

work for the most important of the applications of mathematics for the contemporary engineer.

JOHN B. BUTT

Elements of Gasdynamics, H. W. Liepmann and A. Roshko, John Wiley & Sons, 439 pages, \$11.00.

Elements of Gasdynamics, by Liepmann and Roshko, is an excellent book. The material covered may be ascertained from the chapter headings which read: (1) Concepts from Thermodynamics; (2) One Dimensional Gasdynamics; (3) One Dimensional Wave Motion; (4) Waves in Supersonic Flow; (5) Flow in Ducts and Wind Tunnels; (6) Methods of Measurement; (7) The Equations of Frictionless Flow; (8) Small-Perturbation Theory; (9) Bodies of Revolution. Slender Body Theory; (10) The Similarity Rules of High Speed Flow; (11) Transonic Flow; (12) The Method of Characteristics; (13) Effects of Viscosity and Conductivity; (14) Concepts from Gas Kinetics.

There are very few criticisms which need to be made. It is unfortunate that the authors chose to use the symbols F and G for the Helmholtz and Gibbs free energy rather than A and G . The use of F for the Helmholtz free energy will cause much confusion, since most Americans use F for the Giffs free energy and the majority of the tables of thermodynamic data adhere to this convention. This reviewer would have liked to have seen a somewhat more extended discussion of the second law of thermodynamics and of the principles

of irreversible thermodynamics, especially since the latter is used in one form or another extensively throughout the text. The treatment of the Clausius-Clapeyron equation is very poor and unconvincing. The usual thermodynamic derivations are superior to the quasi-molecular one given by the authors. Also the treatment of imperfect gases is superficial, and the relationship between thermodynamic properties and gas imperfection is very incomplete. These criticisms are not meant to imply that the thermodynamics chapter is poor but rather to indicate some places where improvement is possible. The remainder of the book, especially the sections dealing with the hydrodynamics of compressible fluid flow, is admirably clear.

The final chapter on the kinetic theory of gases is short but complements well the rest of the text. This reviewer was very pleased to see a brief discussion of the properties of Couette flow in the Knudsen region. The development of missiles which fly in regions of the upper atmosphere where the mean free path is of the order of the dimensions of the flying object makes this pressure range of great importance.

Elements of Gasdynamics is to be recommended to all students interested in gasdynamics and its applications. The book will also be of interest to physical chemists who will find a wide realm of irreversible phenomena which await exploration.

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