of Aviation, Mottingham Technical Information and Library Service, Great Britain (1964).
- K. N. NEWHOUSE, Temperature distributions in circular fins of rectangular profile, *J. Heat Transfer* **C86**, No. 4, 563 (1964).
- Z. PALEY, J. N. LYNCH and C. M. ADAMS JR., Heat flow in welding heavy steel plate, *Welding J.* **43**, No. 2, 71 (1964).
- R. E. PATTLE and J. MONAGHAN, The calculation of time-lag in thermal and electrical conduction, and in diffusion, *Quart. J. Mech. Appl. Math.* **17**, No. 1, 73 (1964).
- J. C. ROWLEY and J. B. PAYNE, Steady-state temperature solution for a heat-generating circular cylinder cooled by a ring of holes, *J. Heat Transfer* **C86**, No. 4, 531 (1964).
- J. H. SASS, Heat-flow values from Eastern Australia, *J. Geophys. Res.* **69**, No. 18, 3889 (1964).
- I. T. SHVETS and E. P. DYBAN, Contact heat transfer between plane metal surfaces, *Int. Chem. Engng* **4**, No. 4, 621 (1964).
- K. SONOKAMA, Contact thermal resistance, RSIC-215; AD-443429, Army Missile Command, Redstone Scientific Information Center, Huntsville, Ala. (1964).

- E. M. SPARROW, A. HAJI-SHEIKH and T. S. LUNDGREN, The inverse problem in transient heat conduction, *J. Appl. Mech.* **E31**, No. 3, 369 (1964).
 Study of interface thermal contact conductance, NASA CR-58705; Rept.-64SD652, Valley Forge Space Technology Center, General Electric Co., Philadelphia, Pa. (1964).

FLOW WITH SEPARATED REGIONS

- R. KLIER, Heat-transfer and pressure loss in cross-flow, crossed tube banks (in German), *Z. Ver. Dtsch. Ing.* **106**, No. 27, 1363 (1964).
 H. McDONALD, Turbulent shear layer re-attachment with special emphasis on the base pressure problem, *Aero. Quart.* **15**, Part 3, 247 (1964).
 H. SCHUH and B. PERSSON, Heat transfer on circular cylinders exposed to free-jet flow, *Int. J. Heat Mass Transfer* **7**, No. 11, 1257 (1964).
 D. R. WALZ, Spot cooling and heating of surfaces with high velocity impinging air jets, Tech. Rept. No. 61, Department of Mechanical Engineering, Stanford University, Calif. (1964).
 M. WOLFSHTEIN and A. S. TOTTER, Heat transfer between an impinging jet and a flat surface, *Israel J. Tech.* **2**, No. 1, 131 (1964).

HEAT AND MASS TRANSFER

- H. D. BARRS, Heat of respiration as a possible cause of error in the estimation by psychrometric methods of water potential in plant tissues, *Nature, Lond.* **203**, No. 4950, 1136 (1964).
 G. F. KLICH and E. W. LEYHE, Experimental results of cooling a 12.5° semi-vertex angle cone by ejection of hydrogen and helium from its apex at Mach 7, NASA TN D-2478 (1964).
 K. LEE, H. BARROW and D. J. RYLEY, The visualization of mass-transfer rate around a sphere, *J. Roy. Aeronaut. Soc.* **68**, No. 638, 137 (1964).
 L. M. NIKITINA, A. N. MELIKHOVA and T. F. SHKRABATOVSKAYA, Equilibrium moisture content and mass-transfer coefficient of wood sawdust (in Russian), *Dokl. Akad. Nauk SSSR* **8**, No. 8, 523 (1964).
 C. C. PAPPAS and A. F. OKUNO, Heat-transfer measurement for binary gas laminar boundary layers with high rates of injection, NASA TN D-2473 (1964).
 R. PFEFFER and J. HAPPEL, An analytical study of heat and mass transfer in multicomponent systems at low Reynolds numbers, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 605 (1964).
 D. E. ROSNER, Effects of convection diffusion on the apparent kinetics of zeroth order surface-catalysed chemical reactions, AeroChem TP-102, AeroChem Research Labs., Inc., Princeton, N.J. (1964).
 S. SIDEMAN and G. HIRSCH (Offer), Direct contact heat transfer with change of phase. III. Analysis of the transfer mechanism of drops evaporating in immiscible liquid media, *Israel J. Tech.* **2**, No. 2, 234 (1964).
 E. M. SPARROW, W. J. MINKOWYCZ and E. R. G. ECKERT, Diffusion-thermo effects in stagnation-point flow of

air with injection of gases of various molecular weights into the boundary layer, *AIAA J.* **2**, No. 4, 652-659 (1964).

- E. M. SPARROW, W. J. MINKOWYCZ and E. R. G. ECKERT, Transpiration-induced buoyancy and thermal diffusion-diffusion thermo in a helium-air free convection boundary layer, *J. Heat Transfer* **C86**, No. 4, 508 (1964).
 L. C. SQUIRE, Some notes on turbulent boundary layers with fluid injection at high supersonic speeds, ARC-CP-740, Aeronautical Research Council, Great Britain (1964).

LIQUID METALS

- R. D. BROOKS and C. F. BONILLA, Advanced technology for space reactors: Part I, liquid-metal heat transfer, *Nucleonics* **22**, No. 3, 43 (1964).
 T. MIZUSHINA, T. SASANO, M. HIRAYAMA, N. OTSUKI and M. TAKEUCHI, Effect of gas entrainment on liquid metal heat transfer, *Int. J. Heat Mass Transfer* **7**, No. 12, 1419 (1964).
 Y. S. TANG, P. T. ROSS, R. C. NICHOLSON and C. R. SMITH, Forced convection boiling of potassium-mercury systems, *J. Amer. Inst. Chem. Engrs.* **10**, No. 5, 617 (1964).

LOW DENSITY

- H. COOK and E. A. RICHLEY, Measurements of efflux patterns and flow rates from cylindrical tubes in free-molecule and slip flows, NASA TN D-2480 (1964).
 V. S. GALKIN and M. D. LADYZHENSII, Boundary-layer calculations for a compressible liquid with slip boundary conditions, *Sov. Phys. Dokl.* **9**, No. 2, 134 (1964).
 S. A. GORDON, Flow of low density air over a heated flat plate at Mach no. 0.5, UTIAS-92, Institute for Aerospace Studies, Toronto University, Canada (1964).
 R. H. HARDING, Heat transfer from low-density cellular materials, *I & EC (Process Design & Development)* **3**, No. 2, 117 (1964).
 R. M. INMAN, Heat transfer for laminar slip flow of a rarefied gas between parallel plates with unsymmetrical wall heat flux, NASA TN D-2421 (1964).
 R. M. INMAN, Laminar slip flow heat transfer in a parallel-plate channel or a round tube with uniform wall heating, NASA TN D-2393 (1964).
 N. N. KOCHUROVA, The problem of condensation coefficients, *Int. Chem. Engng* **4**, No. 4, 603 (1964).
 T. W. REYNOLDS and E. A. RICHLEY, Flux patterns resulting from free-molecule flow through converging and diverging slots, NASA TN D-1864 (1964).
 A. I. YEROFYEV, Interaction of atoms with the surface of a solid, Joint Publications Research Service, Washington, D.C. (1964).
 N. V. ZAGORUYKO and G. A. KOKIN, Accommodation of air on tungsten filaments and the radiation coefficient of tungsten, N64-26961 19-15, National Aeronautics and Space Administration, Washington, D.C. (1964).

MAGNETOHYDRODYNAMICS

- W. F. AHTYE, A critical evaluation of methods for calculating transport coefficients of a partially ionized gas, NASA RP-231, Ames Research Center, Moffett Field, Calif. (1964).
- J. FILLO, An approximate solution in magnetohydrodynamics, *J. Appl. Mech.* **E31**, No. 4, 555 (1964).
- K. W. GENTLE and U. INGARD, Determination of neutral gas temperature in a plasma column from sound velocity measurements, *Appl. Phys. Letters* **5**, No. 5, 105 (1964).
- D. W. GEORGE, Electrical conduction in high-temperature gases, *Electron. Power* **10**, No. 9, 317 (1964).
- M. K. KIAN and J. SRINIVASAN, Hydromagnetic heat transfer in the thermal entrance region of a channel with electrically conducting walls, *AIAA J.* **2**, No. 11, 1886 (1964).
- N. RILEY, Magnetohydrodynamic free convection, *J. Fluid Mech.* **18**, No. 4, 577 (1964).
- P. H. ROSE and J. O. STANKEVICS, Heat transfer measurements in partially ionized gases, NASA CR-58049, AVCO-Everett Research Lab., Everett, Mass. (1964).
- D. SINGH and G. C. PANDE, Hydromagnetic laminar boundary layer flow past a non-conducting infinite porous flat plate with time-dependent free stream velocity, *J. Phys. Soc. Japan* **19**, No. 9, 1704 (1964).
- C. B. THOMAS and S. D. PROBERT, Improved thermal insulation using thermo-electric phenomena, *Brit. J. Appl. Phys.* **15**, No. 9, 1120 (1964).
- S. P. ZAGORODNIKOV, G. E. SMOLKIN and C. V. SHOLIN, Spectroscopic investigation of turbulence heating of a plasma, *Sov. Phys.-JETP* **18**, No. 5, 1268 (1964).

MEASUREMENT TECHNIQUES

- C. R. BARBER, Conference on the measurement of high temperatures, London, May, 1964, *Brit. J. Appl. Phys.* **15**, No. 9, 1003 (1964).
- R. E. BEDFORD, Reference tables for platinum 20T rhodium/platinum 5% rhodium thermocouples, *Rev. Sci. Instrum.* **35**, No. 9, 1177 (1964).
- R. BERMAN, J. C. F. BROCK and D. J. HUNTLEY, Properties of gold + 0.03 per cent (at.) iron thermoelements between 1 and 300°K and behavior in a magnetic field, *Cryogenics* **4**, No. 4, 233 (1964).
- M. BOEL and B. ERICKSON, A correlation study of a thermistor thermometer, Rept. No. 696, Department of Aeronautical Engineering and Applied Mechanics, Polytechnic Institute of Brooklyn, N.Y. (1964).
- D. R. BUCHELE, Nonlinear-averaging errors in radiation pyrometry, NASA TN D-2406 (1964).
- K. S. CHAN and K. R. RUSHTON, The simulation of boundary conditions in heat conduction problems in a resistance-capacitance electrical analogue, *J. Sci. Instrum.* **41**, No. 9, 535 (1964).
- J. G. COLLIER and G. F. HEWITT, Film thickness measurements, AERE-R 4684, Chemical Engineering Div., Atomic Energy Research Establishment, Harwell, Berkshire, England (1964).
- W. L. EISENMAN and R. L. BATES, Improved black radiation detector, *J. Opt. Soc. Amer.* **54**, No. 10, 1280 (1964).
- D. C. GINNING and E. D. WEST, Heater lead problem in calorimetry, *Rev. Sci. Instrum.* **35**, No. 8, 965 (1964).
- I. B. GOLDMAN and J. M. MARCHELLO, Impact tube size in fluid velocity measurement, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 775 (1964).
- D. W. GOUSE JR., Void fraction measurement, DSR 8734-2; AD-600574, Engineering Projects Lab., Massachusetts Institute of Technology, Cambridge (1964).
- P. GRASSMANN, R. BÜTTIKER and E. CATHREIN, Messung und Theorie der Wandschubspannung bei Zweiphasenströmung im Rohr, *Forsch. Ing.-Wes.* **30**, No. 4, 105 (1964).
- L. R. HUNT and R. R. HOWELL, Experimental technique for measuring total aerodynamic heating rates to bodies of arbitrary shape with results for Mach 7, NASA TN D-2446 (1964).
- J. J. JAEGER and J. H. SASS, A line source method for measuring the thermal conductivity and diffusivity of cylindrical specimens of rock and other poor conductors, *Brit. J. Appl. Phys.* **15**, No. 10, 1187 (1964).
- V. V. KORNILOV and B. I. MAKAROV, Measurement of rapidly changing temperatures of conducting solid bodies by means of thermocouples, *Measurement Techniques*, No. 10, 849 (1964).
- E. J. LE FEVRE and J. C. GEORGIAN, The temperature scale, *Nature, Lond.* **203**, No. 4950, 1158 (1964).
- M. E. LEVY, Discharge gauge for transient density measurements, *Rev. Sci. Instrum.* **35**, No. 9, 1232 (1964).
- J. G. MCCREARY and G. W. SWIFT, High pressure, low temperature, differential-pressure probe, *Rev. Sci. Instrum.* **35**, No. 10, 1366 (1964).
- J. W. MURDOCK, C. J. FOLTZ and C. GREGORY, Performance characteristics of elbow flowmeters, *J. Basic Engng* **D86**, No. 3, 498 (1964).
- B. PERLMUTTER-HAYMAN and M. A. WOLFF, Modification of the continuous flow apparatus for the measurement of rapid chemical reactions, *Rev. Sci. Instrum.* **35**, No. 8, 1002 (1964).
- J. M. SCHNEIDER and C. D. HENDRICKS, Source of uniform-sized liquid droplets, *Rev. Sci. Instrum.* **35**, No. 10, 1349 (1964).
- H. H. H. SHU, E. W. GAYLORD and W. F. HUGHES, The relation between the rubbing interface temperature distribution and dynamic thermocouple temperature, *J. Basic Engng* **86**, No. 3, 417 (1964).
- G. S. SPRINGER, Use of electrochemiluminescence in the measurement of mass-transfer rates, *Rev. Sci. Instrum.* **35**, No. 10, 1277 (1964).
- G. M. THOMAS and W. A. MENARD, Total radiation heat-transfer gage for hypervelocity shock tube experiments, Tech. Rept. No. 32-636, Jet Propulsion Lab., California Institute of Technology, Pasadena (1964).
- J. T. TOUGH, W. D. MCCORMICK and J. G. DASH, Vibrating wire viscometer, *Rev. Sci. Instrum.* **35**, No. 10, 1345 (1964).
- A. L. WENNERBERG, Precision controlled thermoelectric temperature chamber, *Rev. Sci. Instrum.* **35**, No. 9, 1191 (1964).
- A. WHILLIER, Integrating instrument for measuring solar radiation, *Solar Energy* **8**, No. 4, 134 (1964).

- J. U. WHITE, New method for measuring diffuse reflectance in the infrared, *Brit. J. Appl. Phys.* **15**, No. 10, 1187 (1964).

NATURAL CONVECTION

- E. H. BISHOP *et al.*, Convective heat transfer between concentric spheres, *Proceedings 1964 Heat Transfer Fluid Mechanics Institute*, University of California, Berkeley, 10-12 June (1964).
- V. D. BLANKENSHIP and J. A. CLARK, Laminar free convection from a vertical infinite plate subject to transverse oscillation, *J. Appl. Mech.* **31**, No. 3, 383 (1964).
- K. S. CHANG, R. G. AKINS, L. BURRIS JR. and S. G. BANKOFF, Free convection of a low Prandtl number fluid in contact with a uniformly heated vertical plate, *ANL-6835*, Chemical Engineering Div., Argonne National Lab., Ill. (1964).
- Y. CHIANG, A. OSSIN and C. L. TIEN, Laminar free convection from a sphere, *J. Heat Transfer* **C86**, No. 4, 537 (1964).
- N. T. DUNWOODY, Instability of a viscous fluid of variable density in a magnetic field, *J. Fluid Mech.* **20**, Part 1, 103 (1964).
- J. FOX, Effects of buoyancy on the laminar flow from an isothermal cone rotating in a quiet fluid, *J. Heat Transfer* **C86**, No. 4, 560 (1964).
- R. LEMLICH and J. VARDI, Steady free convection to a flat plate with uniform surface heat flux and non-uniform acceleration, *J. Heat Transfer* **C86**, No. 4, 562 (1964).
- D. PNUELI, Lower bounds to thermal instability criteria of completely confined fluids inside cylinders of arbitrary cross section, *J. Appl. Mech.* **31**, No. 3, 376 (1964).
- D. PNUELI, Thermal stability in porous insulating materials, *Israel J. Tech.* **2**, No. 1, 33 (1964).
- A. A. SZEWCZYK, Combined forced and free-convection laminar flow, *J. Heat Transfer* **C86**, No. 4, 501 (1964).
- C. P. YU, Magneto-atmospheric waves in a horizontally stratified conducting medium, *A & ES* 64-8, School of Aeronautical and Engineering Sciences, Purdue University, Lafayette, Ind. (1964).

PACKED AND FLUIDIZED BEDS

- D. W. GREEN, R. H. PERRY and R. E. BABCOCK, Longitudinal dispersion of thermal energy through porous media with a flowing fluid, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 645 (1964).
- N. V. KHARCHENKO and K. E. MAKHORIN, The rate of heat transfer between a fluidized bed and an immersed body at high temperatures, *Int. Chem. Engng* **4**, No. 4, 650 (1964).
- J. P. SUTHERLAND, The measurement of the pressure drop across a gas fluidized bed, *Chem. Engng Sci.* **4**, No. 10, 839 (1964).
- S. YAGI, D. KUNII and K. ENDO, Heat transfer in packed beds through which water is flowing, *Int. J. Heat Mass Transfer* **7**, No. 3, 333 (1964).

RADIATION

- D. R. BUCHELE, Nonlinear-averaging errors in radiation pyrometry, Lewis Research Center, NASA, Cleveland, Ohio (1964).
- R. D. CESS, Radiation effects upon boundary-layer flow of an absorbing gas, *J. Heat Transfer* **C86**, No. 4, 469 (1964).
- H. CHARNOCK, Energy transfer by the atmosphere and the Southern Ocean, *Proc. Roy. Soc.* **A281**, No. 1384, 6 (1964).
- P. CHENG, Linearized theory of two-dimensional radiating gas flow by a moment method, *AFOSR 64-1002*, Dept. of Aeronautics and Astronautics, Stanford University, Calif. (1964).
- P. CHENG, Two-dimensional radiating gas flow by a moment method, *AIAA J.* **2**, No. 9, 1662 (1964).
- W. C. DAVY, R. A. CRAIG, G. T. CHAPMAN and D. L. COMPTON, Ablation-products radiation from cones, *AIAA J.* **2**, No. 9, 1583 (1964).
- S. M. DECORSO and J. W. COLTMAN, Measurement of the total emittance of rock salt samples, *J. Engng Power* **A86**, No. 4, 495 (1964).
- E. A. FARBER and P. VALANDANI, Theoretical method for determining the apparent radiation properties for materials in sinusoidal configuration, *J. Engng Power* **A86**, No. 4, 472 (1964).
- J. P. FUNK, Direct measurement of radiative heat exchange of the human body, *Nature, Lond.* **201**, No. 4922, 904 (1964).
- J. GILLE and R. GOODY, Convection in a radiating gas, *J. Fluid Mech.* **20**, Part 1, 47 (1964).
- R. GOULARD, Radiation transfer regimes in hypersonic flight, School of Aeronautical and Engineering Sciences, Purdue University, Lafayette, Ind. (1964).
- J. R. HOWELL and M. PERLMUTTER, Monte Carlo solution of radiant heat transfer in a nongrey nonisothermal gas with temperature dependent properties, *NASA-RP-317*, Lewis Research Center, NASA, Cleveland, Ohio (1964).
- JEAN I. F. KING, Greenhouse effect in a semi-infinite atmosphere, *Icarus* **2**, No. 5-6, 359 (1963).
- Z. KOPAL, Radiative transport of heat in lunar and planetary interiors, *Icarus* **3**, No. 1, 8 (1964).
- N. L. KRASCCELLA, Theoretical investigation of the absorption and scattering characteristics of small particles, C-910092-1, Research Labs., United Aircraft Corp., East Hartford, Conn. (1964).
- M. KUDRET SELCUK, Flat-plate solar collector performance at high temperature, *Solar Energy* **8**, No. 2, 57 (1964).
- C. D. LANZO and R. G. RAGSDALE, Heat transfer to a seeded flowing gas from an arc enclosed by a quartz tube, *Proceedings 1964 Heat Transfer Fluid Mechanics Institute*, University of California, Berkeley, 10-12 June (1964).
- T. S. LASZLO, R. E. GANNON and P. J. SHEEHAN, Emission measurements of solids above 2000 degC, *Solar Energy* **8**, No. 4, 105 (1964).
- R. H. LEVY and G. S. JANES, Plasma radiation shielding, *AIAA J.* **2**, No. 10, 1835 (1964).
- A. MCALISTER, H. C. WARD, A. F. HIDALGO and C. ORR

- Jr., Heat transfer to a gas containing a cloud of particles, NASA CR-58088; SSR-4, Georgia Institute of Technology, Atlanta (1964).
- S. J. MORIZUMI, Analytical determination of shape factors from a surface element to an axisymmetric surface, *AIAA J. 2*, No. 11, 2028 (1964).
- Y. R. MULLAMAA, Penetration of direct radiation into the sea (in Russian), *Izv. Akad. Nauk SSSR—Geofiz.*, No. 8, 1259 (1964).
- Y. R. MULLAMAA, Reflection of direct radiation from the surface of the sea (in Russian), *Izv. Akad. Nauk SSSR—Geofiz.*, No. 8, 1232 (1964).
- A. T. ONUFRIEV, An approximate treatment of the problem of a plate of finite length in the stream of a radiating gas, *A & ES TT-6*, School of Aeronautical and Engineering Sciences, Purdue University, Lafayette, Ind. (1964).
- L. V. PETROVA and E. M. FEIGELSON, The role of radiation in the development of a cloud (in Russian), *Izv. Akad. Nauk SSSR—Geofiz.*, No. 8, 1247 (1964).
- I. RUBIN and M. IMBER, Optimization study of space radiators, *AIAA J. 2*, No. 2, 353 (1964).
- M. THOMAS and S. S. PENNER, Thermal conduction and radiant energy transfer in stationary, heated air, *Int. J. Heat Mass Transfer 7*, No. 10, 1117 (1964).
- M. THOMAS and W. S. RIGDON, A simplified formulation for radiative transfer, *AIAA J. 2*, No. 11, 2052 (1964).
- C. L. TIEN and RALPH GREIF, On the transition from black-body to Rosseland formulations in optically thick flows, *Int. J. Heat Mass Transfer 7*, No. 10, 1145 (1964).
- O. VON ROOS, Interaction of very intense radiation fields with atomic systems, Tech. Rept. No. 32-599, Jet Propulsion Lab., California Institute of Technology, Pasadena (1964).
- A. P. WILLMORE, Ionospheric heating in the *F*-region, *Proc. Roy. Soc. A281*, No. 1384, 140 (1964).

ROTATING SURFACES

- R. L. DUTY and W. H. REID, On the stability of viscous flow between rotating cylinders. Part I. Asymptotic analysis, *J. Fluid Mech. 20*, Part 1, 81 (1964).
- G. GALLAGHER and A. LEMAY, Temperature measurements of the near wake generated by hypervelocity bodies, *CARDE-TR-502/64*, Canadian Armament Research and Development Establishment, Valcartier (1964).
- D. L. HARRIS and W. H. REID, On the stability of viscous flow between rotating cylinders. Part 2. Numerical analysis, *J. Fluid Mech. 20*, Part 1, 95 (1964).
- S. V. IORDANSKII, Hydrodynamics of a rotating base system below the condensation point, *Sov. Phys. Dokl. 8*, No. 11, 1079 (1964).
- W. S. KING and W. S. LEWELLEN, Boundary-layer similarity solutions for rotating flows with and without magnetic interaction, *Phys. Fluids 7*, No. 10, 1674 (1964).
- J. F. NASH, The effect of an initial boundary layer on the development of a turbulent free shear layer, *ARC-CP-682*, Aeronautical Research Council, Great Britain (1964).

- V. Y. NEYLAND, The effect of heat exchange and turbulent flow in the region of mixing on characteristics of breakdown zones, Joint publications Research Service Washington, D.C. (1964).
- N. RILEY, The heat transfer from a rotating disk, *Quart. J. Mech. Appl. Math. 17*, Part 3, 331 (1964).
- M. H. ROGERS and G. N. LANCE, The boundary layer along a disc of finite radius in a rotating fluid, *Quart. J. Mech. Appl. Math. 17*, Part 3, 319 (1964).
- E. M. SPARROW, W. D. MUNRO and V. K. JONSSON, Instability of the flow between rotating cylinders: The wide-gap problem, *J. Fluid Mech. 20*, Part 1, 35 (1964).
- A. C. SRIVISTAVA and S. K. SHARMA, Heat transfer due to the flow between two infinite plates (one rotating and the other at rest) under a transverse magnetic field, *J. Phys. Soc. Japan 19*, No. 8, 1390 (1964).
- W. J. YANG, Momentum, heat and mass transfer in logarithmic spiral flows of incompressible viscous fluids, *Int. J. Heat Mass Transfer 7*, No. 10, 1123 (1964).

THERMODYNAMIC AND TRANSPORT PROPERTIES

- S. BADZIOCH, D. R. GREGORY and M. A. FIELD, Investigation of the temperature variation of the thermal conductivity and thermal diffusivity of coal, *Fuel 43*, No. 4, 267 (1964).
- R. C. BHANDARI and M. L. SISODIA, Variation of viscosity with temperature in heavy water, *Indian J. Pure Appl. Phys. 2*, No. 8, 266 (1964).
- R. S. BROKAW, Approximate formulas for viscosity and thermal conductivity of gas mixtures, NASA TN-D-2502 (1964).
- D. J. CRONIN, The temperature variation of gamma for various gases: A student experiment, *Amer. J. Phys. 32*, No. 9, 700 (1964).
- W. O. DAVIES, Carbon dioxide dissociation at 3500° to 6000°K, *J. Chem. Phys. 41*, No. 6, 1846 (1964).
- M. E. FISHER, Deviations from van der Waals behavior on the critical isobar, *J. Chem. Phys. 41*, No. 6, 1877 (1964).
- D. A. GYOROG and E. F. OBERT, Virial coefficients for argon, methane, nitrogen, and xenon, *J. Amer. Inst. Chem. Engrs 10*, No. 5, 621 (1964).
- V. HOPKINS, D. R. WILSON and C. BOLZE, Isothermal bulk modulus of selected fluids to 700°F and 10 000 psig, *J. Basic Engng 86*, No. 3, 463 (1964).
- J. KESTIN and J. H. WHITELAW, The viscosity of dry and humid air, *Int. J. Heat Mass Transfer 7*, No. 11, 1245 (1964).
- W. J. KIM and F. S. MANNING, Turbulence energy and intensity spectra in a baffled, stirred vessel, *J. Amer. Inst. Chem. Engrs 10*, No. 5, 747 (1964).
- E. E. KLAUS and J. A. O'BRIEN, Precise measurement and prediction of bulk-modulus values for fluids and lubricants, *J. Basic Engng 86*, No. 3, 469 (1964).
- R. KUTHE, Thermodynamische Daten von hochoerhitzter Luft. Teil I. Eine Übersicht über die publizierten Tabellenwerke, *Z. Flugwiss. 12*, No. 10, 374 (1964).

- A. L. LEE, K. E. STARLING, J. P. SOLAN and R. T. ELLINGTON, Viscosity correlation for light hydrocarbon systems, *J. Amer. Inst. Chem. Engrs* **10**, No. 5, 694 (1964).
- C. H. LEWIS and C. A. NEEL, Thermodynamic properties for imperfect air and nitrogen to 15 000°K, *AIAA J.* **2**, No. 10, 1847 (1964).
- G. LIANIS, Application of irreversible thermodynamics in finite viscoelastic deformations, *A & ES-64-1; AD-438003*, School of Aeronautical and Engineering Sciences, Purdue University, Lafayette, Ind. (1964).
- J. M. LUTTINGER, Theory of thermal transport coefficients, *Phys. Rev.* **135**, No. 6A, 1505 (1964).
- G. J. MINKOFF, Communication. Binary equilibrium data from single-component isotherms. An approximate determination, *I/EC* **3**, No. 4, 409 (1964).
- C. A. NEEL and C. H. LEWIS, Interpolations of imperfect air thermodynamic data. I. At constant entropy, *AEDC-TDR-64-183*, Air Force Systems Command, United States Air Force, Arnold Air Force Station, Tenn. (1964).
- C. A. NEEL and C. H. LEWIS, Interpolations of imperfect nitrogen thermodynamic data. II. At constant pressure, *AEDC-TDR-64-213*, Air Force Systems Command, United States Air Force, Arnold Air Force Station, Tenn. (1964).
- M. POREH and J. E. CERMAK, Study of diffusion from a line source in a turbulent boundary layer, *Int. J. Heat Mass Transfer* **7**, No. 10, 1083 (1964).
- J. S. ROWLINSON, An equation of state of gases at high temperatures and densities, Theoretical Chemical Institute, Wisconsin University, Madison (1964).
- K. T. SHIH, W. E. IBELE, E. R. F. WINTER and E. R. G. ECKERT, Thermodynamic properties of carbon-nitrogen mixtures at high temperatures, *ARL* 64-149, Office of Aerospace Research, United States Air Force, Wright-Patterson AFB, Ohio (1964).
- A. E. SIMCHEN, Stationary temperatures and critical temperatures in exothermal reactions, *Israel J. Tech.* **2**, No. 2, 248 (1964).
- L. I. STIEL and G. THODOS, The thermal conductivity of nonpolar substances in the dense gaseous and liquid regions, *J. Amer. Inst. Chem. Engrs* **10**, No. 1, 26 (1964).
- F. TEPPER, A. MURCHISON, J. ZELENAK and F. ROEHLICH, Thermophysical and transport properties of liquid metals, *MSAR-64-36; AD-441064*, MSA Research Corp., Gallery, Pa. (1964).
- J. S. THOMSEN, Thermodynamic derivatives without tables, *Amer. J. Phys.* **32**, No. 9, 666 (1964).
- Y. S. TOULOUKIAN, Tables of thermophysical properties of materials, *ML-TDR-64-184; AD-605411*, Purdue University, Lafayette, Ind. (1964).

TRANSFER MECHANISMS

- H. BEER, Heat transfer in dissociating gases (in German), *Z. Ver. Dtsch. Ing.* **106**, No. 27, 1361 (1964).
- W. E. GIBSON and J. D. BUCKMASTER, Effects of species diffusion and heat conduction on nonequilibrium flows behind strong shocks, *AIAA J.* **2**, No. 10, 1681 (1964).
- F. H. HARLOW and J. E. FROMM, Dynamics and heat transfer in the von Kármán wake of a rectangular cylinder, *Phys. Fluids* **7**, No. 8, 1147 (1964).
- J. B. MILES, Heat diffusion from line source into mixing region of two parallel streams, *AIAA J.* **2**, No. 11, 2038 (1964).
- M. SAARLAS, Reference temperature method for computing displacement thickness, *AIAA J.* **2**, No. 11, 2056 (1964).
- S. G. TELETOV, Report to the plenary session of the Conference of Higher Educational Institutions on the similarity theory and its application in heat engineering, *RSIC-234; AD-604034*, Redstone Scientific Information Center, Army Missile Command, Huntsville, Ala. (1964).