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REVIEWS

Shorter Notices

Annual Review of Fluid Mechanics, Vol. 17. Edited by M. van Dyke, J. V. Wehausen and J. L. Lumley. Annual Reviews Inc., Palo Alto, 1985. 630 pp. £28.00.

The articles in this year's Annual Review cover the usual wide range of fascinating topics, and are as follows:

'Jakob Ackeret and the history of the Mach number', N. Rott; 'Multicomponent convection', J. S. Turner; 'Rheometry of polymer melts', Joachim Meissner; 'Coating flows', Kenneth J. Ruschak; 'Sedimentation of noncolloidal particles at low Reynolds numbers', Robert H. Davis and Andreas Acrivos; 'Mathematical models of dispersion in rivers and estuaries', P. C. Chatwin and C. M. Allen; 'Aerodynamics of sports balls', Rabindra D. Mehta; 'Buoyancy-driven flows in crystal-growth melts', W. E. Langlois; 'Sound transmission in the ocean', Robert C. Spindel; 'Fluid modelling of pollutant transport and diffusion in stably stratified flows over complex terrain', William H. Snyder; 'Mathematical modelling for planar, steady, subsonic combustion waves', D. R. Kassoy; 'Fluid mechanics of compound multiphase drops and bubbles', Robert E. Johnson and S. S. Sadhal; 'The response of turbulent boundary layers to sudden perturbations', A. J. Smits and D. H. Wood; 'Modelling equatorial ocean circulation', Julian P. McCreary; 'The Kutta condition in unsteady flow', David G. Crighton; 'Turbulent diffusion from sources in complex flows', J. C. R. Hunt; 'Grid generation for fluid mechanics computations', Peter R. Eiseman; 'Computing three-dimensional incompressible flows with vortex elements', A. Leonard; 'Mantle convection and viscoelasticity', W. R. Peltier.

Navier–Stokes Equations: Theory and Numerical Analysis, 3rd (revised) edn. By R. Temam. Elsevier, 1984. 526 pp. Dfl. 220.00 (hb), Dfl. 100.00 (pb).

The first edition was reviewed fully in this Journal by J. Bona (*J. Fluid Mech.* **96** (1980), pp. 827–829), and the changes in the new edition are minor. An appendix relating the operator curl to the decomposition of certain function spaces (and accidentally containing the charming symbol Kerl (curl)), some new references, two pages of comments on recent work and a short subject index have been added. Apart from these and the titles of two sections, the list of contents (including page numbers of subsections) is unchanged. Some corrections and additional remarks have been squeezed into the text by ingenious use of the available space. In particular, the vexed question of solenoidal vector fields in the space $H_0^1(\Omega)$ for certain unbounded domains Ω, elucidated by J. G. Heywood in 1976 and mentioned in Bona's review, is now treated correctly. Some smaller errors remain (in addition to the printer's frequent use of the wrong fount, and ambiguities of the printed symbols that are unravelled fairly easily).

Bona's review gave the impression that parts of the book are difficult for readers without a Parisian training in functional analysis, that there are signs of hasty writing, and that little interest is shown in the more concrete parts of fluid mechanics. This remains true, but so does Bona's praise: the author shows complete mastery of

his wide-ranging and important material (important for certainty about what the Navier–Stokes equations imply), and there is still much in this book that cannot be found in any other.

Lehrbuch der angewandten Fluidmechanik. By E. TRUCKENBRODT. Springer, 1983. 236 pp. DM 74.00 (pb).

This 'textbook of applied fluid mechanics' is written in German for students of mechanical engineering, and is essentially a concise edition of the more immediately useful material from the author's earlier *Fluid Mechanics* (Springer, 1980). There are six chapters: 1. Introduction to fluid mechanics (physical properties, dimensional analysis, definitions of laminar/turbulent and supersonic/subsonic flow); 2. Basic laws of fluid mechanics (hydrostatics, kinematics, mass conservation and momentum equations); 3. Elementary flow behaviour of incompressible fluids (including many examples of external and internal flows, and a theoretical exposition based on 'stream-filaments'); 4. Elementary flow behaviour of compressible fluids (thermodynamics and gas dynamics); 5. Potential and potential-vortex flows (the laws of vorticity and then many examples of irrotational flows without and with line or sheet vortices); 5. Boundary-layer flows (fundamentals of boundary-layer theory and its application to flows past rigid boundaries). The large number of practical flows discussed, laminar and turbulent, mean that the reader should gain a sound physical feel for the subject.

Biomécanique Circulatoire. By R. COMOLET. Masson, 1984. 231 pp. 192 FFr (pb).

This book on the mechanics of the circulation of blood, probably the first to be written in French, is intended to bridge the gap between physicians and physiologists on the one hand, and fluid dynamicists on the other. The author is an engineering fluid dynamicist who has turned his attention in recent years to the cardiovascular system, and the book will probably be more attractive to engineers than to doctors, because the mathematical content is likely to be too advanced even for those trained in a French medical school. The book is in two parts. The first (Blood flow in the heart and vessels – models) occupies 154 pages and eight chapters, giving a description of the geometry and rheological properties of blood vessels and blood, a summary of the mechanical function of the heart, outlines of early models of blood flow in arteries (introducing pulse-wave propagation in infinite elastic tubes), a discussion of steady flow in collapsible tubes as a model of venous blood flow, and an essay on dynamical similarity and scaling for arterial flow. Part II (Plane wave propagation in tubes – unidirectional theory) contains 62 pages in three principal chapters, on the propagation of undamped waves, propagation and impedance (including a discussion of wave reflections at bifurcations) and the propagation of damped waves, respectively. Apart from the chapter on collapsible tubes, this book contains little that was not known fifteen years ago. English readers are recommended to chapter 12 of Lighthill's *Mathematical Biofluiddynamics* (SIAM, 1975) for a more enlightening account of pulse-propagation theory. The present book is produced from camera-ready copy, with hand-written equations.

HYDROSOFT '84: Hydraulic Engineering Software. Edited by C. A. BREBBIA, C. MAKSIMOVIC and M. RADOJKOVIC. Elsevier, 1985. 728 pp. Dfl 350.00.

This volume contains 55 papers by authors from 25 different countries selected from those presented at the International Conference on Hydraulic Engineering Software at Portoroz, Yugoslavia, in September 1984. The aim of the conference was to bring together hydraulic design engineers and scientists working on experimental hydraulics to discuss the interaction of computational and experimental methods in hydraulic design. The papers are divided into six sections covering: computer-aided experimenting; free-surface flows; turbulence modelling; porous-media flows; unsteady flow in closed conduits; design, monitoring and real-time operation of hydraulic engineering systems; and general hydraulic software. It is difficult for a volume of this nature to have a general theme linking the various sections, although to some extent the editors have overcome this difficulty. The published papers succeed in emphasizing the need for the verification of model hypotheses by laboratory experiment and the care required during the acquisition and processing of field data for the determination of model parameters.

One attraction of this volume should have been the large proportion of papers from Eastern Europe, in particular their citation of the Eastern European literature of which one is often unaware. Unfortunately, in this volume the authors refer to little previous work or concentrate on the Western European literature. It is a pity perhaps that the editors could not have found the space to encourage Eastern European authors to expand slightly on the background to their papers so that those readers who did not attend the conference might learn more about current work outside the West.

The scope of this volume is very broad and as such is unlikely to appeal to the individual purchaser. However, it should be a useful source of information for hydraulic engineers and would not remain unused on a library shelf.

Monitoring and Maintainance of Aqueous Metal-Working Fluids. Edited by K. W. A. CHESTER and E. C. HILL. Wiley, 1984. 190 pp. £19.95.

This volume contains 17 papers originally presented at an international meeting organized by the Institute of Petroleum, London, in 1983. The aims of the seminar were twofold: to examine critically the monitoring of various parameters of metal-working fluids and to discuss procedures for avoiding their degradation. As such, this represents a very specialized volume which is unlikely to be read by any but those specifically involved with aqueous metal-working fluids. However, it does contain a large number of unanswered questions concerned with lubrication and two-phase flow. Hence, any fluid mechanist searching for relevant practical problems to study may find one in this work.