

book. Chap. 6 on "Lateral Buckling of Beams" has been thoroughly revised. Chap. 7 on "Buckling of Rings, Curved Bars, and Arches" differs only slightly from Chap. 4 of the first edition. Chaps. 8 and 10, treating the bending of thin plates and shells, are essentially the same as the old Chaps. 6 and 8. In Chap. 9 on "Buckling of Thin Plates" more cases are discussed than in the first edition, and Chap. 11 on "Buckling of Shells" has been similarly expanded. Throughout the book, references to recent literature have been added.

Thermodynamics

Thermodynamics. By G. N. Lewis and M. Randall. Revised by K. S. Pitzer and L. Brewer. McGraw-Hill Book Company, Inc., New York, N. Y., 1961. Cloth, 6 × 9 in., xii and 723 pp. \$12.50.

REVIEWED BY J. KESTIN⁵

THIS is a modernized version of the well-known, classical treatise on thermodynamics written for physical chemists. The revision fully preserves the individuality of the original, its easy style and understanding of the physical phenomena it sets out to study.

In spite of the fact that the first, original edition was published nearly forty years ago (in 1923), it is much more readable and useful than many of the more contemporary efforts which have recently appeared in such large numbers.

Plasma Physics

Plasmas and Controlled Fusion. By D. J. Rose and M. Clark, Jr. John Wiley & Sons, Inc., New York, N. Y., 1961. Cloth 6 × 9 in., xiv and 493 pp. \$10.75.

REVIEWED BY HANS MOTZ⁶

THIS is by far the most complete book on the subject that has appeared as yet. A remarkable amount of information is compressed into 493 pp. The treatment is very largely based on the macroscopic hydromagnetic equations which are derived *ab initio* after a brief and effective introduction to the basic physics of gas discharges. For the sake of completeness, even the formulation of Maxwell's equation for moving media and the derivation of the electromagnetic stress tensor are included. This certainly makes the book an excellent text for a graduate course. No wonder that some aspects of relevant plasma physics—relaxation effects, conductivity, viscosity, etc.—could not be treated adequately. The authors are aware of this and chose to write a readable book rather than a book that answers the basic question: Is controlled fusion possible? The first problem which has to be solved is that of confinement. The next problem is to confine the plasma for a sufficiently long period. The obstacles are numerous. First, there are the plasma instabilities. They are mathematically analyzed and the difficult work of Rosenbluth, Suydam, Newcomb, and others is presented clearly. However, the authors have not made clear what time intervals are required for useful power output and what the quantitative limitations due to instabilities are. It may well be that the decisive question of feasibility hinges on the validity of the idealizations inherent in this kind of analysis. The next problem which has to be faced is the balance between useful power output and radiation loss. Again, the theory of radiation loss is explained very well with the use of up-to-date material. The conclusion is reached that D-T reactions may give useful output but D-D reaction cannot. The open questions of surface radiation and inadequacy of the plasma model are indicated. The question of how to heat a plasma to the necessary temperatures is not treated systemati-

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cally, and the problem is far from solved, but if all these problems could be solved there would still be many others, connected with practical realizations. Many of these are discussed in the book, even the construction of superconducting solenoids for generating the magnetic confining fields, tritium breeding in lithium, etc. The principal candidates for success, stellarators, mirror devices, pinchlike devices, are discussed in detail. Altogether the book incorporates the latest knowledge and ideas on this important subject. The sceptical reader wonders whether the present status of plasma dynamics may perhaps be compared with that of fluid dynamics before there was any knowledge of boundary-layer effects.

Gear Teeth

Introduction to the Kinematic Geometry of Gear Teeth. By Allan H. Candee. Chilton Co., Philadelphia, Pa., 1960. Cloth, 6½ × 9½ in., ix and 204 pp. \$12.50.

REVIEWED BY H. PORITSKY⁷

THIS book is devoted to the classical kinematic geometry of spur gear teeth. The treatment is elegant, lucid, quite detailed, and graphical whenever possible. Presumably this is the first of several volumes to follow, which will treat more complex gears such as helical gears, worm gearing, bevel gears, and hypoid gears.

Some of the topics covered are: Generation of the conjugate profile as the envelope of the given profile; also by means of segments of normals to the given profile extending to its pitch circle. Methods of manufacturing gear teeth by means of cutters, hobs, shapers, and by "generating" by means of a cutting tool shaped like the conjugate tooth profile. Special properties of involute gear teeth, such as interchangeability irrespective of pitch circle, mating action irrespective of changes in spacing of the axes, etc. Measurement of tooth thickness by means of calipers and by means of pins. "Strength factors" of gears. Profile errors, modification, and variation. Approximations to involutes.

The book forms a valuable addition to gear literature.

Lubrication

Theory of Hydrodynamic Lubrication. By Oscar Pinkus and Beno Sternlicht. McGraw-Hill Book Company, Inc., New York, N. Y., 1961. Cloth, 6 × 9 in., 500 pp., 242 illus. \$15.

REVIEWED BY EDWARD SAIBEL⁸

THE subject of hydrodynamic lubrication has advanced considerably over the past decade. Numerous theoretical solutions of varying degrees of approximation have appeared and a great deal of experimental work has been reported. The time is ripe for a book in which this new work is drawn together, expounded, compared, critically examined, and incorporated into that portion of the old which has stood the test of time.

The authors have gone a great way toward this goal. They have kept track of developments in all parts of the world and they have made substantial contributions of their own. Extracts from all of this have been compiled together with basic derivations and classical material to form a substantial text on the subject. The material is exhibited in a systematic manner, the style is pleasant and readable.

The value of the book would have been greatly enhanced, however, by more exercise of critical judgment. Material from many of the sources which is of doubtful value has been used verbatim and given the same prominence as important matter.

Unfortunately, those unacquainted with the field in detail will

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