deed, this reader will find in Walsh's book a refreshing change from the extreme abstractness of some present-day mathematics and perhaps he too will find it encouraging that so much new and important mathematics can still be discovered by relatively elementary methods.

MORRIS MARDEN

Anwendung der elliptischen Funktionen in Physik und Technik. By F. Oberhettinger and W. Magnus. (Die Grundlehren der Mathematischen Wissenschaften in Einzeldarstellungen, vol. 55.) Berlin, Springer, 1949. 8+126 pp.

The authors' collection, *Formeln und Sätze für die speziellen Funktionen der mathematischen Physik*, which appeared some years ago, is now supplemented by a treatment of those applications of elliptic functions and integrals which arise in the study of a wide variety of physical and engineering problems. With the exception of some conformal maps, none of the results of the theory of elliptic functions are proved. All formulas used in the applications are, however, collected in the first chapter and, wherever desirable, have been supplemented by useful comments.

In the first chapter the authors study elliptic integrals of the first and second kind in Legendre's normal form, as well as the corresponding complete integrals; the elliptic integral of the third kind is not considered. A variety of expansions and transformation formulas are listed, together with a large number of integrals reducible to them. This is followed by the four theta-functions and their properties and by a similar treatment of the Jacobian elliptic functions. A somewhat briefer treatment is accorded the Weierstrass theory. The second chapter deals with the conformal mapping of ellipses and certain types of polygons. The third chapter is devoted to a large number of examples of electrostatic distributions in two dimensions which may be treated by means of elliptic functions. The fourth chapter deals with similar applications to problems in fluid dynamics. In particular, there are some problems on wind tunnels, such as the airfoil in a wind tunnel of elliptic cross-section. The fifth chapter is a collection of various unrelated physical problems, such as the pendulum and the potential due to a charged ellipsoid. Finally, the authors consider a problem of Chebyshev approximation which leads to elliptic functions.

A short, but useful, bibliography follows each chapter and the book concludes with a short set of tables of the Legendre integrals of the first and second kind.

The book should prove valuable for physicists and engineers with a limited mathematical background who wish to acquire quickly a working knowledge of elliptic functions.

W. SEIDEL

Space-time structure. By Erwin Schrödinger. Cambridge University Press, 1950. 8+119 pp. $2.75.

In this book Professor Schrödinger reviews some of the main ideas underlying Einstein's theory of gravitation and the mathematical apparatus for expressing these ideas. The entire book is written in a clear and interesting manner. The main ideas of differential geometry which are needed for an understanding of the theory of relativity are expounded in a simple and lively fashion. The author develops his subject in "three stages, namely, (1) when only general invariance is imposed; (2) when in addition an affine connection is imposed; (3) when this is specialized to carry a metric." The discussion is organized in three parts corresponding to these stages.

Part I is concerned with tensor algebra and invariant integrals. Part II deals with covariant differentiation, parallel displacement, the curvature tensor, geodesics, and a chapter on the hypotheses about gravitation. Part III deals with affine connections derivable from metrics, the meaning of the metric according to the special theory of relativity, conservation laws and variational principles, and generalizations of Einstein's theory.

The last chapter deals with two recent attempts to formulate a unified field theory, one by Einstein and one by the author himself. These theories are given in a brief outline form and fundamental questions concerning them are not discussed. Thus the physical interpretations of the various quantities entering in these theories is not stated nor is there any discussion of the consistency of the equations resulting when the field equations are supplemented by conditions which would determine quantities left arbitrary in the existing theory. This latter question is of paramount importance in the latest formulation of the "Einstein-Strauss-theory." (See Appendix II in *The meaning of relativity*, 3d ed., by Albert Einstein, reviewed below.)

In spite of the short treatment of the newer aspects of the subject which still abounds with difficult and unresolved questions, this is an interesting and stimulating book, especially for the "general" reader.

A. H. TAUB