

REVIEWS

SHORTER NOTICES

Numerical Simulation of Oscillatory Convection in Low-Pr fluids. Edited by B. ROUX. Vieweg, 1990. 365 pp. DM 98 or £47.50.

This volume contains 28 contributions to a GAMM Workshop on two-dimensional oscillatory convection in differentially heated cavities with low- Pr fluids, which was held in 1988 in Marseille, France. It presents accurate benchmark solutions of ‘mandatory’ cases, and deals with various related problems, such as thresholds for the onset of oscillations, thermocapillary effects in open cavities, and three-dimensional simulations. Period doubling, quasi-periodic behaviour, reverse transition, and hysteresis loops were found at high Grashof numbers. The book also contains contributions from stability theory and experiments, which allow an assessment to be made of the domains of validity of the two-dimensional (and three-dimensional) simulations. In the concluding chapter the editor assesses the numerical methods used to analyse oscillatory convection in metallic melts and compares the results with the available observations.

Technical Guide to Thermal Processes. By J. GOSSE. Cambridge University Press, 1986. 227 pp. £7.95 (paperback) or £22.50 (hardback).

This little book was first published in French in 1981. To an English speaker the words ‘technical guide’ seem not to fit the contents of this translation; ‘hand-book’ would be more appropriate. The book gives in summary form the formulae and numerical data relevant to thermodynamics and changes of state, the physical properties of fluids, thermal conduction, heat and mass transfer by convection, and radiative transfer. It is a book for reference, not for study. The selection of material for inclusion shows a proper concern for both fundamentals and particularities useful in practice.

Modern Techniques in Computational Chemistry: MOTECC-89. Edited by E. CLEMENT. ESCOM, 1989. 623 pp.

This strangely titled book is about the techniques of large-scale computing and the various fields of physical science in which they are being used. It is a collective work, made up of 15 chapters on different fields by different authors, most of them associated with IBM. Fluid mechanics is prominent among the fields in which interesting and useful results have been found with the help of supercomputers, and there are two chapters in this area, one on ‘microhydrodynamics’ (which the authors define as ‘the branch of hydrodynamics studied by the molecular dynamics or cellular automata techniques’) and a longer one on the solution of flow problems by finite-element methods in which the level varies from a derivation of the Navier–Stokes equations to a consideration of the direct numerical simulation of turbulent flow. Other chapters are mostly concerned with some aspect of molecular dynamics. The writing is enthusiastic rather than systematic, but conveys successfully some striking examples of the results now obtainable by these massive computations.

Instrumentation for Process Flow Engineering. By N. P. CHEREMISINOFF and P. N. CHEREMISINOFF. Technomic, 1987. 234 pp. S. Fr. 90.

The authors say in their foreword that this book is intended to provide, in ready reference form, a description of instruments available for measurement and control of fluid flow in the processing industries. To a non-technical eye it looks workman-like.

Advances in Windfarming. Edited by G. G. PIEPERS. Elsevier, 1988. 469 pp. \$142.

This volume of 469 pages consists of 40 papers on various aspects of the technology, economics and fluid mechanics associated with wind turbines and their grouping into 'wind farms'. There must be more than 20 wind farms around the world now, showing the importance of this subject. The fluid-mechanical problems range from classical unsteady aerodynamics, to many aspects of turbulence flows (such as wakes and wake-boundary layer interactions). This book, which is a useful introduction to the subject, is in fact a special issue of the *Journal of Wind Engineering and Industrial Aerodynamics*, vol. 27. It is worth buying if your library does not take that journal.

The Breadth and Depth of Continuum Mechanics. Edited by C. M. DAFERMOS, D. D. JOSEPH and F. M. LESLIE. Springer, 1986. 778 pp. DM 120.

The 35 papers on miscellaneous topics in this grandly titled volume were written by friends and associates of J. L. Ericksen at the invitation of the editors and dedicated to him on the occasion of his 60th birthday on 20 December 1984. All the papers were first published in the *Archive for Rational Mechanics and Analysis* during the period 1983-85. This volume brings them together, although the advantage to a reader in doing so is not evident.

Computer-Aided Engineering: Heat Transfer and Fluid Flow. Edited by A. D. GROSMAN, B. E. LAUNDER and G. J. REECE. Ellis Horwood, 1985. 179 pp. £20.35 (hardback) or £10.95 (paperback).

With the aid of a grant from a UK government agency the authors developed a computer-based course in fluid mechanics and heat transfer for final-year undergraduates, the purpose of which was to help students grasp the physical meaning of the equations being solved. The course was centred on a master program, TEACH-C, for solving a time-dependent Poisson equation in general form which could be adapted to suit particular heat transfer and fluid flow problems. After some initial in-house testing, the authors sent copies of some of their 'case studies' to other teaching institutions in UK and USA, and refined the problem further with the help of comments received. This book describes the computer program, and four fully tested particular types of problem (e.g. unsteady one-dimensional conduction processes). Most university departments of engineering and applied mathematics probably now have some computer-based courses. If they do not, they should consider doing so with the assistance of this little book.

The following books are new editions of previously published works:

Fluid Mechanics, 2nd edition. By F. M. WHITE. McGraw-Hill, 1986. 732 pp. £9.50.

The date of the first edition of this elementary text for engineering students in USA is not disclosed. This second edition contains revisions to every one of the 11 chapters, but there is no change in style or approach. Many of the numerous problem exercises have been replaced.

Fluid Mechanics for Engineering Technology, 3rd edition. By I. GRANET. Prentice-Hall, 1989. 402 pp. £43.85.

A very down-to-earth American text which was first published in 1971.

Mechanics of Fluids, 6th edition. By B. S. MASSEY. Van Nostrand Reinhold, 1989. 599 pp. £13.95.

Another heavy-weight text for engineering students, in this case British. It is less elementary than White, and would probably suit final-year undergraduates. The previous five editions have appeared at intervals since 1968, and in this new edition 'the entire text has been thoroughly revised'.

Strömungslehre, 2nd edition. By H. SCHADE and E. KUNZ. de Gruyter, 1989. 546 pp. DM 78.

The first edition of this text for German-speaking students was published in 1980. This second edition differs only slightly. It is intended for engineering students but does not avoid the use of mathematics and is closer to fundamentals than White or Massey.

Physical Fluid Dynamics, 2nd edition. By D. J. TRITTON. Oxford, 1988. 519 pp.

This popular book, first published in 1977, arose out of the author's lectures to final-year physics students (in UK). The author asserts that it differs from books written for applied mathematicians or for engineers in giving a greater role to experimental findings and physical explanation. There is also a wider range of topics, necessarily treated in less depth than in most texts, many of which have geophysical relevance. The revisions in this second edition mainly concern the sections on hydrodynamic stability and turbulence, and there is a brave new chapter on dynamical chaos.

Unsteady Transonic Flow. By M. T. LANDAHL. Cambridge, 1989. 134 pp. £10.95 or \$17.95.

This little book on the forces acting on oscillating wings in transonic flow was published by Pergamon in 1961, and Cambridge have now brought out a paperback reprint with a new preface.