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 BOOK REVIEWS
 

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**Elements of Gasdynamics.** Galcit Aeronautical Series. By H. W. LIEPMANN AND A. ROSHKO, California Institute of Technology. John Wiley and Sons, Inc., 440 Fourth Avenue, New York 16, N. Y. 1957. xv + 439 pp. 15.5 × 23.5 cm. Price, \$11.00.

As stated in the preface the book is primarily intended for students in aeronautics and it is not intended to be a reference handbook; however, it should also prove satisfactory as a rapid introduction to the important fundamentals of the aerodynamics of compressible fluids for any scientist who suddenly finds himself involved in this field. Because of this objective no systematic reference to existing literature has been attempted; instead a selected list of reference works have been given in order to provide the necessary leads for specialized study in the various phases of compressible aerodynamics.

The book presents the fundamentals of gas dynamics in the manner and sequence which should prove most successful for an introductory text. For example the first six chapters (Concepts from Thermodynamics, One-dimensional Gasdynamics, One-dimensional Wave Motion, Waves in Supersonic Flow, Flow in Ducts and Wind Tunnels, Methods of Measurement) are written in such a manner that they could be introduced in the senior year of an undergraduate engineer.

Selected topics could then be used from the remaining eight chapters in the first year of a graduate course in high speed aerodynamics. These chapters include the complete equations of motion, the method of characteristics for two-dimensional and axially symmetric supersonic flow, small perturbation theory, similarity rules, transonic flow, viscosity and the kinetic theory of gases.

The increasing complexity of the problems involved in high speed aerodynamics is apparent in comparing this book with its predecessor, "Aerodynamics of a Compressible Fluid" by Liepmann and Puckett, which is now out of print. Although removed from one another by less than a decade, the differences are striking. Non-steady flow, shock tubes, dissociation and other real gas effects, and three-dimensional problems provide all new material. However the most indicative feature illustrating the modern trend in high speed aerodynamic research is the introduction of the kinetic theory of gases and the expansion of less than nine pages of descriptive comments on viscous effects in Liepmann and Puckett into 78 pages on the development of the fundamental theory and equations of viscosity, heat conduction and the related molecular phenomena (mean free path, relaxation time, slip and accommodation, etc.).

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**Messen und regeln in der Chemischen Technik.** Unter Mitwirkung zahlreicher Fachwissenschaftler herausgegeben von. Edited by Dr. rer. nat. J. HENGSTENBERG, Ludwigshafen/Rh., Dr. phil. B. Sturm, Leverkusen, Dr. phil. O. Winkler, Marl. Springer-Verlag, Reichpietschauer 20, Berlin W. 35, Germany. 1957. xix + 1261 pp. 25 × 18.5 cm. DM, 146.

This encyclopedic compilation of methods of measurement and controls in the chemical industry was planned by the German organization NAMUR (Normenarbeitsgemeinschaft für Mess- und Regeltechnik in der Chemischen Industrie). Some thirty-one experienced persons from recognized chemical industries in Germany served as the authors. One is immediately impressed by the thorough and extensive treatment of the selected topics. The emphasis is mainly on German methods and equipment but many American and British instruments are also described. Extensive use is made of line drawings together with photographs and, in many cases, a mathematical treatment pertinent to the subject under discussion is well presented.

The book is divided into nine chapters as follows, each divided into two to eight subdivisions. 1. Temperature measurements. 2. Measurement of mixtures, fluid flow and volume (263 pages). 3. Pressure and pressure difference. 4. Analytical determinations based on physical properties. 5. Electrochemical methods of measurement. 6. Special techniques (measurement of viscosity, thickness of sheets, speed of revolution and frequency of vibration). 7. Principles and techniques of automatic control. 8. The design of control panels. 9. Organizations for the control of technical operations.

It is difficult to present in a short review a complete picture, but a few examples selected somewhat at random can convey an impression about the comprehensiveness of the text. There is a tabulation of standard temperatures based on the international temperature scale of 1948. Thermocouples, inductive and magnetic compensators, resistance thermometers, radiation and optical pyrometers are all discussed. Methods of weighing large (box cars) or small items (torsion balance) are given. Flow meters of all types are described together with a discussion of the effect of compressibility and viscosity on flow measurements. Throttles of different shapes and sizes are discussed fully with equations and graphs as they are used in flow measurements. There are descriptions of all sorts of proportioning equipment or tables for determining the volume in partially filled tanks of various shapes.

Chapter 4 (171 pages) dealing with analytical techniques describes methods based on the following eight physical properties of matter: absorption of radiant energy, paramagnetism, density, heat conductivity, heat of reaction, volume, electrical conductivity and saturation pressure (dew point). Here one finds a method for determining oxygen (0-0.1%) in gases by measuring the heat of reaction with chromous chloride. In another section there is a table of liquid boundary potentials to the extent it has a use in the determination of pH of solutions. The composition of thirteen pH standards is given together with their variation of pH over a wide range of temperatures. Even a short section discusses the autoprotolytic constants of non-aqueous solvents and the bismuth electrode for pH measurements is also discussed.

In the section on viscosimetry the meaning of Newtonian flow is explained with the help of a tensor (mathematical). The Hagenbach correction is not overlooked. The Koppers capillary viscosimeter and the theoretical basis for the same receives a full treatment. Even Bridgman's method of measuring viscosities under extremely high pressures is mentioned. The chapter on principles of automatic control (251 pages) contains a complete discussion with equations and transform functions for such system as proportional and integral controllers.

For one who can handle the language barrier the text is a valuable source of information. There are extensive references to journal articles and other texts.

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**Comprehensive Inorganic Chemistry. Volume Six. The Alkali Metals.** By JOHN F. SUTTLE. Hydrogen and its Isotopes. By ROBERT C. BRASTED. Edited by M. Cannon Sneed, Professor Emeritus of Chemistry, School of Chemistry, University of Minnesota, and Robert C. Brasted, Professor of Chemistry, School of Chemistry, University of Minnesota. D. Van Nostrand Company, Inc., 126 Alexander Street, Princeton, New Jersey. 1957. viii + 234 pp. 16.5 × 23.5 cm. Price, \$6.00.

The first thing I do in examining a new technical book is to leaf through it, looking for topics with which I may be familiar so I can compare what the author has to say with what I think I know. I then look for topics about which I know little or nothing to see how well the author can teach me or introduce me to a new subject. Finally, I try to analyze the