complished. We join the author in his hope that his work "will attract engineers and applied mathematicians to a field which well rewards study and research."

H. GEIRINGER

Fourier transforms. By I. Sneddon. New York, McGraw-Hill, 1951. 12+542 pp. $10.00.

It is the aim of the author to discuss various types of integral transforms from an elementary mathematical viewpoint and to demonstrate how they may be applied to various boundary value problems which arise in the physical and engineering sciences. Accordingly, some basic aspects of these transforms are discussed in the first three chapters of this text. Chapter one is concerned with the Fourier, Laplace, and Mellin transforms for one variable as well as the multiple Laplace and Fourier transforms. It is unfortunate that the complex form of the Fourier transform was not included here, for then one could see that there is no basic distinction between these transforms. That is, what may then be accomplished by the unilateral transform of Fourier may be equally well accomplished by the unilateral Laplace transform, etc. The second chapter contains a discussion of Hankel transforms (real case) as well as the relation between the real multiple Fourier transform and Hankel transforms. It closes with a discussion of dual integral equations of a special class which has been discussed by Titchmarsh and his collaborators. The closing chapter of this part of the book is devoted to a discussion of the finite Fourier and Hankel transforms. These transforms are infinite series of the Fourier or Fourier-Bessel type which arise naturally in Sturm-Liouville expansion theory. The application of these finite transformations to appropriate boundary value problems simply states that one is aware of the correct form of the expansion in advance.

The remaining seven chapters are concerned with the applications of these mathematical methods to many ordinary and partial differential equations which arise in the physical and engineering sciences. No specialized knowledge of physics is assumed and the remaining background is discussed with the view of supplying the necessary differential equations and their subsidiary conditions. We find, in the second portion of the book, applications drawn from vibration theory, elasticity, hydrodynamics, and heat conduction as well as some problems drawn from atomic and nuclear physics.

The book closes with three appendices. The first one is concerned with some properties of Bessel functions, while the second one discusses the method of steepest descent and some numerical methods.

The last section provides a table of useful transforms of the various types discussed.

Some of the recent work involving the use of the integral equation of the Wiener-Hopf type is conspicuous by its absence. It is in these topics that Fourier methods come to the forefront because, for the most part, there are no other methods available. Such a discussion would also serve to accentuate the importance of the role of function-theoretic methods in the integral transforms discussed in this text.

ALBERT E. HEINS

Vorlesungen über Differential- und Integralrechnung. Vol. II. *Differentialrechnung auf dem Gebiete mehrerer Variablen*. By A. Ostrowski. Basel, Birkhäuser, 1951. 482 pp. 67 Swiss fr.

Volume I of this work appeared in 1945, and was reviewed by the present writer (Bull. Amer. Math. Soc. vol. 52 (1946) pp. 798–799). The first volume was devoted to the structure of differential and integral calculus for functions of a single variable, and to the development of the rules of calculus as they apply to the standard elementary functions. This second volume carries the study of limits and continuity further than was done in the first volume, and deals with a variety of additional topics. There are eight chapters. A third volume is planned to complete the work. It will deal with integral calculus in relation to functions of several variables.

Chapter I is entitled *Infinite sets*. After a discussion of denumerable and nondenumerable sets, the chapter is mainly taken up with the concepts of point set topology for Euclidean space. Chapter II treats the theory of limits and continuity for real functions defined on sets in Euclidean space. Chapter III deals with infinite sequences and series, beginning with the concepts of limits inferior and superior for sequences. A prominent place is given to a useful but apparently little known theorem of Cauchy, which reads as follows: Suppose $0<A_1<A_2< \cdots, A_n\to\infty$ as $n\to\infty$, and let $\{a_n\}$ be any sequence. Then

$$\frac{a_{n+1}-a_n}{A_{n+1}-A_n}\to d \quad \text{implies} \quad \frac{a_n}{A_n}\to d.$$

This holds as well if $d=\pm\infty$. There are numerous applications of this theorem, among which is a proof of one of the forms of l'Hospital's rule (in Chapter IV). The treatment of series of constant terms follows standard lines. There is a generalized form of Raabe's test, but the very useful test of Gauss is omitted. The discussion of uni-