

**CAMBRIDGE: PRINTED AT
THE UNIVERSITY PRESS
BY WALTER LEWIS, M.A.**

Proceedings of the
CAMBRIDGE PHILOSOPHICAL
SOCIETY

LONDON
Cambridge University Press
FETTER LANE

NEW YORK • TORONTO
BOMBAY • CALCUTTA • MADRAS
Macmillan

TOKYO
Maruzen Company Ltd

All rights reserved

Proceedings of the
CAMBRIDGE PHILOSOPHICAL
SOCIETY

VOLUME 31

CAMBRIDGE
AT THE UNIVERSITY PRESS
1935

PRINTED IN GREAT BRITAIN

CONTENTS

VOL. 31

	PAGE
Babbage, D. W. On the resolution of Cremona transformations and particularly those of genus one in space of three dimensions	31
Baber, W. G. and Hassé, H. R. The two centre problem in wave mechanics	564
Baker, H. F. The genus of a developable surface	156
— Note introductory to the study of Klein's group of order 168	468
Bartlett, M. S. The effect of non-normality on the t distribution	223
Bethe, H. A. Ionization power of a neutrino with magnetic moment	108
Bhabha, H. J. On the calculation of pair creation by fast charged particles and the effect of screening	394
Birkhoff, G. On the structure of abstract algebras	433
Bjerge, T. and Westcott, C. H. Some experiments on the slowing down of neutrons by collisions with hydrogen nuclei	145
Bowden, F. P. and Ridler, K. E. W. A note on the surface temperature of sliding metals	431
Cartwright, M. L. Some generalizations on Montel's theorem	26
— On certain integral functions of order 1 and mean type	347
Chadwick, J. and Goldhaber, M. Disintegration by slow neutrons	612
Chandrasekhar, S. On the effective temperatures of extended photospheres	390
Coulson, C. A. The electronic structure of H_2^+	244
Farmer, F. T. An apparatus for recording average amplitudes of wireless echoes	295
Fejér, L. Potenzreihen mit mehrfach monotoner Koeffizientenfolge und ihre Legendrepolynome	307
Finkelstein, B. N. The virial theorem and the theory of strong electrolytes	281
Fowler, R. H. A statistical derivation of Langmuir's adsorption isotherm	260
Frith, R. On the bicarfonical sets of a certain class of curves	327
Fröhlich, H. The number of free electrons in a metal	277
Goldhaber, M. and Chadwick, J. Disintegration by slow neutrons	612

	PAGE
Goldstein, S. On the resistance to the rotation of a disc immersed in a fluid	232
— A note on the vorticity-transport theory of turbulent motion	351
Gott, J. P. Phenomena attending the splashing of water in an electric field	85
Green, A. E. The gliding of a plate on a stream of finite depth	589
Hardy, G. H. The resultant of two Fourier kernels	1
— and Littlewood, J. E. Notes on the theory of series (XVIII): On the convergence of Fourier series	317
Harper, W. R. On the theory of ionic recombination: a correction	429
Hassé, H. R. and Baber, W. G. The two centre problem in wave mechanics	564
Heitler, W. Note on the equilibrium of black-body radiation	242
Henderson, W. J. The mass of the neutrino	285
Hirschfeld, H. O. A connection between correlation and contingency	520
Ho, P. C. An investigation of the upper limit of the thorium C + C' β -ray spectrum by means of the Wilson cloud chamber	119
Hodge, W. V. D. Some theorems on Abelian integrals associated with an algebraic variety	18
Howarth, L. Note on the development of the circulation around a thin elliptic cylinder	582
— Note on the flow past a circular cylinder	585
Jaeger, J. C. Pair production by magnetic multipole radiation	609
Jeffreys, H. Some tests of significance, treated by the theory of probability	203
Kaufmann, B. The dissection of closed sets of arbitrary dimension and the generalized Brouwer-Alexandroff theorem	525
Lees, A. The electric moment of an electron	94
Leggett, D. M. A. On the elastic stability of a rectangular plate, when subjected to a variable edge thrust	368
Levinson, N. On the closure of $\{e^{i\lambda_n x}\}$ and integral functions	335
Littlewood, J. E. and Hardy, G. H. Notes on the theory of series (XVIII): On the convergence of Fourier series	317
Massey, H. S. W. and Mohr, C. B. O. The double excitation of helium by electron impact	604
Maxwell, E. A. Note on the formula for the number of quadrisecants of a curve in space of three dimensions	324
Mitchell, K. The temperature dependence of the photo-electric effect	416

Contents

vii

	PAGE
Mohr, C. B. O. and Massey, H. S. W. The double excitation of helium by electron impact	604
Nahmias, M. E. An attempt to detect the neutrino	99
Niewodniczański, H. and Westcott, C. H. Some experiments with neutrons slowed down at different temperatures	617
Offord, A. C. The uniqueness of a certain trigonometric integral	382
Pawsey, J. L. Further investigations of the amplitude variations of downcoming wireless waves	125
Pedoe, D. On a class of irregular surfaces	48
— On the virtual grade of curves on an algebraic surface	536
Pflugger, A. and Pólya, G. On the power series of an integral function having an exceptional value	153
Pólya, G. and Pflugger, A. On the power series of an integral function having an exceptional value	153
Powell, F. C. A note on the equations of motion in non-relativistic quantum mechanics	291
Pryce, M. H. L. The two-dimensional electrostatic solutions of Born's new field equations.	50
— On a uniqueness theorem	625
Ridler, K. E. W. and Bowden, F. P. A note on the surface temperature of sliding metals	431
Roth, L. Some types of irregular surfaces	159
— On canonical threefolds	508
Sawyer, W. W. Note on a paper of Bell and Wolfenden on electrolytic separation of diplogen	116
Schrödinger, E. Discussion of probability relations between separated systems	555
Scott, S. On the asymptotic periods of integral functions	543
Shoenberg, D. Limitations of crystal symmetry on physical phenomena with particular reference to diamagnetic magnetostriction	265
— A note on the Hall and magneto-resistance effects	271
Siddiqi, M. R. Cauchy's problem in a non-linear partial differential equation of hyperbolic type	195
Smithies, F. On the theory of linear integral equations	76
Stein, P. On the real zeros of a certain trigonometric function	455

	PAGE
Sterne, T. E. A note on creation and annihilation in statistical assemblies	303
Stoneley, R. The refraction of a wave group.	360
Taylor, H. M. Some properties of dipole and quadripole radiation from nuclei	407
Turnbull, H. W. Geometrical properties of three symmetric matrices	174
Ursell, H. D. The Cantor manifolds lying on a closed surface. Part II	183
Verblunsky, S. On positive harmonic functions in a half-plane	482
Watson, G. N. Ramanujan's continued fraction	7
Westcott, C. H. and Bjerger, T. Some experiments on the slowing down of neutrons by collisions with hydrogen nuclei	145
Westcott, C. H. and Niewodniczański, H. Some experiments with neutrons slowed down at different temperatures	617
Whitehead, J. H. C. On subdivisions of complexes	69
PROCEEDINGS	629
BALANCE SHEET	638

PLATES

Plate I. To illustrate Mr Ho's paper	124
Plate II. To illustrate Mr Pawsey's paper	126
Plates III, IV. To illustrate Mr Pawsey's paper	128
Plate V. To illustrate Mr Pawsey's paper	134
Plate VI. To illustrate Messrs Chadwick and Goldhaber's paper	612

Transactions of the Cambridge Philosophical Society

RECENT PAPERS

Vol. XXII.

- No. XXVI **The Escape of Molecules from an Atmosphere, with special reference to the Boundary of a Gaseous Star.** By E. A. MILNE, M.A., Trinity College, Cambridge. Pp. 35. Price 5/-.
,, XXVII. **Some Problems of Diophantine Approximation: The Analytical Properties of Certain Dirichlet's Series Associated with the Distribution of Numbers to Modulus Unity.** By G. H. HARDY, M.A., Savilian Professor, University of Oxford, and J. E. LITTLEWOOD, M.A., Trinity College, Cambridge. Pp. 16. Price 3/6.
,, XXVIII. **Free Paths in a Non-uniform Rarefied Gas with an Application to the Escape of Molecules from Isothermal Atmospheres.** By J. E. JONES, 1851 Exhibition Senior Research Student, Trinity College, Cambridge. Pp. 22. With Title-page and Index to Vol. XXII. Price 5/6.

Vol. XXIII.

- No. I. **On Approximate Continuity.** By M. H. A. NEWMAN, B.A., St John's College, Cambridge. Pp. 18. Price 3/6.
,, II. **A Mathematical Theory of Natural and Artificial Selection.** By J. B. S. HALDANE, M.A., Trinity College, Cambridge. Pp. 23. Price 4/-.
,, III. **On the Form of the Solution of the Equations of Dynamics.** By T. M. CHERRY, B.A., Trinity College, Isaac Newton Student. Pp. 28. Price 4/-.
,, IV. **On the Motion of Spheres, Circular and Elliptic Cylinders through Viscous Liquid.** By W. J. HARRISON, M.A., Clare College, Cambridge. Pp. 18. Price 3/-.
,, V. **Researches in the Theory of Determinants.** By Major P. A. MACMAHON, R.A., F.R.S. Pp. 47. 7/-.
,, VI. **The Optical Constants of Matter.** By C. G. DARWIN, M.A., F.R.S., Christ's College, Tait Professor of Natural Philosophy in the University of Edinburgh. Pp. 31. Price 5/-.
,, VII. **Some Examples of Trajectories Defined by Differential Equations of a Generalised Dynamical Type.** By T. M. CHERRY, PH.D., Fellow of Trinity College, Cambridge. Pp. 32. Price 5/-.
,, VIII. **Some Formulae for Scrolls and Line Systems in Ordinary Space.** By C. G. F. JAMES, Trinity College, Cambridge. Pp. 34. Price 6/-.
,, IX. **The Aberrations of a Symmetrical Optical System.** By G. C. STEWARD, M.A., Fellow of Emmanuel College, Cambridge. Pp. 29. Price 5/-.
,, X. **The Linear Invariants of Ten Quaternary Quadrics.** By H. W. TURNBULL, M.A., Trinity College, Professor of Mathematics in the University of St Andrews, and ALFRED YOUNG, Sc.D., sometime Fellow of Clare College. Pp. 39. Price 6/-.
,, XI. **Mathieu Functions.** By S. GOLDSTEIN, B.A., St John's College. Pp. 34. Price 6/-.
XII. **The Mathematical Theory of the Statistical Methods employed in the Study of Correlation in the case of Three Variables.** By A. A. TSCHUPROW. Translated by L. ISSERLISS, M.A., Christ's College. Pp. 46. Price 7/-.
(Title-page and Table of Contents to Volume XXIII.)

CONTENTS

	PAGE
BIRKHOFF, GARRETT. On the Structure of Abstract Algebras. (With 1 Figure in the Text)	433
STEIN, P. On the Real Zeros of a certain Trigonometric Function	455
BAKER, H. F. Note Introductory to the Study of Klein's Group of Order 168	468
VERBLUNSKY, S. On Positive Harmonic Functions in a Half-plane	482
ROTH, L. On Canonical Threefolds	508
HIRSCHFELD, H. O. A Connection between Correlation and Contingency . .	520
KAUFMANN, B. The Dissection of Closed Sets of Arbitrary Dimension and the Generalized Brouwer-Alexandroff Theorem	525
PEDOE, D. On the Virtual Grade of Curves on an Algebraic Surface	536
SCOTT, SHEILA. On the Asymptotic Periods of Integral Functions	543
SCHRODINGER, E. Discussion of Probability Relations between Separated Systems	555
BABER, W. G. and HASSÉ, H. R. The Two Centre Problem in Wave Mechanics	564
HOWARTH, L. Note on the development of the Circulation around a thin Elliptic Cylinder. (With 2 Figures in the Text)	582
HOWARTH, L. Note on the Flow past a Circular Cylinder. (With 4 Figures in the Text)	585
GREEN, A. E. The Gliding of a Plate on a Stream of Finite Depth. (With 8 Figures in the Text)	589
MASSEY, H. S. W. and MOHR, C. B. O. The Double Excitation of Helium by Electron Impact	604
JAEGER, J. C. Pair Production by Magnetic Multipole Radiation. (With 1 Figure in the Text)	609
CHADWICK, J. and GOLDBABER, M. Disintegration by slow Neutrons. (With Plate VI)	612
WESTCOTT, C. H. and NIEWODNICZAŃSKI, H. Some Experiments with Neutrons slowed down at different Temperatures. (With 2 Figures in the Text) . .	617
PRYCE, M. H. L. On a Uniqueness Theorem	625
PROCEEDINGS	629
BALANCE SHEET	638

LONDON: CAMBRIDGE UNIVERSITY PRESS, FETTER LANE, E.C.4
 INDIA: MACMILLAN TOKYO: MARUZEN COMPANY LIMITED