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I. J. Kumar, *Recent Mathematical Methods in Heat Transfer*. Brief descriptions of several mathematical techniques which have been applied to heat transfer problems and an indication of where more detailed information can be found. 285 references to 1971.

A. Žukauskas, *Heat Transfer from Tubes in Crossflow*. Single tubes and tube banks, both heat transfer and flow resistance. 83 references to 1970.

S. Ostrach, *Natural Convection in Enclosures*. Internal flows caused by wall heating in rectangular and cylindrical cavities. 52 references to 1970.

R. D. Cess and S. N. Tiwari, *Infrared Radiation Energy Transfer in Gases*. Band absorption models and their use in calculating radiative transfer. 59 references to 1970.

Z. Zarič, *Wall Turbulence Studies*. Discussion of turbulence measurements in wall layers. Mostly hot-wire anemometer results—many produced by the author. 64 references to 1970.

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D. Japikse, *Advances in Thermosyphon Technology*. Analysis and experimental results on both open and closed thermosyphons. Discussion of several applications. 117 references to 1972.

C. A. Depew and T. J. Kramer, *Heat Transfer to Flowing Gas–Solid Mixtures*. Turbulent channel flows of dilute mixtures of solids and gases. Discussion of transport properties. 77 references to 1971.

H. Merte, Jr, *Condensation Heat Transfer*. Nucleation in bulk and on surfaces. Condensation rates. 148 references to 1971.

B. Gebhart, *Natural Convection Flows and Stability*. Flows over surfaces and in bouyant plumes. Effect of mass diffusion. Instability. 107 references to 1972.

C. L. Tien and G. R. Cunnington, *Cryogenic Insulation Heat Transfer*. Discussion of types of insulation. Analysis and experimental results. Test methods and applications. 108 references to 1972.

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Heat Bibliography. Published 1972 by the Department of Trade and Industry, 475 pages, £5·35.

Nearly 8000 references to the world's literature on Heat and Mass Transfer and similar subjects are contained in the 1972 *Heat Bibliography*. The Fluids Group of the National Engineering Laboratory compiled the bibliography which is available from Her Majesty's Stationary Office, 49 High Holborn, London W.C.1. or branches throughout the United Kingdom.

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Heat and Mass Transfer in Boundary Layers, Vols. I and II. Edited by N. Afgan, Z. Zaric and P. Anastasijevic. Pergamon Press, September 1973.

These two volumes (of 1012 pages in all) contain the proceedings of the International Summer School on Heat and Mass Transfer in Turbulent Boundary Layers, held at Herceg Novi in September 1968, and some invited lectures and abstracts of other papers of the International Seminar on Heat and Mass Transfer in Flows with Separated Regions and Measurement Techniques, held in the same place one year later.

The latter meeting was the first of the yearly seminars sponsored by the International Centre for Heat and Mass Transfer. In view of the fact that one of the special objectives of the Centre is to promote and assist the exchange of technical information in the field, it is perhaps unfortunate that it was only possible to publish abstracts of 65 of the contributions to the seminar.

As it is, these volumes contain 60 papers from the Summer School and eight from the Seminar, in addition to the 65 abstracts. To list them all, and to comment usefully on each, would strain both the hospitality of this Journal and the ability of this reviewer, who will therefore limit himself to indicating the scope and nature of the meetings by making specific mention of just a few of the papers, chosen (almost!) at random.

V. V. Struminskii considered some aspects of non-linear stability theory related to transition and laminarization. S. S. Kutateladze discussed the turbulent boundary layer in the case of vanishing viscosity; A. Fartier's paper is on a similar topic. J. Mathieu reported on the influence of an external turbulent flow on velocity and temperature distributions in the boundary layer. Transpiration cooling was discussed by J. P. Hartnett and V. M. K. Sastri, by M. R. Head and F. A. Dvorak, and by others. D. B. Spalding described (in his inimitable style) his numerical method for predicting the properties of two-dimensional boundary layers; several other papers came from the Imperial College group. Z. Zaric reviewed some methods of measuring these properties, especially in the close vicinity of the wall. M. A. Styrikovich considered heat and mass transfer in a boiling boundary layer, while W. M. Rohsenow and E. Fedorovich looked at the post-burnout region where the wall is dry and mist flow exists.

Nearly half the papers (25) at the Summer School originated in the USSR and provide a convenient statement of the approaches then used in that country to methods for analyzing turbulent boundary layers (including the effects of transpiration, mass transfer and two-phase flows) as well as giving some limited experimental data in such situations. The UK (with 10 papers), Yugoslavia (9) and France (8) are well represented. The remaining papers came from the USA (4), Sweden (2), Germany (1) and India (1). Thus the "international" nature of the meeting is a little uneven, and does not reflect the quantity or quality of the work being done throughout the heat transfer community. Nevertheless, there is, of course, a wealth of material here covering (in addition to the topics already mentioned) combined forced and free convection boiling heat transfer, duct flow, flow over tubes, flames, heat transfer near the critical state, measurement techniques and other subjects.

The proceedings of the seminar on Heat and Mass Transfer in Flows with Separated Regions and Measurement Techniques (on the title page, the last three words are omitted) opens with a paper by H. H. Korst which analyzes the dynamic and thermodynamic mechanisms involved in in the Chapman-Korst model of separated flows, which is based upon a study of individual components of the flow, such as the attached boundary layer before separation, its modification during separation, the developing and fully developed free shear layer, reattachment, flow recirculation, etc. C. W. Hirt develops a set of generalized turbulence transport equations which requires a judicious combination of ingenuity, intuition and inspiration for closure. Experiments on heat transfer from single tubes and tube banks in cross flow are described by A. Zhukauskas. Various geometries, and parameter ranges of $0{\cdot}7 < Pr < 500$ and $1 < Re < 2 \times 10^6$ were studied. The remaining papers report on experimental techniques: E. A. Brun describes a number of methods for measuring concentration and hence mass transfer rates in a boundary layer; M. Barat examines the influence of turbulence on pressure measurement; T. J. Hanratty discusses electrochemical techniques used to measure local mass transfer rates and local wall velocity gradients; R. J. Goldstein describes the laser-Doppler method of velocity measurement; and A. M. Trohan reviews several optical methods for the study of turbulence.

The other contributions to the seminar are described (often very cryptically) only by their abstracts. About a third of them are concerned with experimental techniques. The remainder treat such diverse topics as cavities of one sort or another, impinging jets and wall jets, roughness elements, cylinders and other bodies in cross flow, steps, channels and discs.

The books are very poorly produced: Trohan's paper ends in mid-sentence, several pages are so faint as to be almost unreadable, and there is a very large number of irritating mis-prints. (Spelling mistakes are detectable—but how many misprints have also occurred in the equations and numerical constants, which are not so readily identified?) The delay in publication is greatly to be deplored: much of the work is now out of date. Future volumes in this series have considerable scope for improvement. Nevertheless, these books should obviously find their way into research libraries.

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E. F. ADIUTORI, **The New Heat Transfer.** Ventuno Press, Cincinnati (1974); (Unpriced).

THE AUTHOR'S claims are not modest. He believes he is initiating not only a new heat transfer, but also a new engineering. According to him, in 120 years time, the laws of Hooke, Newton, Ohm, Fourier, Stefan-Boltzmann, will have vanished, coefficients of heat-transfer, thermal conductivity, electrical resistance, elastic moduli, drag and lift, will all have disappeared, and there will be no more dimensional analysis. "In their place will be simple non-linear concepts—providing the foundation for a simple logical science of engineering which will transform presently impossible problems into simple exercises!" Of course these predictions as such do not constitute claims. Adiutori's claims consist in saying that such major revolutions are all made possible by his new proposals and will inevitably grow from them. Now it would be a very rash man who would insist that the conceptual structure of engineering science will not change in 120 years and it is possible that some of the changes may be in the direction predicted. But I do not think it is at all rash to say that if this does indeed occur, it will not be on the "foundation" provided by Adiutori.

For, let us consider what this proposed new method actually is. Given that we observe a thermal flux rate $\dot{Q}$ and a temperature difference ΔT we can assume a general functional relation of the form

$$\dot{Q} = \dot{Q}(\Delta T, x_1, x_2 \ldots x_i) \tag{1}$$

where the x's are any other variables which may be relevant. We can also consider a relation

$$h = \frac{\dot{Q}}{\Delta T} = h(\Delta T, x_1, x_2 \ldots x_i). \tag{2}$$

Similar alternative relations are possible when the variable ΔT is replaced by grad T.

Now the whole of Adiutori's case is based on his statement that we should not consider relations of the type (2) but only relations of type (1). He gives no rationale for this statement, but simply endless repetitions of it in a variety of forms, e.g.: "In the new heat transfer we deal with heat flow and thermal driving force separately and do not permit these two primary and dynamic variables to be confounded in a ratio." "The primary variables are confounded in the old heat transfer and separated in the new." "In the old heat transfer the invention of the h.t.c. promotes the use of confounded variables because the coefficient is itself the result of confounding the primary variables heat flow and thermal driving force." "In the new heat transfer experimental results will be correlated with separated variables and permit equipment to be designed and analysed with separate variables." And so on.

The best that can be said for Adiutori is that he has thought about the meaning of engineering concepts, and particularly heat transfer concepts, somewhat more than many workers who publish results in this field—but that is not saying very much since few think about them at all. Anyone who wants to introduce fundamental innovations in the conceptual pattern of science or engineering—and some innovations may indeed be desirable—has to think much more deeply about the philosophy and methodology of the subject than the author has done. Given his initial idea, and enthusiasm, he should have armed himself with a thorough study of the epistemology of engineering before tackling such an important task. Instead he has approached the matter with a complete naivete, and nothing in his text shows awareness of even the most elementary methodological principles.

Thus, for example, heat flow rate itself is, to use his terminology, a "confounded" variable, the ratio of a measured energy quantity Q to a time t. If equation (2) is to be proscribed, why should we not also eschew equation (1) and insist on using the form

$$Q = Q(t, \Delta T, x_1, x_2 \ldots .) \tag{3}$$

A list of such naivetes in his views would be merely boring, but there are indeed many. In fact no scientific property, concept, or measurable quantity, has this direct "separated" characteristic which he assumes for some and denies to others. The raw data of pressure measurement for example are levels of liquids in tubes or displacements of diaphragms or rotations of Bourdon tubes, etc. The result which we state as pressure is already a "confounded" variable. So of course are velocity, acceleration, mass flow rate, and indeed everything with which we do our useful thinking.