analysis, is further illustrated by the fact that the last four pages of the book contain numerical data on the thermal and creep constants of commonly used engineering materials, while the preceding eleven pages present the most significant properties of Cartesian tensors.

Problems of stress distribution, including thermal stresses and stress relaxation, and stability are treated, and solutions are presented for rods, beams, thick-walled tubes, plates, and shells. Many of the solutions were first obtained by the two authors, but they also show an unusually broad acquaintance with the work of others, particularly in the United States and in the Soviet Union; the list of references contains almost 250 entries.

Since the book deals with the effects of creep only in metallic elements of structures and machinery in which the strain rate increases much more rapidly with increasing stress than proportionally, linearly viscoelastic materials are not treated in detail in the volume.

Stationary Random Functions

An Introduction to the Theory of Stationary Random Functions. By A. M. Yaglom. Prentice-Hall, Inc., Englewood Cliffs, N. J., 1962. Cloth, $6^1/_2 \times 9^1/_2$ in., xiii and 235 pp. $10.60.

REVIEWED BY GORDON NEWELL[2]

THIS is a revised version of a review published originally in Russian in 1952. About half of the book deals with "The General Theory of Stationary Random Functions" based mainly on correlation theory and spectral analysis. The other half deals with "Linear Extrapolation and Filtering of Stationary Random Functions." The mathematics is done correctly, but the author keeps it at a reasonable level of difficulty by not trying to prove theorems in their most general form. The development is everywhere well motivated by physical problems. The prerequisite is some familiarity with basic notions of probability theory, complex variable, and Fourier integrals. Although the applications come mainly from electronics, statistical mechanics, and the theory of turbulence, the relevance to other fields is clear. The book is exceptionally well suited as an introduction for readers concerned with applications.

Shell Theory

Theory of Elastic Thin Shells. By A. L. Goldenveizer. Translation edited by G. Herrmann. Pergamon Press, New York, N. Y., 1961, for ASME. Cloth, 658 pp. $15.

REVIEWED BY P. M. NAGHDI[3]

THIS is the translation of an outstanding book on the linear theory of thin elastic shells which is largely devoted to the developments of the subject in the Soviet Union prior to 1953. The contents of the book are arranged in five parts, each part containing several chapters.

Part 1 includes an account of the differential geometry of a surface, equations of equilibrium, analysis of strain, stress-strain relations, and general theorems. This portion of the book, as well as V. V. Novoshilov's *The Theory of Thin Shells* (translated by P. G. Lowe, P. Noordhoff, Ltd., 1959), contains several features which have had no parallel in the Western literature. Notable among these are the general strain compatibility equations (page 58) first derived by Goldenveizer, and the significant correspondence between the compatibility and the equilibrium equations in the absence of surface loads (page 92), called the static-geometric analogy. A number of known constitutive equations, such as those due to Novoshilov and Lur'e, are discussed, and, in this connection, on page 72, the author writes: "In the literature on shell theory there does not exist a unique way of defining the elasticity relations. . . It is for this reason that we shall not specify any particular set of relations as the definitive elasticity relations, but shall reserve the right to select these relations so that they will be best suited for the particular concrete problem that we may consider."

The remaining parts deal with membrane theory, circular cylindrical shells, determination of stress in an arbitrary shell, and the use of approximate methods in shell theory. Also included is a 38-page Addendum to the English edition which contains Goldenveizer's recent contributions to asymptotic integration of partial differential equations. (This Addendum represents three chapters of an expository article by Goldenveizer, the full translation of which has appeared in *Russian Mathematical Surveys*, vol. 15, 1960, pp. 1–73.)

The translation of this book is most certainly welcomed by English-speaking research workers and, as in the case of Novoshilov's *The Theory of Thin Shells*, is highly recommended to everyone working in shell theory.

Metals

The Mechanical Properties of Metals. By D. McLean. John Wiley & Sons, Inc., New York, N. Y., 1962. Cloth, 6×9 in., xv and 403 pp. $12.

REVIEWED BY J. GURLAND[4]

THE AUTHOR discusses the mechanical properties of metals on the basis of microscopic and atomistic processes. The book takes up, in succession, the major phenomena of engineering interest, such as yielding, strain hardening, ductile and brittle fractures, creep, fatigue, radiation damage, and stress corrosion, and, in each case, compares the observed behavior with that predicted by the current theories of imperfections in metals. It is concerned particularly with the interaction of dislocations, vacancies, and interstitials with each other and with the structural features of metals, i.e., grain orientations, grain boundaries, and second phase particles.

The book will serve as a very good introduction to the present state of the field, and its presentation will appeal particularly to metallurgists and engineers who are concerned with extrapolating the "defect" point of view to design principles.

Gear Systems

Gear Load Capacity. By W. A. Tuplin. John Wiley & Sons, Inc., New York, N. Y., 1962. Cloth, $5 \times 7^1/_2$ in., xiv and 177 pp. $4.75.

REVIEWED BY E. L. BROGHAMER[5]

THIS book is essentially written for the engineer concerned with the design of gears and gear systems. It is concerned with the presentation of working formulas useful for the determination of the load capacity of spur, helical, bevel, hypoid, worm, and crossed helical gears.

The first section is devoted to the determination of the allowable load on gear teeth using formulas representative of British Standard formulas. The treatment is extensive, covering load distribution, bending and surface stresses, size effect, speed effect, fatigue effect, and load limitation due to sliding velocity. A series of charts are provided to facilitate use of the formulas.

The second section is concerned with a study of the dynamic

[2] Associate Professor, Division of Applied Mathematics, Brown University, Providence, R. I.

[3] Professor of Engineering Science, University of California, Berkeley, Calif.

[4] Associate Professor, Division of Engineering, Brown University, Providence, R. I.

[5] Professor, Department of Mechanical Engineering, University of Illinois, Urbana, Ill.