
Books

Close Binary Systems. By Zdeněk Kopal. Vol. 5 of *Internat'l Astrophysics Series*, edited by M. A. Ellison and A. C. B. Lovell. 558 pp. John Wiley & Sons, Inc., New York, 1959. \$16.75. *Reviewed by E. J. Öpik, University of Maryland.*

SPECKS of light of variable intensity hundreds of light years away: who could expect volumes to be written on such scanty information, with a heavy arsenal of mathematics, celestial mechanics, multibody problems, the theory of tidal and rotational distortion, the laws of radiation, the theory of stellar structure and evolution to be invoked for the interpretation of the observational data provided by close binary stars? Kopal's monograph provides a summary of theoretical research in this branch of astrophysics. It is mainly addressed to the specialist, only few pages descending to the level of the general reader. Much of the recent research belongs to the author himself. Descriptive and detailed bibliographical notes, with summaries and comments, transcend the usual pattern of mere lists of literature and greatly help in elucidating the subject. The more involved chapters are followed by a "Survey of Results" which chiefly serves as a guide to the labyrinth of mathematical formulas, enabling the practical researcher to use them without necessarily following up the intricacies of derivation. On the other hand, the absence of a list of notations is a serious handicap.

The book covers the dynamics of close binaries, tidal and rotational effects, being followed up to first-order terms of the distortions. The Roche model, of two revolving mass points with extended envelopes whose periods of axial rotation and revolution coincide, is considered in particular as corresponding to the close binaries; the high central concentration of mass inside stars, required by the theory of stellar structure, as well as tidal equalization of the periods justify this model. Theoretical variation of light in spherical as well as rotating distorted stars is discussed; this includes variation of projected area, mutual illumination effects, eclipses complicated by the distribution of light over the stellar disk as well as by the von Zeipel effect of surface gravity, and, finally, atmospheric eclipses or obscuration due to extended semitransparent atmospheres. Theoretical velocity changes as revealed in Doppler shifts and profiles of spectral lines are analyzed. The longest chapter is dedicated to the derivation of the elements of eclipsing binaries, taking into account the entire variety of effects and applying iterative and least-square methods. The last, most read-

able, chapter deals with the physical properties of close binaries; elements of many systems are tabulated and aspects of evolution are discussed. Particular attention is given to the escape of matter from the extended gaseous envelopes and the loss or exchange of mass between the components. In this context are of interest the results of integrations of particle trajectories in the restricted three-body problem, carried out with the aid of the electronic computers of the University of Manchester, and presented in the form of instructive tables and diagrams. These and many other features of the book will be of interest to a much wider circle of scientists than those specifically interested in close binary stars.

An Introduction to Plasticity. By William Prager. 148 pp. Addison-Wesley Publishing Co., Inc., Reading, Mass. \$9.50. *Reviewed by E. H. Dill, University of Washington.*

PROFESSOR Prager shows himself to be an outstanding teacher by presenting sophisticated concepts in a form which can be readily understood. Instead of the abstract mathematical phraseology which is usually employed, he introduces simple kinematic models to illustrate complex physical problems. At the same time, numerous references are given so that the reader may easily locate pertinent material in the advanced technical literature if he so desires.

Unfortunately only perfectly plastic materials are considered and there is very little discussion of the relation of this theory to real materials. General theorems on the behavior of structures which are constructed of perfectly plastic material are given. The load-carrying capacity of rigid perfectly plastic structures is discussed in some detail with applications to beams, plates, and shells. The applications to the finite plastic deformations occurring during extruding, drawing, or rolling of metals are indicated.

This is not a new book but is a translation of the German-language edition, *Probleme der Plastizitätstheorie* (Birkhauser Verlag, Basel, 1955). It can be highly recommended to everyone who, with a minimum of effort, wishes to become familiar with the theory of perfectly plastic bodies.

Fundamentals of Physical Science (4th Revised Ed.). By Konrad Bates Krauskopf. 653 pp. McGraw-Hill Book Co., Inc., New York, 1959. \$6.95. *Reviewed by H. A. Liebhafsky, General Electric Research Laboratory.*

THIS excellent textbook should continue to serve as well as any single book can for the training in science of students seeking a liberal education. Such students are likely to look for the kind of royal road that Euclid said did not lead to geometry. The author tries to oblige by all legitimate means. He writes entertainingly. ("Early physics was an offspring of astronomy, early chemistry an outgrowth of misguided efforts to