D. CHISHOLM, **The Heat Pipe.** Mills and Boon, London (1971). Price £2.50. 123 pp.

THE DRAMATIC growth in heat pipe development and research has been phenomenal in recent years. It is estimated that about four hundred papers and reports have been put out in the short time span of seven years. There have been more than twenty sessions devoted solely to this subject in various U.S. national meetings in the last three years including, among many others, National Heat Transfer Conferences, ASME Annual Meetings, AIAA Thermophysics Conferences, Direct Energy Conversion Conferences and Space Simulation Conferences. In addition, short courses on the subject have been given at various academic institutions and professional gatherings with enthusiastic responses. The rapidly developing (particularly in design and application concept) nature of the subject, however, makes it a formidable task to present a mature, complete treatment in a book.

The present book is in the form of a short monograph. Indeed, the actual length of this monograph is shorter than the recent monograph article (E. R. F. Winter and W. O. Barsch, The Heat Pipe) in *Advances in Heat Transfer*, Vol. 7, 1971. It contains chapters with the following titles: Introduction, Basic Theory for Axial Heat Flux, Temperature Distributions and Heat Transfer Coefficients, Selection of the Working Fluid, Characteristics of Wicks, Start-up and Control, Manufacture and Life, and Commercial Heat Pipes. In the author's own words: "The monograph is intended to serve two functions: first, to answer questions such as 'What is a heat pipe?' and 'How does it work?'; second, to serve as an introduction to the technical problems involved in the design and manufacture of heat pipes."

To a practising engineer who has little or no prior background on the subject, this monograph serves well as an introduction to the practical functions and the analytical concepts of the heat pipe. It has a good overall balance between hardware and software aspects, and contains some manufacturing and commercial information, as well as a long bibliography. However, those who have worked in the area of heat pipes or who intend to do research or advanced development work in this area will probably find this monograph a little disappointing. It covers many subjects without in-depth treatment and critical discussions, resulting in some statements that are rather ambiguous and can be quite misleading.

To supplement the smooth, elementary reading of this book, the readers are recommended to consult also two other general articles: Winter and Barsch in *Advances in Heat Transfer*, Vol. 7, 1971, and B. D. Marcus, Theory and Design of Variable Conductance Heat Pipes: Hydrodynamics and Heat Transfer (Part I), and Control Techniques (Part II), TRW Systems Group, Redondo Beach, California, 1971. The latter article places more emphasis on the variable conductance heat pipes, but does contain an excellent discussion of many general aspects of heat pipe theory and design.

Berkeley, California, USA CHANG-LIN TIEN

S. S. ZABRODSKY, **High-Temperature Fluidized-Bed Units.** Energia, Moscow (1971).

THE PRESENT book does not repeat the author's "Hydrodynamics and Heat Transfer in Fluidized Beds", MIT Press, Cambridge, Mass., (1966) known to English readers, but rather comprises its extension or compliment on a number of items connected with further development of fluidization engineering. The book under review covers the problems which are involved primarily in design of high temperature fluidized bed units.

The author's aim is other than to give a description of units designed to perform particular industrial processes. His intention is to give a combination of general basic information needed for development of a variety of high-temperature fluidized-bed reactors and furnaces. The information on particular apparatuses encountered in the book serves mainly for illustration of certain general statements of designing a kind of units. But in the book there is a specialized bibliography under the title "Supplementary Literature" which includes more than 300 references valuable for readers interested in details of particular fluidized-bed technologies.

Among new items not touched upon in the previous monograph, the present book describes numerous means to achieve high temperatures in fluidized beds, and contains descriptions of design of main parts of fluidized-bed units, such as initial gas distributors and also the means to transfer solids from one stage of a multistage unit to another which define efficiency of a unit. The author elucidates the situation concerning the operation of gas-distributors and ducts for solids.

The book comprises comprehensive information on the experiments with electrothermal fluidized beds carried out under the author's direction.

A survey and analysis of the reported data on employment of different fuels are presented including the data of the author's laboratory.

The paragraphs on radiative and composite heat transfer are of interest. The author has systematized the data obtained both at his laboratory and by other investigators.

He has explained apparent anomalies and inconsistencies of the data and dwells upon additivity conditions of individual components of composite heat transfer.

Besides, a lot of general information on hydrodynamics and heat transfer in fluidized beds is available from the book, including the data on modifications of such fluidized beds as vibro-fluidized bed, fluidized bed with internals and beds fluidized at subatmospheric pressures. But as the author himself has noted, such general items are often given in a concise form, somewhere even in the form of references because of the lack of space and want of correspondence to the main subject of the book. On the other hand, the author has succeeded to dwell on recent findings concerning the effect mechanisms and to give a detailed bibliography covering about a thousand contributions.

We may agree with the author that under modern conditions of highly specialized science such bibliographies are desirable.

As commercial units often comprise fluidized beds along with other kinds of dispersed systems, to which it is easily convertable, the appropriate information is included.

Minsk, USSR A. V. LUIKOV

L. G. LOITSYANSY, **Fluid Mechanics,** Izd. "Nauka", Moscow (1970) 904 pp.

PROF. L. G. LOITSYANSKY is widely known as an outstanding mechanical engineering scientist working in the field of

aerodynamics and hydrodynamics and as a brilliant lecturer, teacher and methodologist, the author of excellent text-books, courses of lectures and surveys.

Being a fundamental work containing encyclopedic information written at a high scientific level, the book under review will take its due place in the world literature devoted to the fluid mechanics. The author has succeeded to express in a clear and comprehensive form the physical meaning of the problem discussed that allowed the reader to get a correct view of the phenomena in question, methematical strictness of the derivations and calculations being maintained.

The book begins with a rather detailed historical survey of the development of hydromechanics including the present state of art.

The first four chapters contain some problems of continua kinematics, general equations of motion and equilibrium of continuum are also considered and problems of one-dimensional gas flow and relevant theories of plane shock waves and supersonic diffusers are investigated.

Chapters 5 and 6 deal with a wide range of problems concerned with plane vortex-free motion of a perfect incompressible liquid and perfect gas such as a flow around plane bodies of different geometry, flow around a wing profile, discontinuous flows, supersonic flow around a thin profile, the theory of oblique shock waves, etc.

Some problems concerning spatial vortex-free fluid flows particularly, axisymmetric longitudinal flow around bodies of revolution are considered in detail.

Much emphasis is laid upon general aspects of viscous fluid dynamics. In Chapter 8 alongside with Newtonian fluid flows, a number of problems concerning the dynamics of non-Newtonian viscous and viscoplastic fluids and electroconducting liquids in a magnetic field are treated. Besides, numerical methods for solution of the Navier–Stokes equations are given.

The presentation of a boundary layer theory together with the analysis of exact solutions contains also approximate one-parametric methods (including those developed by the author) for laminar and turbulent flows in a layer on a wing and on a body of revolution. Here is discussed generalized parametric similarity method by Loitsyansky for calculation of a boundary layer, The method is based on the possibility revealed by the author to reduce the boundary layer equations to a "universal" form which is the same for various problems of the boundary layer theory.

Turbulent incompressible viscous fluid flows are considered in Chapter 10. Semi-empirical theories are also analysed. Besides the classical results of the turbulence theory for internal and external problems, much attention is to be paid to new estimations of molecular viscosity effect on turbulent transfer, which is essential in wall flow regions of very viscous and slightly heat conducting liquids.

The basic equations for viscous gas flows, problems of a laminar boundary layer at high supersonic and hypersonic velocities, universal equations of a laminar boundary layer in a gas flow at high velocities and problems of turbulent boundary layer in gas are presented in the last chapter.

From the aforesaid it may be concluded, that L. G. Loitsyansky's monograph is a fundamental work generalizing a very important material which is of interest and significance for everyone dealing with mechanics of continua.

Minsk, USSR Z. P. SHULMAN