# Proceedings of the CAMBRIDGE PHILQSOPHICAL SOCIETY

(MATHEMATICAL AND PHYSICAL SCIENCES)

VOLUME 58
PART 4



CAMBRIDGE UNIVERSITY PRESS

BENTLEY HOUSE, 200 EUSTON ROAD, LONDON, N.W. 1

AMERICAN BRANCH: 32 EAST 57TH STREET, NEW YORK, 22 N.Y.

Price Thirty-eight Shillings Net (U.S.A. \$6.50) Subscription price per volume £6. 10s. net post free (\$23.50 in U.S.A.)

October 1962

### CAMBRIDGE PHILOSOPHICAL SOCIETY

FOUNDED 1819; ROYAL CHARTER 1832

## Session 1961–1962

President: F. P. WHITE

Vice-Presidents: F. P. BOWDEN, J. D. BOYD, E. J. H. CORNER

Treasurer: R. C. EVANS

Secretaries: (Mathematical) J. H. WILLIAMSON

(Physical) J. S. GRIFFITH (Biological) S. SMITH

The publications of the Society consist of the Proceedings and of the Biological Reviews.

The publication of *Transactions* was suspended at the end of Volume XXII.

Orders should be sent to: THE MANAGER, CAMBRIDGE UNIVERSITY PRESS, BENTLEY HOUSE, 200 EUSTON ROAD, LONDON, N.W.1. Enquiries from the U.S.A. should be addressed to the Cambridge University Press, American Branch, 32 East 57th Street, New York 22, U.S.A.

For the purchase of early parts of the Transactions, Proceedings and Biological Reviews application should be made to the Secretaries. All parts of the Proceedings (including the cumulative index to Vols. 1 to 50) and Biological Reviews are available, and prices of sets or single parts will be quoted on application.

Fellows and Associates of the Society are particularly requested to inform the Secretaries of any change of postal address, and to send their subscriptions to the Treasurer, CAMBRIDGE

PHILOSOPHICAL SOCIETY, FREE SCHOOL LANE, CAMBRIDGE.

All correspondence regarding library exchanges and Fellows' copies should be addressed to the Secretaries at the Society's office.

# PROCEEDINGS of the CAMBRIDGE PHILOSOPHICAL SOCIETY

edited by J. H. WILLIAMSON

in consultation with

J. W. S. CASSELLS	
P. C. CLEMMOW	

E. R. LAPWOOD D. W. S. SCIAMA A. M. WALKER E. C. ZEEMAN

J. S. GRIFFITH

F. SMITHIES

- 1. Four parts of the Proceedings are issued each year.
- 2. Communications for the Proceedings should be sent to The Librarian, Cambridge Philosophical Society, Free School Lane, Cambridge. Papers by Fellows and Associates of the Society should be communicated directly by the author. Other papers must be communicated by a Fellow, who in doing so should give his opinion on the suitability of the paper for publication.
  - 3. Papers occupying more than twenty pages of print can only rarely be accepted.
- 4. It is recommended that each paper be prefaced by a short abstract. Copies of a Guide for the Preparation of Synopses, prepared by the Abstracting Services Consultative Committee and issued by the Royal Society, may be obtained from the Librarian.
- 5. Drawings for illustration and diagrams should be on a large scale and on smooth white Bristol board in Indian ink. Lettering should be written clear of the diagram, and the desired position of the lettering indicated by pencilled lines.
- 6. References should be listed at the end of each paper. Titles of journals listed in Mathematical Reviews should be abbreviated as in Mathematical Reviews, except that proper names should be given in full. First and last page numbers should be given where relevant.
- 7. Authors are particularly requested to prepare their manuscripts in a form suitable for printing, with adequate margins. A pamphlet on the preparation of papers may be obtained from the Librarian. If a large number of corrections are required in the proofs, the Council reserves the right to make a charge towards the cost.
- 8. Authors may receive, on request, free offprints of *Proceedings* papers (fifty for a sole author, and a smaller number for each joint author).

# JOURNAL OF THE INSTITUTION OF ELECTRICAL ENGINEERS

- ELECTRONICS
- TELECOMMUNICATIONS
- INSTRUMENTS
- POWER

Circulation A.B.C. 46,692 Overseas circulation, 9,072

Further details and rates from:

MICHAEL McCARTNEY ADVERTISEMENT MANAGER THE INSTITUTION OF ELECTRICAL ENGINEERS SAVOY PLACE, LONDON, W.C. 2

Telephone: Covent Garden 1871

# THE JOURNAL OF THE SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

### VOLUME 10, NUMBER 2, JUNE 1962

Natural Sorting. ROBERT BAER and PAUL BROCK.

Bounds for Derivatives in the Dirichlet Problem for Poisson's Equation. J. H. BRAMBLE and L. E. PAYNE.

An Optimal Algorithm, and Suboptimal Algorithms, for the Quadratic Assignment Problem. P. C. GILMORE.

An Application of Generalized Linear-Programming to Network Flows. R. E. GOMORY and T. C. Hu.

Multi-Step Integration Methods. T. E. HULL and A. C. R. NEWBERY.

Exponential-Like Solutions of Systems of Linear Ordinary Differential Equations. H. B. KELLER and J. B. KELLER. Output Probabilities in the Filter-Clip-Filter Problem. J. A. McFadden, W. Doyle and I. Marx.

Computations of Bending Modes and Mode Shapes of Single and Double Beams. E. E. OSBORNE.

General Perturbational Solution of the Mathieu Equation. R. A. STRUBLE and J. E. FLETCHER.

A Stable Difference Scheme for the Mixed Boundary Problem for a Hyperbolic, First Order System in Two Dimensions. V. THOMÉE.

Optimum Alternating-Direction-Implicit Iteration Parameters for a Model Problem. E. L. WACHSPRESS.

The Journal is published quarterly. Subscriptions are \$10.00 per volume Orders should be placed with the

### SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

Box 7541, Philadelphia I, Pennsylvania, U.S.A.

Camb. Phil. Soc. Proc. 58, 4