of real gas dynamics, reflect the interests and experience of the authors. Even though such subjects as combustion and detonation processes, flows with phase changes, and flows which are influenced by radiation are omitted from the exposition, all of the material is suitable for a graduate course in the dynamics of real gases.

This book should be a valuable addition to the library of those concerned with physical gas dynamics.

Approximation Theory

Similitude and Approximation Theory. By Stephen J. Kline, McGraw-Hill Book Company, Inc., New York, N. Y., 1965. Cloth, 6 × 9 in., xiv and 229 pp. $12.75.

REVIEWED BY J. R. RADBILL[5]

THE AUTHOR has attempted to give a unified account of elementary approximation theory and has succeeded in producing a very useful volume for both students and research workers. Starting with a discussion of units and the pi theorem, he proceeds through the Method of Similitude by force and energy ratios to his principal emphasis on the use of governing equations for "fractional analysis." The last entails extracting information from differential or integral equations without obtaining a solution. Approximation theory for reducing differential equations to manageable form is discussed and related to boundary layer methods and to the expansion methods of Poincaré and Lighthill. A particularly useful section covers transformations which produce similarity rules or reduce the number of independent variables.

The book is provided with many examples which are carefully and thoroughly worked out with the exception of one on turbulent shear layers where some inconsistencies appear. Contrary to the practice in many texts, the shortcomings as well as the strong points of the methods are carefully illustrated in the examples. An important conclusion, well documented by examples, is that the pi theorem is inferior to use of governing equations, when available, for establishing dimensionless groups.

Continuous Media

Introduction to the Mechanics of a Continuous Medium. By L. I. Sedov. International Press, New York, N. Y., 1965. xvi and 270 pp. $12.50.

REVIEWED BY P. G. HODGE, JR.[6]

THIS IS A theoretical, highly mathematical book whose accomplishments and limitations are well expressed by the following paragraph from the author's preface:

"In this book, we present the theoretical apparatus, the basic physical concepts, and principles, which will be used to establish models of material bodies that fill space in an uninterrupted manner, i.e., as continua. Various examples of continua and typical processes will be examined, although the properties of individual processes and the solutions of particular problems on the motion of continuous media will not be given."

The first chapter reviews elements of general tensor analysis necessary for the later development, and the next chapter contains a general discussion of the kinematics of a deformed medium. The first part of the third and final chapter discusses general dynamic and thermodynamic requirements for a continuous medium, and the final sections deal more specifically with selected models for liquids and gases and for elastic and plastic solids.

The general procedure is to begin with utmost generality (finite deformations, material properties described by unspecified tensor parameters, etc.) and to consider successively specialized cases. However, the simplest results presented are still not in a form directly useful for the solution to specific problems. Rather, the book requires detailed and systematic study at the end of which the engineer will be better prepared to understand some of the mathematical and thermodynamic factors to consider in choosing a simplified model appropriate for his particular problem.

Air Tables

Air Tables. By D. P. Jordan and M. D. Mintz. McGraw-Hill Book Company, Inc., New York, N. Y., 1965. Cloth, 797 pp. $17.50.

REVIEWED BY J. KESTIN[7]

DURING the last decade or so, the demands on the accuracy of design feasibility studies have increased to an unprecedented degree. As our systems become more complex and, therefore, expensive, it becomes uneconomical to build pilot plants without a very thorough, theoretical investigation of their characteristics. In turn, this means that many simplifying assumptions must be dropped and the discussion of simple, closed-form solutions is replaced by a vast amount of numerical calculations.

The present set of tables has been prepared in conjunction with project PLUTO which addressed itself to the problem of the economic feasibility of high-temperature, air-cooled nuclear reactors. As the program progressed, it became necessary to perform many calculations of flow- and heat-transfer processes making due allowance for the real thermodynamic properties of working fluids. The present set of tables has been designed to facilitate such calculations for air.

Part 1 gives an extensive tabulation of the standard flow functions when air is treated as a perfect gas ($\gamma = 1.4$). Part 2 lists several thermodynamic equilibrium functions of air, elaborating on the well-known NBS Circular 564. Finally, Part 3, which comprises 85 percent of this book, contains functions for the computation of one-dimensional, compressible fluid flow quantities, including those for normal shocks, with air treated as a real gas.

The tables have been printed directly from computer outputs; nevertheless, they are legible and are provided with clear headings. The introductory material is somewhat skimpy and does not describe the sources of data and methods used in sufficient detail. This is regrettable, because most users would rather program the functions on their own computers, rather than use tables. However, for calculations which are of reduced complexity, the availability of these tables will prove to be of great value.

Solid Mechanics

Foundation of Solid Mechanics. By Y. C. Fung. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1965. Cloth, xiv and 525 pp. $18.

REVIEWED BY D. C. DRUCKER[8]

PROFESSOR FUNG has provided a book rich in its range of coverage and conceptual content. Wave propagation problems play a major role. The reader is supposed to have had some exposure to the theory of strength of materials and elasticity. Although the more conservative among us may have some doubts about the ability of many students to master the text in the usual first-year graduate course, there is no doubt of its value for the more mature student and the instructor. A wealth of references and historical perspective illuminates the classical theory of elasticity and the mathematical methods to

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which major attention is devoted. Less but intense attention is paid to thermodynamics of solids, thermoelasticity, viscoelasticity, plasticity, and finite deformation theory. General tensor theory is presented but Cartesian tensors are employed in developing the mechanics of solids.

Granular Media

Statics of Granular Media. By V. V. Sokolovskii. Translated by J. K. Kushner. Pergamon Press, New York, N. Y., 1965. Cloth, xiv and 270 pp. $12.

A revised and enlarged edition based on a translation of the second Russian edition.—*Editor.*

Similarity Theory

Introduction to the Theory of Similarity. By A. A. Gukhman. Translation by Scripta Technica, Inc. Edited by Robert D. Cess. Academic Press, New York, N. Y., 1965. Cloth, 6 × 9 in., xxi and 256 pp. Originally published by Vysshaya Shkola, Moscow, USSR, 1963. $9.60.

REVIEWED BY M. D. HERSEY[9]

It is refreshing to find a treatise on similarity and dimensions in which the subject is approached from an unusual viewpoint. The author begins by showing that phenomena are most naturally described in terms of generalized variables, and that the differential equations can be put in this form. He emphasizes physical principles rather than mathematical methods, and indicates the need for a complete qualitative knowledge of the facts. These ideas are illustrated by discussing three broad problems—heat conduction in solids, heat transfer by fluids, and fluid resistance.

The inferences drawn in the first part of the book seem to be largely intuitive or inductive. Not until the fifth and last chapter is dimensional analysis accepted as the most logical approach. The author refers to "such giants as Newton, Rayleigh, Buckingham, Bridgman," but mentions very few other investigators except as their names are attached to dimensionless numbers. The book contains no list of references.

This reviewer had difficulty in understanding Gukhman's exposition, and would hesitate to question his arguments without a more intensive study of the text. He suspects it would not be found such hard going if he were able to read it in the original Russian, or if he had read the last chapter first. The translation is doubtless accurate, but somewhat literal, as where the term "schematization" is used instead of *idealization*, and "Chemical Machine Construction" instead of *Chemical Engineering*.

We doubt if the book should be called an "Introduction" in the academic sense, but believe it one of serious interest to the more advanced reader, already somewhat familiar with the literature.

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