

# JOURNAL of the AUSTRALIAN MATHEMATICAL SOCIETY

Series B — Applied Mathematics

Volume 26 Part 3

JANUARY 1985

<b>On the rate of convergence of finite difference schemes on nonuniform grids</b>	
Frank de Hoog and David Jackett . . . . .	247
<b>Characteristic identities for semi-simple Lie algebras</b>	
M. D. Gould . . . . .	257
<b>Second order optimality conditions for mathematical programming with set functions</b>	
J. H. Chou, Wei-Shen Hsia and Tan-Yu Lee . . . . .	284
<b>Eigenvalues of the Laplacian with Neumann boundary conditions</b>	
H. P. W. Gottlieb . . . . .	293
<b>Growth and oscillation properties of solutions of a fourth order linear difference equation</b>	
John W. Hooker and William T. Patula . . . . .	310
<b>The lumped mass finite element method for a parabolic problem</b>	
C. M. Chen and V. Thomée . . . . .	329
<b>A canonical form and solution for the matrix Riccati differential equation</b>	
R. B. Leipnik . . . . .	355
<b>Generalised functions for applications</b>	
B. D. Craven . . . . .	362
<b>Families of three-stage third order Runge-Kutta-Nyström methods of <math>y'' = f(x, y, y')</math></b>	
M. M. Chawla and S. R. Sharma . . . . .	375

## THE JOURNAL

The Journal of the Australian Mathematical Society began publication in 1959, and from 1975 appears in two series, Series A (Pure Mathematics and Statistics) and Series B (Applied Mathematics). Information about Series A may be found on the inside back cover.

### SERIES B APPLIED MATHEMATICS

This series is published in volumes, comprising four parts, starting with Volume 19 Part I in 1975. From 1980, four parts are published annually. Subscriptions may be arranged through the Business Manager (see inside back cover). The annual cost for 1985 is A\$90 (Members A\$15).

It is the editorial policy of Series B to accept papers in any field of applied mathematics and related mathematical sciences. Novel applications of mathematics in real situations are welcomed. Authors are encouraged to write an introduction accessible to the whole applied mathematical community. Every effort will be made to publish suitable material with a minimum of delay.

### Editor of the Journal, Series B

E. O. TUCK, Applied Mathematics Department, University of Adelaide, Adelaide, S.A. 5001, Australia.

#### Associate Editors

B. DAVIES  
Department of Mathematics  
Faculty of Science  
A.N.U., P.O. Box 4  
Canberra, A.C.T. 2600

R. H. J. GRIMSHAW  
Department of Mathematics  
University of Melbourne  
Parkville, Vic. 3052

J. M. HILL  
Department of Mathematics  
University of Wollongong  
P.O. Box 1144  
Wollongong, N.S.W. 2500

C. A. HURST  
Department of Mathematical  
Physics  
University of Adelaide  
G.P.O. Box 498  
Adelaide, S.A. 5001

A. McNABB  
Applied Mathematics  
Division  
D.S.I.R.  
P.O. Box 1335  
Wellington, New Zealand

J. B. MOORE  
Department of Systems  
Engineering  
Institute of Advanced Studies  
A.N.U., P.O. Box 4  
Canberra, A.C.T. 2600

B. A. MURTAGH  
School of Mechanical and  
Industrial Engineering  
University of N.S.W.  
Kensington, N.S.W. 2033

M. R. OSBORNE  
Department of Statistics  
Institute of Advanced  
Studies  
A.N.U., P.O. Box 4  
Canberra, A.C.T. 2600

C. J. THOMPSON  
Department of Mathematics  
University of Melbourne  
Parkville, Vic. 3052

#### Assistant Editors

C. E. M. PEARCE, P. M. GILL, Applied Mathematics Department, University of Adelaide, Adelaide, S.A. 5001, Australia.

Manuscripts (two copies) for publication should be sent to the editor or to an appropriate associate editor at the address given above. Such action is a representation by the author that the manuscript has not been copyrighted or published, and that it is not being considered for publication elsewhere. Authors are asked to read the section "Preparation of Manuscripts" on the outside cover.

Irrespective of the number of authors, 100 free offprints of each paper are provided; additional offprints may be ordered at the expense of the authors.

Excessive costs incurred by the Society through corrections to or withdrawal of articles may be charged to the authors concerned.

---

*Journal of the Australian Mathematical Society, Series B—Applied Mathematics* (ISSN 0334-2700) is published quarterly for A\$90 (Members A\$15) per annum by the Australian Mathematical Society, Department of Mathematics, University of Queensland, St. Lucia, Qld. 4067, Australia. Second class postage is paid at Ann Arbor, Michigan 48106. Postmaster: Send address change notices to Dr B. D. Jones, *Journal of the Australian Mathematical Society*, Department of Mathematics, University of Queensland, St. Lucia, Qld. 4067, Australia.