BOOK REVIEWS

Advances in Heat Transfer, Vol. 14.

THIS volume is one of a series designed to bridge the gap between specialist articles and general text books. Nevertheless it still assumes a reasonable background in fluid flow and heat transfer. There has been the general difficulty of drawing up a balance between mentioning all the relevant papers and giving a coherent description of the physical models involved. Five separate topics are covered which are as follows:

Heat transfer in geothermal systems. The subject of the flow of a single phase or two phase fluid in a porous medium is one that is traditionally studied in connection with petroleum or underground water reservoirs. Recently an additional slant has been added because of the geothermal contribution to the energy problem. Although the geological aspects have not been considered, to the casual reader, the article gives an interesting overall view of progress in the subject.

Electrodynamically enhanced heat transfer in liquids. This article gives a clear account of investigations in which an electric field has been used to increase the rate of heat transfer to liquids. The conditions include nucleate and film boiling and condensation. Presumably the potential of using the technique in situations where the heat transfer rate under conventional conditions is low remains to be explored.

Heat transfer between a gas fluidised bed and immersed tubes. This is a review of an important subject in which a general correlation describing the available results is not possible. Thus, although in parts it throws valuable light on some of the physical processes involved, in the main it consists of grouping together the published results in the various aspects of the subject.

Influence of radiative heat transfer on certain types of motion in planetary atmospheres. This article is a translation from Russian and perhaps because the subject was unfamiliar to the reviewer and the notation and the physical models were not clearly defined it was difficult to follow.

Homogeneous nucleation. This article gives an account of this nucleation theory from the view point of physical chemists. No attempt is made to show or describe its practical applications.

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ALAN JENNINGS, Matrix Computation for Engineers and Scientists.

THIS book is intended for those who require the ingredients of matrix computation and who might not already possess the relevant mathematical skills.

Chapter 1 deals with the basic algebraic and numerical concepts in a way which the present reviewer finds extremely pleasing. The text is arranged in a clear, logical fashion which makes for easy reading. Also there are numerous examples involving simple matrices which help the reader to understand what may be considered by the less mathematically inclined to be rather difficult matrix manipulations. Chapter 2 provides a selection of problems, from various engineering disciplines, which can be tackled using matrix methods, and includes a useful introduction to the finite-element method applied to a simple heat-conduction problem. Chapter 3

introduces the reader to methods of computer storage and discusses this often-forgotten topic in relation to the problem of matrix multiplication. Chapters 4 and 5 are concerned with elimination methods, with the larger part of Chapter 5 devoted to sparse matrices. Again, mainly because of the repeated use of examples, these chapters are easily understood and the reader's interest is retained. Chapter 6 deals with iterative methods for solving linear simultaneous equations whilst Chapter 7 is concerned with eigenvalue problems. Attention is focussed in Chapter 8 on the many transformation methods available for the determination of eigenvalues, the main advantage over the characteristic-equation method being their ease of computation. The Sturm-sequence methods are discussed in a short Chapter 9 and the final Chapter 10 discusses vector-iterative methods for eigenvalue determination. The Appendices, which take the form of checklists for program layout, preparation and verification, are an extremely useful addition since they help steer the reader past the many pitfalls which can occur in numerical computation.

The book succeeds in a highly practical manner in comparing the various techniques mentioned and also lists an extensive bibliography at the end of every chapter. The referenced papers are recent ones and provide the reader with a useful literature survey. The book is well organized, clearly written, and should prove of great value to all those who need the solution to problems which are amenable to matrix methods. In this respect I am pleased to recommend it to both novice and expert alike.

J. L. SPROSTON

D. S. MILLER, Internal Flow Systems.

THIS book is essentially a design manual intended for use by engineers concerned with pipe and duct systems on all scales and is basically a guide to flow-energy losses in piping and associated flow components at high Reynolds numbers.

Fully detailed contents and index sections allow ready access to the wide range of information given. The book itself divides into two parts with Part 1 comprising Chapters 1–7. The first five chapters cover basic definitions, the origin of pressure losses, the concept of loss coefficient, pump/system matching and description of the various aspects of internal flow behaviour, e.g. turning flow, diffusing flow etc. Chapters 6 and 7 are taken up with the specific areas of cavitation and transient flow respectively. Part 2, Chapters 8–15, details a wide range of loss coefficient data and design recommendations for the various flow components. The aspects covered are flow in pipes and passages, turning flow-bends, diffusing flow, dividing/combining flow and combination and interaction effects. The penultimate chapter deals with miscellaneous system components such as valves, nozzles, flowmeters, screens etc., and the final chapter details sources of information.

This comprehensive collection of both existing and new data is presented in a clear and accessible form by the author and, in conjunction with the background explanation given in the initial chapters, forms a valuable basic design text.

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