displacement has been modified to read thus:

$$\mathfrak{D} = \epsilon \mathfrak{E} \text{ instead of } \mathfrak{D} = \frac{\epsilon}{4\pi} \mathfrak{E},$$

which introduces a change in the equations of the displacement current.

The influence of the Maxwell theory is evident from the popularity of this (and other similar treatments) and no doubt will continue to grow.

JAMES BYRNIE SHAW.

NOTES.

THE Colloquium Lectures delivered at the Princeton meeting of the American Mathematical Society, September 15–17, 1909, by Professor GILBERT A. BLISS on "Fundamental Existence Theorems," and Professor EDWARD KASNER on "Differential-Geometric Aspects of Dynamics," have been published by the Society in a volume of about 230 pages. The book is now on sale; price to members of the Society, $1.00, to non-members $1.50. Orders should be addressed to the American Mathematical Society, 501 West 116th Street, New York.

THE April number (volume 14, number 2) of the *Transactions of the American Mathematical Society* contains the following papers: "A study of the circle cross," by J. L. COOLIDGE; "Projective differential geometry of developable surfaces," by W. W. DENTON; "The solutions of non-homogeneous linear difference equations and their asymptotic form," by K. P. WILLIAMS; "An application of finite geometry to the characteristic theory of the odd and even theta functions," by A. B. COBLE; "Conformal transformations on the boundaries of their regions of definition," by W. F. OSGOOD and E. H. TAYLOR.

THE April number (volume 35, number 2) of the *American Journal of Mathematics* contains the following papers. "The reducibility of maps," by G. D. BIRKHOFF; "The highest common factor of a system of polynomials in one variable,"

by L. L. DINES; "Linear mixed equations and their analytic solutions," by R. D. CARMICHAEL; "On the theory of linear difference equations," by R. D. CARMICHAEL; "On the product of two quadro-quadric space transformations," by Miss H. P. HUDSON; "On some topological properties of plane curves and a theorem of Möbius," by S. LEFSCHETZ; "On a flat spread, sphere geometry in odd-dimensional space," by J. EIESLAND.

THE commission of the Wolfskehl foundation of the Göttingen academy provided a series of lectures at Göttingen during the week April 21–April 26 on the kinetic theory of matter. Lectures on different phases of the subject were given by M. PLANCK, P. DEBYE, W. NERNST, M. v. SMOLUCHOWSKI, A. SOMMERFELD, H. A. LORENTZ. A 16-page prospectus of the course is contained in the last number of the *Jahresbericht.*

ANALYTICAL catalogue cards for both the German and the French encyclopedias of mathematics can be obtained from the Library of Congress. The price of the set as issued to March 20, 1913, is: author set, German, $2.60, French, $1.60; dictionary set, German, $4.08, French, $1.60.

THE firm of Martin Schilling in Leipzig has recently prepared the following mathematical models.

1. Generation of a hyperboloid of revolution by means of the rotation of a straight line or a space curve, by Professor K. DOEHLEMANN.
2. Three plaster models of surfaces of constant width, by Professor MEISSNER.
3. Three card-board models of Bessel functions of complex argument, with a description by Professor A. SOMMERFELD, by Mr. Fr. BERGMANN.
4. Gyroscopic apparatus, by Professor L. PRANDTL.

THE Francoeur prize (1000 fr.) of the academy of sciences of Paris has been awarded to Dr. A. CLAUDE, of the bureau of longitudes of Paris, for his researches in mathematics and astronomy.

AT the session of the mathematico-physical society of Kasan held December 14, 1912, the Lobachevsky prize for

1912 was awarded to Professor F. SCHUR, of the University of Strassburg, for his book: Grundlagen der Geometrie. Professor J. L. COOLIDGE, of Harvard University, received honorable mention for his Elements of Non-Euclidean Geometry.

THE royal academy of sciences of Bologna has received a request from Dr. A. MERLANI to repeat its prize problem of 1912, for the best solution of which he will present 500 lire. The problem proposed is the following:

"To present, in a critical historical manner the organic development of the theory of elliptic functions, and the various points of view under which the theory has been presented from the end of the eighteenth century until the present time. Indicate the influence the various developments have had on other branches of mathematics."

No member of the academy may compete, otherwise there are no restrictions. Competing memoirs should be plainly written in Italian and be in the hands of the secretary, under the usual conditions, before December 31, 1914.

INDIANA UNIVERSITY. Summer Quarter (June 19–September 3, 1913).—By Professor S. C. DAVISSON: Advanced calculus, five hours; Theory of functions, five hours.—By Professor D. A. ROTHROCK: Ordinary differential equations, double course, first half.—By Professor R. D. CARMICHAEL: Projective geometry, five hours; Foundations of mathematics, five hours.

THE following courses in mathematics are announced for the academic year 1913–1914.

INDIANA UNIVERSITY.—By Professor S. C. DAVISSON: Theory of functions, two hours; Ordinary differential equations, three hours (*a*, *w*).—By Professor D. A. ROTHROCK: Differential geometry, three hours.—By Professor U. S. HANNA: Theory of groups of substitutions, two hours.—By Professor R. D. CARMICHAEL: Theory of ordinary differential equations, three hours; Bessel, Laplace, and Lamé functions, three hours; Difference equations, two hours.—By Mr. K. P. WILLIAMS: Fourier series and integrals, three hours (*s*).

All courses continue throughout the year, except those marked a = autumn, w = winter, s = spring.

YALE UNIVERSITY.—By Professor J. PIERPONT: Theory of functions of a complex variable, two hours; Modern analytic geometry, two hours; Theory of differential equations, two hours; Non-euclidean geometry, two hours.—By Professor P. F. SMITH: Differential geometry, two hours (second term); Continuous groups, two hours (second term).—By Professor E. W. BROWN: Advanced calculus and differential equations, three hours; Statics and dynamics, two hours; Advanced and theoretical dynamics, two hours, first half-year; Periodic orbits, two hours, second half-year.—By Professor W. R. LONGLEY: Integral equations with applications, two hours; Potential theory and harmonic analysis, two hours.—By Professor W. A. WILSON: Theory of functions of real variables, two hours.—By Dr. G. M. CONWELL: Theory of finite groups, two hours.—By Dr. D. D. LEIB: Advanced algebra, two hours.—By Dr. H. F. MACNEISH: Integration of differential equations; Synthetic projective geometry, two hours.—By Dr. E. J. MILES: Calculus of variations, two hours.—By Dr. J. I. TRACEY: Analytic geometry, two hours.

THE following courses in mathematics are announced for the present semester:

UNIVERSITY OF BERLIN.—By Professor H. A. SCHWARZ: Integral calculus, four hours; with exercises, two hours; Applications of elliptic functions, four hours; The fundamental theorem of projective geometry, two hours; Colloquium, two hours; Seminar, two hours.—By Professor G. FROBENIUS: Theory of algebraic equations, II, four hours; Seminar, two hours.—By Professor F. SCHOTTKY: Special problems in the theory of functions, four hours; Theory of elliptic functions, four hours; Seminar, two hours.—By Professor G. HETTNER: Infinite series, products and continued fractions, two hours.—By Professor J. KNOBLAUCH: Theory of determinants, four hours; Theory of curved surfaces, II, four hours; Theory of space curves, II, one hour.—By Professor R. LEHMANN-FILHÉS: Differential calculus, four hours; with exercises, one hour.—By Professor I. SCHUR: Ordinary differential equations, four hours; Theory of functions, I, four hours.—Dr. K. KNOPP: Analytic geometry, four hours; Theory of aggregates, two hours; Theory of entire transcendental functions, two hours.

UNIVERSITY OF LEIPZIG.—By Professor K. ROHN: Projective geometry, two hours; with exercises, one hour; Analytic geometry, four hours; with exercises, one hour.—By Professor O. HÖLDER: Ordinary differential equations, four hours; with exercises, one hour.—By Professor G. HERGLOTZ: Algebra, four hours; Higher problems of elementary mathematics, two hours; Introduction to recent literature in the theory of functions, two hours.—By Professor P. KOEBE: Theory of functions, four hours; Fourier series and definite integrals, two hours; Recent literature in the theory of functions, two hours.—By Dr. R. KÖNIG: Algebraic analysis, two hours.

UNIVERSITY OF STRASSBURG.—By Professor H. WEBER: Definite integrals and introduction to the theory of functions, four hours; Seminar, two hours.—By Professor F. SCHUR: General theory of curves and surfaces, four hours; Selected chapters of projective geometry, two hours; Seminar, two hours.—By Professor J. WELLSTEIN: Matrices and their application to vector analysis and to integral equations, four hours; Encyclopedia of elementary mathematics, two hours.—By Professor R. v. MISES: Descriptive geometry, four hours; with exercises, two hours; Calculus of probabilities, two hours; Fundamental concepts in the technics of flight, one hour; Seminar, two hours.—By Professor P. EPSTEIN: Calculus of variations, two hours.

DR. A. ROSENBLATT has been appointed docent in mathematics at the University of Cracow.

DR. U. CISOTTI, of the University of Padua, has been appointed professor of mathematical physics at the University of Pavia.

MR. A. S. EDDINGTON, chief assistant at the Royal Observatory, Greenwich, has been elected to the Plumian professorship of astronomy in the University of Cambridge.

DR. P. BOUTROUX, of the University of Poitiers, has been appointed professor of mathematics at Princeton University.

AT the meeting of the American philosophical society held April 19, Professor L. P. EISENHART, of Princeton University,

was elected to membership, and Professor Sir JOSEPH LARMOR, of the University of Cambridge, was elected foreign member.

AT the meeting of the National academy of sciences held in Washington, D. C., April 24, Professor L. E. DICKSON, of the University of Chicago, and Professor A. O. LEUSCHNER, of the University of California, were elected to membership.

DR. C. T. SULLIVAN has been promoted to an assistant professorship of mathematics at McGill University.

PROFESSOR P. H. SCHOUTE, of the University of Groningen and author of the Geometrie der mehrdimensionalen Räume, died April 18 at the age of 67 years.

NEW PUBLICATIONS.

I. HIGHER MATHEMATICS.

AMODEO (F.). Lezioni di geometria proiettiva, dettate nella università di Napoli. 3a edizione, migliorata e corretta. Ristampa, con appendice. Napoli, Pierro, 1912. 8vo. 15+506 pp. L. 12.00

ARCHIMEDIS Opera omnia cum commentariis Eutocii. Iterum edidit J. L. Heiberg. Volumen II. Leipzig, Teubner, 1913. 8vo. M. 8.00

AUERBACH (F.). See TASCHENBUCH.

BERNSTEIN (S. I.). See PICARD (E.).

BOLYAI (J.). La science absolue de l'espace. Traduit de l'allemand par J. Houel, avec une notice sur la vie et l'oeuvre de J. et W. Bolyai par F. Schmidt. Paris, Hermann, 1911. 8vo. Fr. 4.00

BUKREIEF (B. I.). Elements of algebraic analysis. Lectures in the advanced course for women at Kief. (Russian.) (*Kief University Bulletin.*) Kief, 1912. 8vo. 6+224 pp. R. 2.00

CALDARERA (F.). Trattato dei determinanti. Palermo, Virzi, 1913. 8vo. 255 pp. L. 7.00

CAPITO (C. A. A.). A text-book of mathematics and mechanics. London, Griffin, 1913. 12mo. 398 pp. $4.00

DEMARTRES (G.). Cours de géométrie infinitésimale. Avec une préface de G. Darboux. Paris, Gauthier-Villars, 1913. 8vo. 10+418 pp. Fr. 17.00

ENRIQUES (F.). Les concepts fondamentaux de la science. Traduit de l'italien par L. Rougier. Paris, Dunod et Pinat, 1912. 18mo. Fr. 3.50

FAZZANI (G.). See FREYCINET (C. de).