THIRTY-SECOND SESSION, 1895-96

(since the Formation of the Society, January 16th, 1865).

November 14th, 1895.

THE SECOND ANNUAL GENERAL MEETING OF THE LONDON MATHE-
MATICAL SOCIETY, as incorporated under the Companies Act,
1867, on October 23rd, 1894, held at 22 Albemarle Street, W.

Major MACMAHON, R.A., F.R.S., President, in the Chair.

The Treasurer read his report. Its reception was moved by
Mr. Basset, seconded by Mr. S. Roberts, and supported by Mr.
Kempe, who also moved a vote of thanks to Dr. Larmor for the
trouble he had taken in connexion with the duties of his office.
Both votes were carried unanimously.

The Rev. T. R. Terry, having signified his willingness to act
again as Auditor of the report, was, on the nomination of the Presi-
dent, appointed to that office.

The President announced the death of Mr. E. H. Rhodes, elected a
member June 10th, 1875, which took place on the 1st instant.

Mr. Tucker stated that the number of names on the roll of mem-
bers was 220, of whom 107 were life compounders.

The Society's losses by deaths during the past session had been
exceptionally severe, as will be seen by the names which follow:—
Prof. Cayley, elected June 19th, 1865; Sir James Cockle, F.R.S.,

elected June 9th, 1870; Prof. A. M. Nash, M.A., elected November 10th, 1887; Mr. E. H. Rhodes, B.A., June 10th, 1875, and Mr. A. Cowper Ranyard, M.A., who was an original member and joint founder of the old Society.

The following communications had been made or received :—

Mathematics (the Presidential Address) : Mr. A. B. Kempe.

Third Memoir on the Expansion of certain Infinite Products : Prof. L. J. Rogers.

On the Kinematics of non-Euclidian Space : Prof. W. Burnside.

On a Class of Groups defined by Congruences : Prof. W. Burnside.

On Fundamental Systems for Algebraic Functions : Mr. H. F. Baker.

Electric Vibrations in Condensing Systems : Dr. J. Larmor.

On certain Definite ϑ-Function Integrals : Prof. L. J. Rogers.

The Electrical Distribution on a Conductor bounded by Two Spherical Surfaces cutting at any angle : Mr. H. M. Macdonald.

Note on some Properties of a Generalized Brocard Circle : Mr. J. Griffiths.

On certain Differential Operators, and their use to form a Complete System of Seminvariants of any Degree or any Weight : Prof. Elliott.

Notes on the Theory of Groups of Finite Order : Prof. W. Burnside.

The Dynamics of a Top : Prof. Greenhill.

The Electrical Distribution induced on a Circular Disc placed in any Field of Force : Mr. H. M. Macdonald.

The Perpetuant Invariants of Binary Quantics : the President.

An Extension of Vandermonde's Theorem : Mr. F. H. Jackson.

A new Theorem in Probability : Rev. T. C. Simmons.

Notes on the Theory of Groups of Finite Order (continued) : Prof. W. Burnside.

On the Geometrical meaning of a Form of the Orthogonal Transformation : Prof. M. J. M. Hill.

A Property of Skew Determinants : Prof. M. J. M. Hill.

Researches in the Calculus of Variations, Part VI. : Mr. E. P. Culverwell.

On those Orthogonal Substitutions that can be generated by the Repetition of an Infinitesimal Orthogonal Substitution : Dr. H. Taber.

On Elliptic and Hyper-Elliptic Systems of Differential Equations and their Rational and Integral Algebraic Integrals, with a Discussion of the Periodicity of Elliptic and Hyper-Elliptic Functions : Rev. W. R. W. Roberts.

An Extension of Boltzmann's Minimum Theorem : Mr. S. H. Burbury.

Applications of Trigraphy : Mr. J. W. Russell.

The Reciprocators of Two Conics discussed Geometrically : Mr. J. W. Russell.

The Reciprocators of Two Conics discussed Analytically : Mr. A. E. Jolliffe.

On the Form of the Energy Integral in the Varying Motion of a Viscous Incompressible Fluid : Mr. J. Brill.

On an Expansion of the Exponential Function $1/R^{s-1}$ in Legendre's Functions : Dr. Routh.

On the most General Solution of given degree of Laplace's Equation: Dr. E. W. Hobson.

Point-Groups in relation to Curves: Mr. F. S. Macaulay.

On Maxwell's Law of Partition of Energy: Mr. G. H. Bryan.

Proof that $2^{197}-1$ is Divisible by 7487 : Lt.-Col. Cunningham.

On the Integration of Allégret's Integral : Mr. A. E. Daniels.

On the Expansion of Functions: Mr. E. T. Dixon.

The Spherical Catenary : Prof. Greenhill and Mr. I. Dewar.

The Transformation of Elliptic Functions : Prof. Greenhill.

A Generalized Form of the Hypergeometric Series, and the Differential Equation which is satisfied by the Series : Mr. F. H. Jackson.

The Linear Equations that present themselves in the Method of Least Squares : the President.

On the Complex Number formed by Two Quaternary Matrices : Dr. G. G. Morrice.

The same journals had been subscribed for and the same exchanges of *Proceedings* made as in the preceding Session.

The Rev. T. R. Terry and Mr. W. W. Taylor having been appointed Scrutators, the ballot was taken, with the result that the following gentlemen, nominated by the Council, were elected to serve as the Council for the ensuing Session:—Major MacMahon, R.A., F.R.S., President; Prof. M. J. M. Hill, F.R.S., Mr. M. Jenkins, and Mr. A. B. Kempe, F.R.S., Vice-Presidents; Dr. J. Larmor, F.R.S., Treasurer ; Mr. R. Tucker and Mr. A. E. H. Love, F.R.S., Hon. Secs. Other Members of the Council:—Mr. H. F. Baker, Dr. G. H. Bryan, F.R.S., Lt.-Col. Cunningham, R.E., Prof. Elliott, F.R.S., Dr. Glaisher, F.R.S., Prof. Greenhill, F.R.S., Dr. Hobson, F.R.S., Prof. W. H. H. Hudson, and Mr. F. S. Macaulay.

The President then made a statement of the reasons which had led Mr. Jenkins, after thirty years' tenure of the office, to resign his position of Secretary, and proposed a vote of thanks to that gentleman for his devoted services of thirty years to the Society, coupling with it the hope that his health might be restored by his retirement to the country. This vote, which was seconded by Mr. Kempe and supported by Mr. S. Roberts, who had been connected with the old Society almost from its inception, was unanimously carried, and Mr. Jenkins suitably acknowledged the compliment.

The following papers were read, or communicated as read :—

On the Stability and Instability of certain Fluid Motions (iii.), and on the Propagation of Waves upon the Plane Surface separating Two Portions of Fluid of Different Vorticities : Lord Rayleigh.

Note on Matrices: Mr. J. Brill.

Determination of the Volumes of certain Species of Tetrahedra without Employment of the Method of Limits: Prof. M. J. M. Hill.

Some Algebraical Theorems connected with the Theory of Partitions: Prof. Forsyth.

Certain General Series: Mr. F. H. Jackson.

An Extension of Sylvester's Constructive Theory of Partitions: the President.

Note on the Representation of a Conic by a Linear Equation: Mr. J. Griffiths.

On the Representation of a Number as a Sum of Squares: Prof. G. B. Mathews.

Researches in the Calculus of Variations: Part VII., Limiting Conditions in Multiple Integrals; Part VIII., Reduction of the Problem of the Discrimination of Maxima and Minima Values in Double Integrals with Variable Limits to a new Problem in Single Integrals: Mr. E. P. Culverwell.

A Note on certain Forms of the Equation of Normals to Conic Sections: Mr. J. S. L. Hatton.

On the Evaluation of a certain Dialytic Determinant: Mr. W. W. Taylor.

Criterion of 2 as a 16-ic Residue, with Remarks upon some of Mersenne's Numbers: Lt.-Col. Cunningham.

The following presents were made to the Library :—

Elliott, E. B.—" Introduction to the Algebra of Quantics," 8vo; Oxford, 1895.

" Beiblätter zu den Annalen der Physik und Chemie," Bd. XIX., St. 10; Leipzig, 1895.

" Memoirs and Proceedings of the Manchester Literary and Philosophical Society," Vol. IX., No. 6 ; 1894-95.

" Proceedings of the Physical Society of London," Vol. XIII., Pts. 11, 12 ; 1895.

" Berichte über die Verhandlungen der Königl. Sachsischen Gesellschaft der Wissenschaften zu Leipzig," IV. ; 1895.

" Bulletin de la Société Mathématique de France," Tome XXIII., No. 8 ; Paris, 1895.

" Bulletin of the American Mathematical Society," 2nd Series, Vol. II., No. 1 ; New York, 1895.

" Bulletin des Sciences Mathématiques," Tome XIX., Sep., Oct., 1895 ; Paris.

" Nyt Tidsskrift for Matematik," Aargang 7, Nr. 4, A., and Nr. 3, B. ; Copenhagen, 1895.

" Atti della Reale Accademia dei Lincei," Sem. 2, Vol. IV., Fasc. 7, 8 ; Roma, 1895.

" Annali di Matematica," Serie 2, Tome XXIII., Fasc. 4 ; Milano, 1895.

"Journal fur die reine und angewandte Mathematik," Bd. cxv., Heft 3; Berlin, 1895.

" Annales de la Faculté des Sciences de Toulouse," Tome ix., Fasc. 3 ; 1895.

" Educational Times," November, 1895.

" Atti della Reale Accademia delle Scienze Fisiche e Matematiche," Vol. vii. ; Naples, 1895.

"Memorie della Regia Accademia di Scienze, Lettere ed Arte in Modena," Vol. x. ; 1894.

" Indian Engineering," Vol. xviii., Nos. 12–16.

Cayley, A.—" Collected Mathematical Papers," Vol. viii., 4to ; Cambridge, 1895.

" Bulletins de l'Académie Royale de Belgiqué," 65me Année, 3me Série, Tomes xxvi.–xxix. ; Bruxelles, 1893–95.

" Annuaire de l'Académie Royale d_ Belgique," Années 60 and 61 ; Bruxelles, 1894–5.

On the Stability or Instability of certain Fluid Motions (III.).*
 By LORD RAYLEIGH, Sec. R. S.   Received October 4th, 1895.
 Read November 14th, 1895.

The steady motions in question are those in which the velocity is parallel to a fixed line (x), and such that U is a function of y only. In the disturbed motion $U+u$, v, the infinitely small quantities u, v are supposed to be periodic functions of x, proportional to e^{ikx}, and, as dependent upon the time, to be proportional to e^{int}, where n is a constant, real or imaginary. Under these circumstances the equation determining v is

$$\left(\frac{n}{k}+U\right)\left(\frac{d^2v}{dy^2}-k^2v\right)-\frac{d^2U}{dy^2}v = 0 \quad \dots\dots\dots\dots\dots(1).$$

The vorticity (Z) of the steady motion is $\frac{1}{2}dU/dy$. If throughout any layer Z be constant, d^2U/dy^2 vanishes, and, whenever $n+kU$ does not also vanish,

$$d^2v/dy^2 - k^2v = 0 \quad \dots\dots\dots\dots\dots\dots\dots(2),$$

or
$$v = A\,e^{ky} + B\,e^{-ky} \quad \dots\dots\dots\dots\dots\dots\dots(3).$$