

## BOOK REVIEWS

W. M. ROHSENOW, J. P. HARTNETT and E. N. GANIC (Editors), **Handbook of Heat Transfer Fundamentals and Handbook of Heat Transfer Applications**. McGraw-Hill, New York, 1985.

WHEN an editor responsible for procuring book reviews writes one himself, the reason may be either that the book is so bad that he could find no-one else to spend time on it, or so good that he wanted to keep it on his own shelves.

In the present case, the second reason is operative; the two connected volumes under review are, though expensive (U.S. \$95 and \$79.50), of such value that no serious practitioner of the subject should be without them. Contributors to the volumes include many world authorities; each of whom has rightly concluded that only his best efforts would be good enough for the occasion. The editors, who have also contributed special-topic articles of their own, are to be heartily congratulated.

At this point I might terminate my review, leaving myself open to the suspicion of not having studied the books thoroughly; or I might make some detailed criticisms, and so run the risk of being thought insincere in my earlier praise. I shall do neither, rather using the occasion for expressing some thoughts to which perusal of the volumes gives rise.

Chapter 4 on Conduction by P. J. Schneider is 187 pages long; yet Chap. 5 on Numerical Methods in Heat Transfer by K. E. Torrance consists of only 85 pages. Both do their jobs well; but the former devotes much space to displaying particular results, whereas the latter concentrates on methods of *getting* results, and for convective situations as well as conductive ones.

The differences in size, content and style between the two chapters are worth commenting upon by an editor of the *International Journal of Heat and Mass Transfer*, because they illustrate the direction in which heat transfer is moving, and they bear on a class of decisions which editors must frequently make.

Heat-conduction theory is rightly portrayed by Schneider as being concerned with constant properties, simple geometries, linear equations, simple boundary conditions and classical mathematics. Because practical men cannot make direct use of the latter, solutions of the equations have to be prepared in advance, represented by graphs and formulae, and supplied in handbooks. This is the traditional practice; yet it can *never* be fully satisfactory, because there will always be geometries and boundary conditions for which no solution has yet been published; and, besides, practising engineers have to deal with non-constant properties and so with non-linear problems.

Fortunately, the digital computer has provided an alternative source of quantitative predictions for heat-conduction processes; and it is one which is both less limited (being able to handle non-linearities, and awkward geometries) and more compact (which is a reason for the shortness of Torrance's chapter compared with Schneider's). The computer, and its increasing use by researchers, educators and practising engineers, is changing the way in which knowledge is communicated; and editors of journals need to respond to the change.

The change entails that there is little point nowadays in publishing further papers on heat conduction (or laminar boundary layers for that matter). It is far more cost-effective to promote the development of the numerical approach to heat transfer, the results of which are embodied not in handbooks of ever-increasing bulk but in computer codes of ever-

increasing predictive power; for the latter can provide the precise information that the designer needs *when he needs it*. It is as though the day of the ready-to-wear clothing store were declining because techniques for instant tailoring had been perfected.

The *Handbook of Heat Transfer* under review is the second edition; and it makes little mention of computer codes. The *third* edition, I predict, will give much more emphasis to them; for they are what the engineer of the future will be using.

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R. I. SOLOUKHIN and N. H. AFGAN (Editors), **Measurement Techniques in Heat and Mass Transfer**. Hemisphere, Washington, DC (distributed outside North America by Springer-Verlag, Berlin), 1985, 569 pp.

THIS book is made up of papers presented at the Fifteenth International Centre for Heat and Mass Transfer Symposium devoted to heat and mass transfer measurements. The last two decades bear witness to two important trends in measurement techniques: the increasing use of non-invasive techniques and the acquisition of data in digital form for computers. Both have necessitated adjustments to measurement and signal processing philosophies. Of the 42 papers presented here 17 are devoted to optical methods. One of these latter is the Plenary Lecture of Gouesbet (Rouen) on optical sizing with simultaneous measurements of velocities and sizes of particles. There is a paper on time-resolved concentration measurements of gaseous species using Rayleigh scattering, but nothing on Coherent Anti-Raman Scattering (CARS) or Laser Induced Fluorescence (LIFS) techniques.

At present, there is increasing interest in internal transport processes in rooms of buildings and real time holographic interferometry to elucidate these is reported. Such basic studies suggest a unified approach to air conditioning, fire prevention and fire containment. Flow visualisation covers the use of aluminium particles and, more locally, tellurium dye techniques involving pointed tellurium cathodes. Utton and Sheppard (Leicester) report a new technique to determine single-phase convective transfer rates from measurements of light intensity reflected from a surface.

Goldstein (Minnesota) reviews the different ways in which mass transfer can simulate heat transfer. Two-phase flows, often in a nuclear context, are featured and Souhar and Cognet (Nancy) describe an electrochemical method to evaluate wall friction in such flows. A paper by Sackett (Argonne) deals with special problems of measurement in liquid-metal-cooled fast breeder reactors. Techniques include fast response thermocouples, acoustic monitors, ultrasonic signal transmission and eddy-current flowmeters. In another specialised area Vasilieva (Moscow) describes heat transfer studies in MHD generators. These cover spectroscopic techniques for gas temperature and alkali concentration, radiometers for radiant flux, laser interferometry for electron concentration and electrostatic probes for ion concentration.

A final section on Power Engineering Measurement is introduced with a survey of research and operational

measurements on power station boilers by Chojnowski (Marchwood). This gives special attention to the more novel instruments such as heat flux meters, sonic pyrometers and sonic anemometers.

The titles of the papers represent an attractive and varied menu from which the reader can select nourishment for his

or her greater understanding in almost any area that may excite interest.

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