

quantum concepts and a desire to minimize the abruptness of the transition are manifested throughout the book. For example, Corben and Stehle discuss the quaternion representation in connection with the motion of rigid bodies and introduce the Pauli spin operators and their properties there. An entire chapter is devoted to the theory of real linear vector space, with the eigenvalue problem and the diagonalization of symmetric matrices being covered. In addition, such modern applications of classical theory as the motion of particles in high-energy accelerators are treated. While in some respects perhaps unsuited to the traditional graduate course in classical mechanics, this book will certainly find a welcome reception for its fresh outlook on and elegant presentation of its subject.

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Fatigue and Fracture of Metals. A Symposium held at the Massachusetts Institute of Technology, June 1950. Edited by William M. Murray. 313 pp. The Technology Press of MIT and John Wiley and Sons, Inc., New York, 1952. \$6.00.

This collection contains 14 papers. Those of the authors who are listed in *American Men of Science* include one physicist, three metallurgists, and four engineers. It is interesting to compare these numbers with the corresponding ones for a 311-page collection published in 1948 by the American Society for Metals. That collection, entitled *Fracturing of Metals*, contained 19 seminar papers presented in October 1947. For it, the numbers were: six physicists, six metallurgists, and three persons concerned with engineering or mechanics. It might be inferred that engineers are now successfully applying concepts and methods developed for them, earlier, by physicists; but the inference would be wrong. The ideas about basic phenomena presented in the earlier book are almost completely absent from this one, and so are any applications of them. I will illustrate this with three examples.

First, in the 1947 papers the dislocation concept was used to elucidate the micromechanisms of fracture and of fatigue; both the familiar schematic drawing and the bubble model were shown and discussed. In the 1950 papers the dislocation concept is scarcely mentioned; the drawing is presented (p. 288) only for the purpose of contrasting "what the physicist imagines" with "what the metallurgist sees"—and with no evidence of admiration for the physicist's imagination.

Second, in 1947 Griffith's theory of fracture was discussed critically and extended quantitatively by several authors. In 1950 neither it nor any substitute for it receives attention, except in Orowan's paper; he presents briefly the general ideas he has discussed more fully in Vol. 12 (1948-49) of *Reports on Progress in Physics*, with one new ingredient added.

Third, in 1947 there was interest in the details of stress distributions about notches; for it was recognized

that these details must be known in order to proceed from experiments to inferences about the necessary conditions for fracture. Once the yield point has been exceeded somewhere, the determination of the stress distribution requires a difficult and tedious calculation. But during the last few years, electronic calculators have been built that are designed to do difficult and tedious calculations. Have they been applied to this problem? Not so far as I know. In this book, except on a few isolated pages, the analysis of stress distributions consists in merely classifying the specimens as "notched" or "unnotched."

Thus the book leaves almost unmentioned those aspects of fracture that are of interest to a physicist. It contains many experimental results, mostly taken under field conditions or under the arbitrarily standardized conditions of engineering tests. The applications emphasized are to airplanes, ships, and machinery. There is quite a bit of fitting to formulas, all of the formal empirical type, with no attempt at physical interpretation. There is much unquantitative verbiage. In this respect there is no noticeable change from 1947.

A person active in the field of fracture will need this book for the data and references it contains. A person interested in learning about the field had better begin somewhere else: for instance, with the 1948-49 review by Orowan already cited.

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Isotope Catalog and Price List

The current catalog of the Oak Ridge National Laboratory listing the isotopes and services available may be purchased from the Radioisotope Sales Department of the Laboratory, Post Office Box P, Oak Ridge, Tennessee at the price of one dollar. In convenient loose-leaf form, the publication includes useful information on the various stable and radioactive isotopes and on their handling.

Mathematical Tables

Two new publications in the National Bureau of Standards Applied Mathematics Series have been announced, *Tables of Chebyshev Polynomials $S_n(x)$ and $C_n(x)$, $n = 2(1)12$, $x = 0(.001)2$* , and *Table of Bessel-Clifford Functions of Orders Zero and One*. The volume on Chebyshev polynomials (161 pages) contains an introduction by Cornelius Lanczos that gives a comprehensive survey of their important properties and applications, with their use in the solution of ordinary differential equations being well illustrated by numerical examples. It is available from the Government Printing Office, Washington 25, D. C. for \$1.75. An introduction to the basic properties of the Bessel-Clifford functions by M. Abramowitz is provided along with the tables in the volume devoted to them (72 pages), which can be obtained from the Government Printing Office for 45 cents.