Propagation de l'Electricité : Histoire et Théorie. By MARCEL BRILLOUIN. A. Hermann, Paris, 1904. ii + 398 pp.

THIS valuable work, as the author says in his preface, is "la reproduction assez fidèle des leçons que j'ai professées au Collège de France pendant l'année 1901–1902. Ce n'est nullement un traité d'électricité complet et méthodique; c'est, conformément, je crois, à l'esprit de l'enseignement du Collège de France, un ensemble de leçons, très inégalement développées, suivant que le sujet dont elles traitent est plus ou moins connu par des publications françaises, ou qu'il m'a paru comporter quelques remarques historiques ou théoriques nouvelles."

The author expects to follow this volume by another, containing the essential portions of his lectures for 1902–1903 and 1903–1904 on electron theory.

The first of the four books which make up the present volume is devoted to the pioneers of the science from Cavendish to Kirchhoff and Clausius. Cavendish and Ohm receive separate chapters, which are biographical as well as scientific, and particularly interesting. In this book, as in most other portions of the work, numerous references are given.

The second book treats of steady currents, and also of changing currents without magnetic induction. The first chapter, entitled "currents in space," considers, among other matters, the decay with time of electrification in a conducting medium, electric double layers, and the methods of Gouy and Cohn and Arons for the determination of the dielectric constants of conducting liquids. In the treatment of the first mentioned subject the relaxation time, involving the dielectric constant, is given for a number of substances, including bismuth and copper; but the dielectric constants of these substances are not given, nor is any authority quoted, while the well known dielectric constant of water is given — a procedure which can hardly be justified in view of the little that is known of the dielectric constants of metals. The second and third chapters are devoted to the resistances of conductors with electrodes of relatively high conductivity and to Rayleigh's method of approximate resistance evaluation. The resistance of a circular cylinder, with various electrodes, is treated at length by Bessel's functions, to some of the properties of which a separate chapter is devoted. Electric propagation along a cable is discussed in a long chapter after Kelvin, Kirchhoff, and Vaschy; and the book ends with

two chapters on the much neglected subject of the electric field of the steady current. Attention should be called to the erroneous statement at the beginning of the book to the effect that all following equations are written in electromagnetic units. As a matter of fact the author continually expresses K, the dielectric constant, in the electrostatic unit, and therefore introduces the square of Ω, the ratio of the electromagnetic unit charge to the electrostatic unit charge, to make his equations correct. Unfortunately, M. Brillouin is not alone in this practice.

The third book, on electromagnetic induction, is introduced by a brief but excellent historical chapter. Joseph Henry, however, is not mentioned, and Faraday receives scarcely better treatment. Four chapters are devoted to induction in fixed circuits; special attention being given to parallel wires, cylindrical coils, and *spherical* coils. On account of the simplicity of the exact formulæ and the facility of construction, the author recommends the latter form of coil for inductance standards. A chapter is devoted to the diffusion of currents in conductors, and the book ends with two chapters on electric propagation along conductors devoted largely to Kirchhoff's classic memoir of 1857.

The fourth and concluding book treats of the general electromagnetic field. After a discussion of the more general equations, involving a comparison of the theory of Maxwell with the older theories of Neumann and Helmholtz, the field of the Hertzian oscillator is treated at length, first without damping, after Hertz, and then with damping, after Pearson and Lee. The two final chapters of the work are devoted to the electric oscillations of a sphere and the electric oscillations of a prolate spheroid. Extensive numerical tables for the latter are given at the end of the volume.

The treatment appears to us to be, in general, accurate, elegant, and commendably concise. Too great brevity, however, has in some places resulted in obscurity. The book contains valuable critical remarks and considerable original work by the author not hitherto published, as well as other valuable matter not readily accessible elsewhere. The errata we have noticed are not numerous and are for the most part typographical and not likely to be misleading. Confusion will doubtless be produced in the minds of some readers by the author's indiscriminate use of $\triangle$ for both $\triangle$ and ∇ as ordinarily employed.

The work naturally contains little to interest the student of pure mathematics, but it can be highly recommended to the physicist and forms an acceptable addition to electrical literature.

S. J. BARNETT.

NOTES.

THE annual meeting of the AMERICAN MATHEMATICAL SOCIETY will be held on Thursday and Friday, December 28–29. The Council will meet on Thursday morning, and the annual election of officers and other members of the Council will close on Friday morning. The usual informal dinner will be arranged for Thursday evening.

THE Chicago Section will hold its eighteenth regular meeting at the University of Chicago, on December 29–30. Titles and abstracts of papers to be presented at this meeting should be in the hands of the Secretary of the Section, Professor THOMAS F. HOLGATE, 617 Library Street, Evanston, Ill., not later than December 5.

THE concluding (October) number of volume 6 of the *Transactions* of the AMERICAN MATHEMATICAL SOCIETY contains the following papers: "Sur l'écart de deux courbes et sur les courbes limites," by M. FRÉCHET; "On a certain system of conjugate lines on a surface connected with Euler's transformation," by J. EIESLAND; "Surfaces of constant curvature and their transformations," by L. P. EISENHART; "Volumes and areas," by N. J. LENNES; "On a problem including that of several bodies and admitting of an additional integral," by E. O. LOVETT; "On the stability of the motion of a viscous liquid," by F. R. SHARPE; "Ueber die vollständig reduciblen Gruppen, die zu einer Gruppe linearer homogener Substitutionen gehören," by A. LOEWY; "On the Cayley-Veronese class of configurations," by W. B. CARVER. Also, Notes and Errata, volumes 5–6; and table of contents, volume 6.

THE October number (volume 7, number 1) of the *Annals of Mathematics* contains: "Concerning Green's theorem and the Cauchy-Riemann differential equations," by M. B. PORTER; "On the singularities of tortuous curves," by P. SAUREL; "On the twist of a tortuous curve," by P. SAUREL; "The continuum as a type of order: an exposition of the modern