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REVIEWS

Introduction to Thermal Sciences, 2nd Edn. By F. W. SCHMIDT, R. E. HENDERSON and C. H. WOLGEMUTH. John Wiley, 1993. 476 pp. £16.95.
Heat Transfer. By A. BEJAN. John Wiley, 1993. 674 pp. £17.95.

These two books have the same purpose of providing a first course in heat transfer with emphasis on its close relationship to thermodynamics and fluid dynamics, and present similar material though to the different extent represented by the different number of pages. They have been written by professors at well-known eastern United States universities – the Pennsylvania State and Duke universities respectively – where education is a serious matter and heat transfer remains an important subject. *Introduction to Thermal Sciences* is a second edition with the first edition having appeared in 1984, and *Heat Transfer* was published in 1993 for the first time and by an author who has written several related textbooks in the last decade. The preface to the second edition makes no mention of the changes which have been made and indeed they appear to be important only in so far as the material of the chapter on special flows and differential form of conservation laws has been largely relocated in other chapters.

The two books contain the same basic material, as one would expect, and with little difference from the now elderly texts by Eckert & Drake, Rohsenow & Choi, Grober, Erk & Grigull which appeared around 1960. The emphasis is different in that *Thermal Sciences* provides separate chapters to deal with thermodynamic concepts, properties of pure substances, the laws of thermodynamics and control-volume analysis, whereas *Heat Transfer* assumes more and deals with thermodynamics within other chapters. The conduction chapter of *Thermal Sciences* is expanded to three chapters in *Heat Transfer* to consider one-dimensional, multi-dimensional and time-dependent problems separately. External and internal flows with convection, and radiation are assigned separate chapters in both books. Natural convection and heat exchangers are more comprehensively dealt with in the separate chapters of *Heat Transfer*. The smaller of the two books is arranged to provide an introduction to students within a one-semester course and the larger offers material which could fulfil this requirement and the additional use by more advanced students including aspects of graduate-student curricula and research. Both books offer problems for students to attempt and worked examples to provide the necessary assistance and in this respect they are a considerable improvement on the early books dealing with similar material. *Heat Transfer* also offers some interesting projects. *Thermal Sciences* provides problems and solutions in a mixture of Imperial and SI units whereas *Heat Transfer* confines itself to SI.

I liked both books, with *Thermal Sciences* the more restrictive, as it was intended to be. They both provide students with well-presented material and worked examples which are truly helpful and the authors have clearly had their students in mind when formulating the sequence of chapters and presentation within them. It remains an unsolved problem for books of this type to deal with the transition from correlation formula to the numerical methods for the solution of problems of convection which is reflected in many research publications over the past twenty years. In this respect they cannot really be said to present modern material and yet the teaching of the numerical methods remains a problem in that additional effort is required to deal with the numerical aspects so that less time may be available for the fundamentals. The experienced teachers have chosen to avoid the problem, except in relation to heat transfer by conduction, as in previous texts.

J. H. WHITELAW

Matched Field Processing for Underwater Acoustics. By ALEXANDRA TOLSTOY. World Scientific, 1993. 212 pp.

This book provides a useful and informative introduction to a relatively new concept in the field of signal processing, namely the Matched Field. The idea grew up mainly in the area of underwater acoustics in efforts to make a best estimate of the range and position of a source on the basis of the signals received at an array of hydrophones. All the available information on the environment including the surface, bottom and ocean sound speed profiles is used to calculate the acoustic field arriving at the array in a large number of cases of source range and position. The case for which the computed field makes the best match with the experimentally observed field gives the 'true' source range and position. The calculations can be performed in a number of ways and can involve a variety of techniques from traditional signal processing.

The book is clearly written, with many figures that help to illustrate the methods. A straightforward introduction explains the basic concept and sketches the history of Matched Field Processing. The various computational methods are next described briefly in chapter 2 with comments on their respective merits, while chapter 3 discusses some of the pitfalls that can be encountered in the course of practical implementation. A survey of applications of Matched Field Processing is given in chapter 4, and chapter 5 considers additional issues such as broadband fields and moving or multiple sources.

As the author points out, this is the first book to give an overall account of the Matched Field method. It is a good straightforward introduction to the subject and contains a large number of references for further reading. Although Matched Field methods are being rapidly extended and improved, this book will be welcomed by all who wish to work in this new field.

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