Int. J. Heat Mass Transfer. Vol. 20, pp. 183–185. Pergamon Press 1977. Printed in Great Britain

BOOK REVIEWS

P. D. DUNN and D. A. REAY, **Heat Pipes.** Pergamon Press, Oxford (1976), 299 pp. Price $18.00 (£9.00).

THE USEFUL heat-transfer characteristics of heat pipes have been recognised since the publication by G. M. Grover *et al.* of the paper "Structure of very high thermal conductance" in 1964, 22 years after the idea of the heat pipe had been suggested and patented by R. S. Gaugler in 1942. During the last 12 years, the high-thermal-conductance characteristic of the heat pipe has been appreciated, developed and successfully applied to a wide range of problems. Initially, heat pipes were used for satellite isothermalisation; but today they are in general use for (a) separation of heat source and heat sink, (b) temperature flattening, (c) heat flux transformation, (d) temperature control, (e) thermal diodes and switches. The five groups of application listed above correspond to the five basic properties of a heat pipe. The understanding of the heat-transfer and fluid-flow mechanisms of the heat pipe has progressed to the stage where heat-pipe design for specific application can be undertaken with some confidence. This is exemplified by the growing specialist commercial use of heat pipes and the wide range of published material on heat pipe application.

Dunn and Reay state: "This book is intended to provide the background required by those wishing to use or to design heat pipes. The development of the heat pipe is discussed and a wide range of applications described."

The tasks thus defined by the authors have been adequately achieved and the use of their text is enhanced by the extensive working-fluid property data, provided as an Appendix. However, the text suffers from a number of typographical errors, and the use of units other than S.I.; further, Fig. 2.1. on p. 19 is wrong, it should be replaced by the figure below.

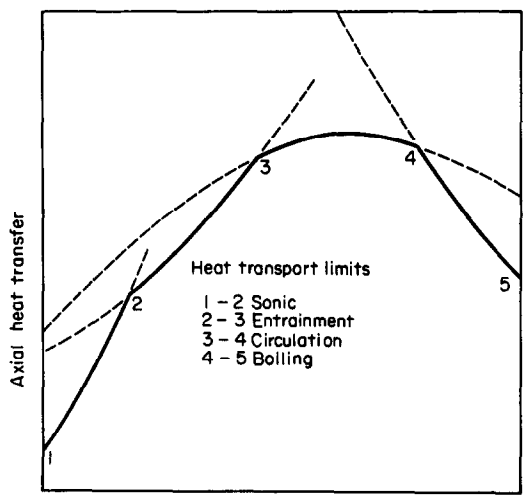

FIG. 2.1.

"Heat Pipes" is well written; and, in a text of 299 pages, it covers the history, theory, design development and application of heat pipes admirably. It is a timely and valuable addition to the literature on heat pipes and should be widely read by designers and users alike.

A. BROWN

A Bibliography of Finite Elements, compiled by J. R. WHITEMAN, Academic Press, New York (1975).

THIS volume contains some two thousand two hundred titles listed by author and by subject on topics such as "classical analysis, functional analysis, approximation theory, fluids, diffusion and aeronautical, civil, mechanical, electrical and nuclear engineering applications. Literature on the solution of systems of linear and non-linear equations" is not included. Entries against specific topics in Applied Mechanics range from 10 to 50 items per subject area. From knowledge of some of the papers listed and examination of titles of others, it would seem that the coverage is very mixed between papers describing new advances or others applying known finite element techniques to specific problems.

This bibliography obviously provides a start to the worker unfamiliar with a particular field, but makes no claim—indeed disclaims—to give comprehensive coverage.

C. E. TURNER

Heat Transfer at Low Temperatures, edited by W. FROST. Plenum Press, New York (1975). Price $35.00. 362 pp.

CRYOGENIC engineering has become an increasingly important subject to many practising engineers and researchers. The recent growth of cryogenic technology has been particularly propelled by large scale uses of cryogenic liquid fuels in space propulsion systems, and of liquefied gas fuels for transport and storage. Rapid expansion in the future is further assured with the advent of superconducting devices and machineries, cryogenic transmission cables, cryopumping, cryosurgery, etc. Naturally, the subject of heat transfer at low temperatures becomes an integral part of this new development. While most of the heat-transfer problems at low temperatures can be resolved through existing heat-transfer theories, many do require special considerations and solutions because some assumptions or approximations commonly employed are no longer valid in this regime. Furthermore, cryogenic applications have often generated new heat-transfer problems that do not exist otherwise. To produce a successful treatise for heat transfer at low temperatures, however, is a formidable task, because of the substantial overlap with general heat-transfer principles as well as the heavy reliance on cryogenic applications.

The present book is the latest addition to the highly acclaimed International Cryogenics Monograph Series under the general editorship of K. Mendelssohn and K. D. Timmerhaus. Judging from the inherent difficulties in treating this subject as mentioned above, this book must be regarded as a successful venture on an overall viewpoint. It contains chapters with the following titles: Introduction, Conductive Heat Transfer, Convective Heat Transfer to Low-Temperature Fluids, Terminology and Physical Description of Two-Phase Flow, Nucleate Pool Boiling, Critical Heat Flux, Film Boiling, Minimum Film Boiling Heat Flux, Vapor–Liquid Condensation on Cryogenic Surfaces, Vapor–Solid Condensation, Pressure Drop and Compressible Flow of Cryogenic Liquid–Vapor Mixtures, Forced Convection Heat Transfer with Two-Phase Flow, Transient Conditions in Boiling and Two-Phase Discharge,