

rather than the general case, so that in the chapter on instability of two-phase flow no reference is made, for example, to the (award-winning) 1963 paper of Ostrach and Koestel.

For a long time it has been a fact that our understanding of the physics involved in vapor formation and transport is insufficient even to permit satisfactory determination of empirical relationships based, say, on dimensional analysis. The recent advances in the cloud physics of bubbles in boiling have not been sufficient to change this fact. Meanwhile, advances in technological requirements (the cooling of nuclear reactors and rocket motors) have increased the need for careful review and further investigation. This book should be very useful to designers and to investigators who want a compact survey of the subject and an extensive introduction to its literature.

Elasticity

Stability and Oscillations of Elastic Systems. By Y. Panovko and I. I. Gubanova. Translated by Charles V. Larrick. Consultants Bureau Enterprises, Inc., New York, N. Y., 1965. Cloth, x and 291 pp. \$17.50.

As Professor Flügge states in his foreword: "It is a book for mature readers, for those who have already been initiated into applied mechanics and who will read it for the pleasure of seeing many a surprising detail that is not found in books elsewhere. The authors have collected the unusual, the unexpected, the little, fascinating things that lie off the beaten path, and they have seasoned their presentation with historic notes, showing how even the leaders in the field have erred when a new situation called for an unconventional idea."—*Ed.*

Thermodynamics

Principles of General Thermodynamics. By G. N. Hatsopoulos and J. H. Keenan. John Wiley & Sons, Inc., New York, N. Y., 1965. xiii and 788 pp. \$15.

REVIEWED BY H. W. BUTLER⁶

THIS VOLUME, in two parts, is a general treatise, a research report, and a new textbook. The degree to which the authors have succeeded in meeting such mutually incompatible objectives will be determined only by the collective experience of the respective users of this novel treatment of the subject.

Part I contains thirty chapters "designed to introduce the beginner to thermodynamics." The development is based on novel and often strange definitions of properties and statements of laws. For example, the second law is given essentially as a statement that an isolated system can reach a stable state.

Part II contains 22 chapters, the first 18 involving a redevelopment of the laws of thermodynamics based on the "law of stable equilibrium" and the Gibbs "principle of generalized inertia." Applications are made to systems involving electrolytes, ionized gases, general fields, and relativity. The last four chapters deal with irreversible processes, but not from the continuum viewpoint.

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The book contains seven appendixes, including tables of data, applications, quantum mechanics, and answers to problems.

The basic philosophy of the presentation is axiomatic; thermodynamics is developed essentially as a branch of geometry. Whether this will produce better future engineering thermodynamicists is an open question.

Friction and Wear

Friction and Wear of Materials. By E. Rabinowicz. John Wiley & Sons, Inc., New York, N. Y., 1965. Cloth, 6 1/4 × 9 1/4 in., x and 244 pp. \$12.

REVIEWED BY R. I. TANNER⁷

AS THE author says, there are few monographs or research workers dealing with the important subject of wear. The two volumes on friction by Bowden and Tabor, for example, devote only one short chapter to wear. Therefore the present book is very welcome, providing a simply written alternative view based on the specific surface energy (W) concept developed by the author. It is honestly admitted that some of the ideas expressed are not universally accepted, and at times one gets the impression that phenomena are forced to depend on surface energy whether they like it or not. For example, on p. 66 we are told that the friction coefficient depends on the dimensionless group W/pr , where p and r are the yield pressure and the "welded" junction radius, respectively. Later, on p. 161, we find r is a multiple of W/p , which seems to imply that the friction coefficient is independent of W/p , although the contrary is reiterated throughout the book. Despite such objections, the misprints and the misspellings, the work is full of interesting useful observations on the actual behavior of surfaces.

Beams and Frames

Plastic Analysis and Design. Vol. 1, Beams and Frames. By C. E. Massonet and M. A. Save. Blaisdell Publishing Co., New York, N. Y., 1965. Cloth, 379 pp. \$10.50.

As Professor Prager states in his Preface to the English edition: "Special features of the present book made a translation particularly worthwhile. Without sacrificing rigor, the authors have reduced mathematical developments as far as possible. They have also refrained from using mathematical notation unfamiliar to engineers. On the other hand, they have not hesitated to discuss numerous practical questions that are not normally regarded as falling within the scope of the theory of plastic analysis and design. In this manner, they have achieved a remarkably lucid presentation, which is addressed to engineers interested in the solution of practical problems."—*Ed.*

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The shear force and frictional thrust are increased with the increase in applied load and these increments accelerate the wear rate. Figure 10 also shows the comparison of the variation of wear rate with normal load for gear fiber, glass fiber, nylon and PTFE. The highest values of wear rate for PTFE and lowest values for nylon are obtained among these materials. In sliding contacts, sliding speed has an important role on friction and wear of different polymer and composite materials. Figure 11 shows the comparison of the variation of friction coefficient with sliding speed for different materials. Results show that friction coefficient increase almost linearly with sliding speed [44]. Covers Friction physics and tribosystem thermodynamics; Surface characterization; Wear monitoring; Surface engineering; Nanotribology; Contact mechanics; Metal fatigue, wear susceptibility measurement and more. Launched in 1980. Remains the primary source of tribological studies in the former Soviet Union. Please note, we are currently updating the 2018 Journal Metrics. Journal of Friction and Wear is intended to bring together researchers and practitioners working in tribology. Papers cover tribological problems of physics, chemistry, materials science, and mechanical engineering, discussing issues from a fundamental or technological point of view. English Language Editing. English Language Editing.