

SOCIETY FOR INDUSTRIAL AND APPLIED MATHEMATICS

SIAM invites those interested in the application of mathematics to consider membership.

As one concerned with mathematics, a membership in SIAM offers you a broad publications program with a healthy balance of emphasis between abstract and applied mathematics.

SIAM Journal on Applied Mathematics (8 issues per year)

SIAM Journal on Computing (Quarterly)

SIAM Journal on Control and Optimization (6 issues per year)

SIAM Journal on Numerical Analysis (6 issues per year)

SIAM Journal on Mathematical Analysis (6 issues per year)

SIAM Review (Quarterly)

SIAM News (6 issues per year)

Further information about SIAM, its publications and activities, may be obtained from

Secretary
SIAM
33 South 17th Street
Philadelphia, PA. 19103
U.S.A.

MATHEMATICAL PROCEEDINGS

(formerly Proceedings)

*of the
Cambridge Philosophical Society*

VOLUME 79



CAMBRIDGE UNIVERSITY PRESS

CAMBRIDGE · LONDON · NEW YORK

1976

PUBLISHED BY
THE SYNDICS OF THE CAMBRIDGE UNIVERSITY PRESS

The Pitt Building, Trumpington Street, Cambridge CB2 1RP
Bentley House, 200 Euston Road, London NW1 2DB
32 East 57th Street, New York, N.Y. 10022

© The Cambridge Philosophical Society 1976

Printed in Great Britain at the University Printing House, Cambridge

INDEX

	PAGE
Adams, J. F. and Hoffman, P. Operations on K -theory of torsion-free spaces	483
Arrowsmith, D. K. and Smith, R. A note on Smale's formulation of electrical network theory	537
Atiyah, M. F., Patodi, V. K. and Singer, I. M. Spectral asymmetry and Riemannian geometry. III	71
Baker, R. C. and Gajraj, J. On the fractional parts of certain additive forms	463
Bala, P. and Carter, R. W. Classes of unipotent elements in simple algebraic groups. I	401
Berstein, I. On the Lusternik – Schnirelmann category of Grassmannians	129
Bollobás, B. On complete subgraphs of different orders	19
Bollobás, B. and Eldridge, S. E. Maximal matchings in graphs with given minimum and maximum degrees	221
Bona, J. L. and Smith, R. A model for the two-way propagation of water waves in a channel	167
Brooke Benjamin, T. Applications of Leray–Schauder degree theory to problems of hydrodynamic stability	373
Brown, G. and Moran, W. Gleason parts for measure algebras	321
Bushell, P. J. On a class of Volterra and Fredholm non-linear integral equations	329
Calvert, B. The Equation $A(t, u(t))' + B(t, u(t)) = 0$	545
Carter, R. W. and Bala, P. Classes of unipotent elements in simple algebraic groups. I	401
Chee-Seng, Lim Magnetohydrodynamic flow past sources in the presence of a wall	183
Chillingworth, A. and Stefan, P. Integrability of singular distributions of Banach manifolds	117
Curtis, R. T. A new combinatorial approach to M_{24}	25
Deleanu, A. and Hilton, P. J. Borsuk shape and a generalization of Grothendieck's definition of pro-category	473
Devapakkiam, C. Viola and Rema, P. S. Hilbert space methods in the theory of Jordan algebras. II	307
Dyer, Joan L. and Formanek, E. Automorphism sequences of free nilpotent groups of class two.	271
Eldridge, S. E. and Bollobás, B. Maximal matchings in graphs with given minimum and maximum degrees	221
Elliott, P. D. T. A. General asymptotic distributions for additive arithmetic functions	43
Erdős, P. and Hall, R. R. Proof of a conjecture about the distribution of divisors of integers in residue classes	281
Even, S. and Gillis, J. Derangements and Laguerre polynomials	135

	PAGE
Formanek, E. and Dyer, Joan L. Automorphism sequences of free nilpotent groups of class two	271
Friedlander, F. G. The wave front set of the solution of a simple initial-boundary value problem with glancing rays	145
Galambos, J. A remark on the asymptotic theory of sums with random size	531
Gillis, J. and Even, S. Derangements and Laguerre polynomials	135
Goldie, A. W. Azumaya algebras and rings with polynomial identity	393
Hajnal, J. On products of non-negative matrices	521
Hall, R. R. and Erdős, P. Proof of a conjecture about the distribution of divisors of integers in residue classes	281
Harary, F. and Thomassen, C. Anticritical graphs	11
Harrison, Jenny Structure of a foliated neighbourhood	101
Hasler, M. On a quantum mechanical model for a maser. I	351
Heading, J. Invariant properties of wave propagation in n -dimensional space	563
Hilton, P. J. and Deleanu, A. Borsuk shape and a generalization of Grothendieck's definition of pro-category	473
Hoare, A. H. M. and Macbeath, A. M. Groups of hyperbolic crystallography	235
Hodges, W. Läuchli's algebraic closure of Q	289
Hoffman, P. and Adams, J. F. Operations on K -theory of torsion-free spaces	483
Islam, J. N. A class of approximate exterior rotating solutions of Einstein's equations	161
Kalton, N. J. and Wood, G. V. Orthonormal systems in Banach spaces and their applications	493
Laver, R. Well-quasi-orderings and sets of finite sequences	1
Macbeath, A. M. and Hoare, A. H. M. Groups of hyperbolic crystallography	235
Martens, E. Strictly singular and cosingular operators	111
Mason, D. R. Finite simple groups with Sylow 2-subgroups of type $PSL(5, q)$, q odd	251
Masser, D. W. Linear forms in algebraic points of Abelian functions. II	55
Moran, W. and Brown, G. Gleason parts for measure algebras	321
Morris, Clare. A. N. The generation of surface waves over a sloping beach by an oscillating line source. III. The three-dimensional problem and the generation of edge waves	573
Nanda, S. A geometrical proof that causality implies the Lorentz group	533
Patodi, V. K., Singer, I. M. and Atiyah, M. F. Spectral asymmetry and Riemannian geometry. III	71
Poston, T. and Woodcock, A. E. R. A higher catastrophe machine	343
Rema, P. S. and Devapakkiam, Viola C. Hilbert space methods in the theory of Jordan algebras. II	307
Ripley, B. D. The disintegration of invariant measures	337
Sanders, J. W. Unbounded operators and random Fourier series	511

Index

V

	PAGE
Singer, I. M., Atiyah, M. F. and Patodi, V. K. Spectral asymmetry and Riemannian geometry. III	71
Skilling, J. Uniform compounds of uniform polyhedra	447
Smith, A. G. Two compounds of antiprisms in R^4	459
Smith, J. D. H. Centraliser rings of multiplication groups on quasigroups	427
Smith, R. and Arrowsmith, D. K. A Note on Smale's formulation of electrical network theory	537
Smith, R. and Bona, J. L. A model for the two-way propagation of water waves in a channel	167
Stefan, P. and Chillingworth, D. Integrability of singular distributions on Banach manifolds	117
Thomassen, C. and Harary, F. Anticritical graphs	11
Ward, A. J. Three notes on proximity theory	299
Ward, A. J. On the axiomatics of nearness and compression	469
Williams, A. G. Characteristics of $GW\Gamma S_n$	433
Wood, G. V. and Kalton, N. J. Orthonormal systems in Banach spaces and their applications	493
Woodcock, A. E. R. and Poston, T. A higher catastrophe machine	343
Wright, J. D. M. On semifinite $A W^*$ -algebras	443
Yates, C. E. M. Banach–Mazur games, comeager sets and degrees of unsolvability	195

The attention of authors is particularly directed to the following requests.

1. Papers should be typed, double-spaced, on one side of white paper (of which A4, $8\frac{1}{4}$ by $11\frac{1}{2}$ inches, is a suitable size). The pages must be numbered. Margins of $1\frac{1}{2}$ inches should be left at the side, top and bottom of each page. The copy sent must be clear.

A cover page should give the title, the author's name and institution, with the address at which mail is to be sent to him.

The title, while brief, must be informative (e.g. *A new proof of the prime-number theorem*, whereas *Some applications of a theorem of G. H. Hardy* would be useless).

The first paragraph or two should form a summary of the main theme of the paper, providing an abstract intelligible to mathematicians.

For a typescript to be accepted for publication, it must accord with the standard requirements of publishers, and be presented in a form in which the author's intentions regarding symbols etc. are clear to a printer (who is not a mathematician).

The following notes are intended to help the author in preparing his manuscript. New authors may well enlist the help of a senior colleague, both as to the substance of their work and the details of setting it out correctly and attractively.

2. Notation

Notation should be chosen carefully so that mathematical operations are expressed with all possible neatness, to lighten the task of the compositor and reduce the chance of error.

For instance, n_k (n sub k) is common usage, but avoid if possible using c sub n sub k . Fractions are generally best expressed by a solidus. Complicated exponentials like

$$\exp \{z^2 \sin \theta / (1 + y^2)\}$$

should be shown in this and no other way.

In the manuscript, italics, small capitals and capitals are specified by single, double and triple underlining. Bold-faced type is shown by wavy underlining; wavy will be printed wavy.

It helps if displayed equations or statements which will be quoted later are numbered in order on the right of their line. They can then be referred to by, for example, 'from (7)'.

The author must enable the printer (if necessary by pencilled notes in the margin) to distinguish between similar symbols such as o , O , o , O , 0 ; x , X , \times ; ϕ , Φ , \varnothing ; l , 1 ; e , ϵ ; κ , k .

Greek letters can be denoted by Gk in the margin.

If an author wishes to mark the end of the proof of a theorem, the sign \square or \dashv may be used.

Footnotes should be avoided.

3. Diagrams

It is extremely helpful if diagrams are drawn in indian ink on white card, faintly blue or green-lined graph paper, or tracing cloth or paper. Symbols, legends and captions should be given on a transparent overlay. Each text figure must be numbered as Figure 1, Figure 2, ... and its intended position clearly indicated in the manuscript:

Figure 1 here

The author must pencil his name on all separate sheets of diagrams.

A figure is expensive to reproduce and should be included only when the subject matter demands it, or when it greatly clarifies the exposition.

The Society recognizes that some authors do not have the facilities for producing drawings of a sufficiently high standard to be reproduced directly and it is therefore willing to have such diagrams re-drawn, provided they are reasonably clear.

4. Tables

Tables should be numbered (above the table) and set out on separate sheets. Indicate the position of each in the text as for figures:

Table 3 here

5. References

References should be collected at the end of the paper numbered in alphabetical order of the authors' names. A reference to a book should give the title, in italics, and then in Roman type the publisher's name and the place and year of publication:

(4) JEFFREYS, H. *The earth*, 5th edition, University Press, Cambridge, 1970.

A reference to a paper should give in italics the title of the periodical, the number of the volume and year, and the beginning and end pages of the paper. Titles should be abbreviated as in *Mathematical Reviews*:

(6) LITTLEWOOD, J. E. The 'pits effect' for functions in the unit circle. *J. Analyse Math.* 23 (1970), 237-268.

*Mathematical Proceedings of
the Cambridge Philosophical Society*

MPCPCO 79 (Pt 3) 393-585 (1976) 0305-0041 May 1976

CONTENTS

	PAGE
GOLDIE, A. Azumaya algebras and rings with polynomial identity	393
BALA, P. and CARTER, R. W. Classes of unipotent elements in simple algebraic groups. I	401
SMITH, J. D. H. Centraliser rings of multiplication groups on quasigroups	427
WILLIAMS, A. G. Characteristics of $G \text{ Wr } S_n$	433
WRIGHT, J. D. M. On semifinite AW^* -algebras	443
SKILLING, J. Uniform compounds of uniform polyhedra	447
SMITH, A. G. Two compounds of antiprisms in R^4	459
BAKER, R. C. and GAJRAJ, J. On the fractional parts of certain additive forms	463
WARD, A. J. On the axiomatics of nearness and compression	469
DELEANU, A. and HILTON, P. J. Borsuk shape and a generalization of Grothendieck's definition of pro-category	473
ADAMS, J. F. and HOFFMAN, P. Operations of K -theory of torsion-free spaces	483
KALTON, N. J. and WOOD, G. V. Orthonormal systems in Banach spaces and their applications	493
SANDERS, J. W. Unbounded operators and random Fourier series	511
HAJNAL, J. On products of non-negative matrices	521
GALAMBOS, J. A remark on the asymptotic theory of sums with random size	531
NANDA, S. A geometrical proof that causality implies the Lorentz group	533
ARROWSMITH, D. K. and SMITH, R. A note on Smale's formulation of electrical network theory	537
CALVERT, B. The equation $A(t, u(t))' + B(t, u(t)) = 0$	545
HEADING, J. Invariant properties of wave propagation in n -dimensional space	563
MORRIS, CLARE A. N. The generation of surface waves over a sloping beach by an oscillating line source. III. The three-dimensional problem and the generation of edge waves	573

© The Cambridge Philosophical Society 1976

CAMBRIDGE UNIVERSITY PRESS

BENTLEY HOUSE, 200 EUSTON ROAD, LONDON NW1 2DB
32 EAST 57TH STREET, NEW YORK, N.Y. 10022

Price £6.40 net (*U.S.A. and Canada* US \$18.00)

Subscription price £16.00 per volume (£32.00 per annum) net post free
(*US* \$45.00 per volume (*US* \$90.00 per annum) in *U.S.A. and Canada*)

Printed in Great Britain at the University Printing House, Cambridge