Int. J. Heat Mass Transfer. Vol. 12, pp. 245–246. Pergamon Press 1969. Printed in Great Britain

BOOK REVIEWS

Thermophysical Properties—Research Literature Retrieval Guide, Y. S. TOULOUKIAN, Editor. Book I, 819 pp; Book II, 625 pp; Book III, 1315 pp. Plenum Press, New York, 1967.

THIS second edition of the Guide culminates the classification of references to information on thermophysical properties as compiled from sixteen abstracting journals through the year 1964, by the Thermophysical Properties Research Center at Purdue University. The "properties" concerned are: (1) thermal conductivity (including accommodation coefficient and thermal contact resistance); (2) specific heat; (3) viscosity (Newtonian and non-Newtonian); (4) thermal radiative properties (a heterogeneous grouping containing total and spectral radiative reflectance and emittance, and optical constants); (5) diffusion coefficient; (6) thermal diffusivity; and (7) Prandtl number. This search has produced 139305 reference entries for such properties for 45116 kinds of substance.

Book I lists general works on these physical properties and follows this with a listing of substances in six series: (1) chemical elements and compounds not containing carbon and hydrogen simultaneously; (2) compounds containing carbon and hydrogen simultaneously; (3) ferrous alloys; (4) non-ferrous alloys; (5) combinations of chemical compounds and/or elements; and (6) natural and processed products. For each there is indicated the kind of property available and a classification number.

Book II contains seven separate sections, one for each of the properties involved. The classification number obtained from Book I (if it was there indicated that information for a particular property is included), specifies for the property concerned the serial number of each available reference, and there is an indication also of the physical state considered, the nature of the work, i.e. theoretical, experimental, survey, etc. (though the classifications here involve some expected overlap and are not as definitive as might be hoped for); the language of the reference and the temperature range involved. This coded but readily identifiable information is intended as a guide for the selection of references and on this basis the reference serial numbers may be selected.

Book III serializes all of the references and the selected serial numbers give the usual kind of bibliographical reference, the title of the work being included, and a Thermophysical Properties Research Center number is indicated. The brief steps involving Books I, II, and III have thus provided a bibliography on the property and substance concerned, specialized according to the state, temperature range, subject, and language as established in selecting the serial numbers from Book II. The bibliography must now be used with such library facilities as are available to search for the property information that is desired.

The ease with which this procedure will yield specific property information, given convenient access to the cited references, depends on the nature of the property and the substance and the amount of literature that has appeared. If, for example, one decides to examine the situation with respect to the thermal conductivity of air in the normal temperature range, Book II indicates about 275 references for this thermal conductivity, most of which deal with the normal temperature range. Among them is National Bureau of Standards Circular 564 "Tables of thermal properties of gases", the reference that would most likely at first occur to the seeker of specific thermal conductivity information for air. But this reference is only one of the many that is indicated by Book II, though of course the searcher might be expected also to examine the Handbooks and Tables as listed in Book I, without regard to the particular substance involved.

The task of assembling the information in this Guide, with its convenient system for the specification of the references on a given property, was obviously too great to permit the additional task of selectivity and recommendation of references. Could this have been done, an indication of optimum references would have been a valuable addition to the information in Book II, particularly when the number of references given there for a particular property and substance exceeded ten or so in number.

The format of the work is quite acceptable. The lists of Book I are type set, while those of Books II and III are partially computer print out. The size of the books, particularly Book III, may be incompatible with the strength of the binding and this book may not endure the use that it deserves.

Future guides, for literature since 1964, are forthcoming and it is indicated in the introduction to Book I that information is now secured from the publications themselves rather than on review of Abstraction Journals. Increased selectivity may emerge from the process.

R. A. SEBAN

Boundary-Value Problems of Heat Conduction. M. N. OZISIK, International Textbook Comapny Inc., Price £6, pp. xiv + 505, (1968).

THE FIRST reaction to a book with this title is to dismiss it as just another among the many already available. To do so, however, would be unfortunate and unjust for this new volume is most valuable and opportune. It deals systematically and comprehensively with modern mathematical methods of solving problems in heat conduction and diffusion.

The early chapters present a unified treatment of the solution of linear boundary value problems of heat conduction based on integral transforms. The transforms are of

the Fourier and Hankel type which are applied to remove the space variables from the partial differential equation. No mention is made of the more familiar Laplace transform which removes the time variable. As well as presenting the basic theory and describing in detail the solution of problems in the different co-ordinate systems, the book contains tables of the transforms, the inversions and the kernels which reduces the process of solution to a relatively simple and straightforward drill. The classical method of separating variables is also mentioned. There is a chapter on Duhamel's method and Green's functions and another relates to composite regions.

Approximate analytical methods for dealing with non-linearitics arising, for example, from the boundary conditions or variable thermal properties include the integral method and Galkerkin's method. Another chapter discusses some useful transformations of variable, some involving ideas from group theory.

Chapter 9, of a quite different character, is an introduction to numerical techniques including those based on finite differences and Monte Carlo methods. The final chapter collects together useful information about heat conduction in anistropic solids.

There are exercises at the ends of the chapters and some references to useful books and papers. Altogether, this is a satisfying volume which will undoubtedly be welcomed by the growing number of scientists and technologists whose work in leads them into problems in heat flow.

J. CRANK

Brunel University
Uxbridge
Middlesex