

References

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BOOK REVIEW

Developments in Flow Measurement

Ed. R. W. W. Scott

In-depth analyses of several individual meter types combined with a number of excellent surveys of broad aspects of flow measurement make this book very good value. With eight authors who have already written extensively on their subjects in journals and for Conferences it would be surprising if there was much that was new in the book but few will have had the opportunity to follow the dozens of references at the end of each chapter. In consequence collecting together their expertise to produce an overview of the status of flow measurement at the beginning of the 1980's is certainly valuable to all who are involved in the art and science of this subject.

Each chapter has its own distinctive flavour melded together by the editor who has himself contributed a very useful introduction and a detailed

appraisal of liquid (mainly water) flowmetering. Similar general studies of petroleum and gas measurement are followed by two detailed examinations of present developments in turbine and electromagnetic flowmeters. Another broad look, this time at open channel flow, leads to the final chapter on assessing the uncertainties which occur in every measurement.

I have purposely left Chapter 2 for special mention. This is by Dr Mattingly of the National Bureau of Standards in the USA and deals with calibration facilities and the dynamic traceability which should be determined between every measurement installation and the eventual national primary standards of mass, length, time, etc. However accurate or inaccurate the actual user wishes to be, it is only by the conscious effort to find out the answer in his case to dynamic traceability that his measurement can have real meaning.

E. A. Spencer

Published by Applied Science Publishers, London. 6×9" (15.5×23 cm), x 326 pages, 136 illustrations, 1982, price £36

Modern Compressible Flow

J. D. Anderson

Compressible fluid flow is a subject of considerable interest to students, but one which can easily become an apparently endless parade of equations. The lecturer must enliven the subject by discussing practical applications, experimental results, personal experience and occasionally commenting on the historical development of the subject. This 'filling out' of the subject is not too difficult for a lecturer, but few authors have followed Professor Anderson's approach of including historical and biographical notes in a text book. These notes provide an interesting background to the theory, placing the work in perspective and making the book more readable. The result is a book to which students and teachers can turn without being 'turned off'.

After a general introduction to compressible flow, the governing equations are derived and applied to one-dimensional flows and normal shocks.

The Fanno line and Rayleigh line are introduced at this stage, but the flow in nozzles is discussed later. There is a thorough treatment of oblique shocks, shock reflection, shock interaction and expansion waves, with some interesting notes on the development of the subject by Prandtl and Taylor. The chapter on nozzle flows contains an interesting biographical sketch on de Laval and a summary of the pioneering work of Stodola. Linearised compressible flow theory is described and there is a short chapter dealing with the Taylor-Maccoll equation for compressible flow over a cone. The first 259 pages, as outlined here, provide a good treatment of compressible flow theory prior to the development of digital computers.

The remainder of the book, another 200 pages, is an introduction to modern numerical methods in fluid dynamics. The method of characteristics is described, with application to nozzle design. This is followed by finite difference methods and an outline of time-marching techniques, with the last two chapters adding real gas effects with reactions at high

temperatures. The chapters dealing with time dependent techniques can be no more than an introduction to the subject since, in these methods, stability and convergence are critically dependent on the detailed treatment of the equations and of the boundaries. This is a complex topic and the author has done well to present a short description of the technique with suitable references for further study.

There are relatively few typographical errors, the more obvious being that manometer is frequently given as monometer and in Figure 5.8, the area ratio should be unity for $M = 1$.

This book provides a very good introduction to gas dynamics, compressible fluid flow and modern

methods for calculating these flows, while also providing a useful historical perspective. The first ten chapters are suitable for undergraduate teaching, while the remaining chapters on numerical methods would be more appropriate for post-graduate courses. It is a very useful and well-written book which can be recommended to students and teachers. Perhaps other authors should follow Professor Anderson's example and include historical and biographical notes.

H. Marsh

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Heat Transfer in Nuclear Reactor Safety

Eds. S. G. Bankoff and N. H. Afgan

In the late summer of 1980 the International Centre for Heat and Mass Transfer in Dubrovnik organised a Conference and Summer School to cover all aspects of nuclear reactor safety. This book is based on 11 invited papers and 48 contributed papers delivered at the Conference. The Summer School papers formed the basis of a complementary volume, Nuclear Reactor Safety Heat Transfer by Owen C. Jones, which was reviewed earlier. It would have been quite appropriate to refer to these as Vols I and II under the same title.

The papers deal with contemporary topics both from the experimental and theoretical viewpoint. Code validation is also covered and the standard of the papers is high.

Authors are drawn from thirteen countries including USSR, Peoples Republic of China and Japan. Global contributions are to be commended but we suspect that in many cases it will be difficult to obtain copies of reports from the comprehensive lists of references given at the end of all the papers. In two instances only the abstract, not the complete paper, is published.

The papers predominantly relate to light water reactor (lwr) problems. Only one paper on fluid structural interactions is of particular interest to gas cooled reactor designers and the liquid metal fast breeder reactor field is covered by seven papers, four on 'accident dynamics' and three on 'post accident heat removal and fuel structure interactions'.

Though one could assume that this balance indicates the problems that still remain to be solved in the various systems, it would probably be more realistic to explain it on the grounds of world interest. Nevertheless in the concluding remarks in several invited lectures the authors attempt to indicate the scale of the problems still to be solved and suggest they can only be tackled on an international basis. A Framatome paper (3.10) gives a very detailed introduction to the principal areas of their thermal hydraulics research.

Apart from a few figures which are too small or illegible the volume is well produced. We have no hesitation in recommending its purchase to workers in the nuclear reactor thermal hydraulics field particularly if their problems relate to lwr's.

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National Nuclear Corporation Limited

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Books received

Drying '82, ed. A. S. Mujumdar, \$120, pp 254, Hemisphere Publishing Corporation

Radiation Heat Transfer Notes, D. K. Edwards, \$19.95, pp 370, Hemisphere Publishing Corporation

Industrial Energy Manager's Sourcebook, ed. R. L. Koral, £30.60, pp 399, Van Nostrand Reinhold

Flow Visualization II, ed. W. Merzkirch, \$90.00, pp 803, Hemisphere Publishing Corporation

Fouling of Heat Transfer Equipment, E. F. Somerscales and J. G. Knudsen, \$75.00, pp 743, Hemisphere Publishing Corporation

Finite Elements in Fluids, ed. R. H. Gallagher, D. H. Norrie, J. T. Oden and O. C. Zienkiewicz, £30.00, pp 646, John Wiley & Sons Ltd

Industrial Heat Exchangers, G. Walker, \$41.50, pp 408, Hemisphere Publishing Corporation

Heat Transfer in Nuclear Reactor Safety, S. George Bankoff and N. H. Afgan, \$95.00, pp 964, Hemisphere Publishing Corporation

Thermal Energy Storage, ed. G. Beghi, Dfl 140, pp 505, D. Reidel Publishing Company

Heat Transfer 1982, ed. U. Grigull, E. Hahne, K. Stephan and J. Straub, \$395.00, pp 3260, Hemisphere Publishing Corporation

Proceedings of 7th International Heat Transfer Conference held in Munich in September 1982. Six volumes contain 25 review keynote papers plus 450 papers.

Heat Exchanger Design Handbook, 5 volume looseleaf set, pp 2080, \$600, Hemisphere Publishing Corporation

Intended to provide single source of data, correlations, practice, procedures and techniques for equipment designers. Looseleaf journal adopted to allow up-dating. The volumes cover: Heat exchange theory; fluid mechanics and heat transfer; thermal and hydraulic design of heat exchangers; Mechanical design of heat exchangers; Physical properties.