Such a discussion will be shortly available, however, in a paper * by Miss Bess Eversull, which is to appear in the ANNALS OF MATHEMATICS.

Quite a little of the new material to be found in the present edition of Professor Carslaw's book is based on his own contributions to the subject since the appearance of the first edition. Thus for example the discussion in section 90 of the flow of heat in a wedge is based on a paper by the author in the PROCEEDINGS OF THE LONDON SOCIETY ((2), vol. 8 (1909–10)). Also chapter XI, dealing with the use of contour integrals in the solution of the equation of conduction, is based on papers by the author in the PHILOSOPHICAL MAGAZINE ((6), vol. 39 (1920)) and the PROCEEDINGS OF THE CAMBRIDGE PHILOSOPHICAL SOCIETY (vol. 20 (1921)).

Chapter XII, which deals with the use of integral equations in the solution of the equation of conduction, is only a very brief sketch of this subject. It was doubtless introduced mainly for the purpose of acquainting the student of applied mathematics with the possibilities in this direction and in this manner stimulating him to a study of the works that deal with the subject in a more extensive manner. A list of such works is given in a footnote at the beginning of the chapter.

The bibliography of works on the conduction of heat, found in Appendix II, has been brought up to date by the addition of titles of articles that have appeared since the publication of the first edition. The added titles for this period of fifteen years occupy three pages and form approximately one-fourth of the entire list, which corresponds to a period of a century. Thus we have a rough index of the mathematical activity in this particular field during recent years.

CHARLES N. MOORE

Praxis der Gleichungen. By C. Runge. Zweite, verbesserte Auflage. Berlin and Leipzig, Vereinigung wissenschaftlicher Verleger, 1921. 2 + 172 pp.

This book, printed in 1900 as number XIV of the SAMMLUNG SCHUBERT, now appears in larger format and better type as one of the new GÖSCHENS LEHRBÜCHEREI,—the second of the first group (*Reine Mathematik*). Changes have been few and unimportant. The reviewer noticed a paragraph at the foot of page 98 and a figure between pages 106 and 107, neither of which appears in the first edition, and an index has been added. Two errata have been carried over from the first edition: in line 2 from the bottom of page 38, for a_{14}, read a_{14}/a_{11}; in line 3 from the bottom of page 87, for 3217.18, read 5217.18. A new misprint is the omission of the i in the exponent of e in line 11 of page 165. But, considering the nature of the contents, there are on the whole remarkably few typographical errors.

This volume has become such a classic that it is scarcely necessary to describe it more fully than to say it gives in considerable detail, illustrated by numerous examples, the actual processes to be followed in solving numerical equations where the roots are to be found to a high degree of accuracy. Some theory is given, culminating in Sturm's Theorem, but the emphasis is laid on actual computations. It is to be hoped that

* This paper was presented to this Society at its meeting in Chicago, April 14, 1922. See this BULLETIN, vol. 28 (1922), p. 289.

sometime an English translation will make this work even more accessible to our students. A study of it is most heartily recommended to the mathematician who is interested in the applications of theory to numerical practice, to the applied mathematician who has to perform computations, and to the teacher of secondary mathematics who thinks that with Horner's method the last word on the solution of equations has been said.

ELIJAH SWIFT

Les Applications Élémentaires des Fonctions Hyperboliques à la Science de l'Ingénieur Électricien. By A. E. Kennelly. Paris, Gauthier-Villars, 1922. vii + 151 pp.

This book covers the subject of a series of lectures delivered in France by the author as exchange professor, representing a group of American universities. The same topic has been covered by Professor Kennelly in a previous work (in English) published in 1912 by the University of London Press. The differences are so slight that an American student would naturally prefer the one written in his own language.

The aim of both books is to spread more widely the fact that cable problems are best understood in terms of hyperbolic functions,—of real variables for the case of direct current with distributed leakage, of complex variables in the case of alternating currents with distributed earth or parallel-wire capacitance. This aim is very heartily to be commended. The author's method of solving alternating current problems by considering the corresponding problem with direct current, and then by replacing resistances by complex impedances is also easily the best. In some text-books this method is not used as consistently and thoroughly as it should be. It enables the principles of the wave-filter, for example, to be stated very easily by means of the two principles of the addition of impedances (admittances) of series (parallel) conductors. It is probable, however, that this method finds its way more frequently into lectures than into text-books. In this connection the reviewer would advise a more frequent use of four-terminal impedances (current between AB in terms of voltage drop from C to D).

Either of the two books would also be a useful source of problems in the elementary theory of the complex variable.

In some ways the book under review suffers from condensation. In particular, the remark that the hyperbolic angle of a sector can be measured, not only by twice its area, but also "par la longueur de l'arc hyperbolique AP, rapportée à la longueur croissante du vecteur OP" is not clear until one observes, in the earlier book, that by this is meant the integral with respect to the arc of the reciprocal of the radius.

The book under review contains a brief study of transient currents which is not contained in the earlier work.

Finally mathematicians may have their attention called to Appendix F of the earlier book in which is shown an interesting relation between continued fractions of a certain class and hyperbolic functions. The student is referred to a paper by the author in the ANNALS OF MATHEMATICS, vol. 9 (1908), p. 85 et seq.

P. J. DANIELL