



THE ANZIAM JOURNAL

*(The Australian & New Zealand
Industrial and Applied
Mathematics Journal)*

Editorial Office and Address

Editor-in-Chief C. E. M. PEARCE, charles.pearce@adelaide.edu.au
Executive Editor E. HUNT, emma.hunt@adelaide.edu.au
School of Mathematical Sciences, The University of Adelaide, SA 5005, Australia.

Associate Editors

A. P. BASSOM
The University of Western Australia
School of Mathematics
and Statistics (M019)
35 Stirling Highway
Crawley WA 6009
bassom@maths.uwa.edu.au

A. J. BRACKEN
Department of Mathematics
The University of Queensland
St. Lucia QLD 4072
ajb@maths.uq.edu.au

B. D. CRAVEN
Department of Mathematics
The University of Melbourne
VIC 3010
craven@ms.unimelb.edu.au

A. C. EBERHARD
Department of Mathematics
Royal Melbourne Institute of
Technology
GPO Box 2476V
Melbourne VIC 3001
andrew.eberhard@ems.rmit.edu.au

L. K. FORBES
School of Mathematics
and Physics
The University of Tasmania
Hobart TAS 7001
Larry.Forbes@utas.edu.au

J. M. HILL
Department of Mathematics
The University of Wollongong
PO Box 1144
Wollongong NSW 2500
j.hill@uow.edu.au

G. C. HOCKING
Department of Mathematics
and Statistics
Murdoch University
Murdoch WA 6150
hocking@prodigal.murdoch.edu.au

C. A. HURST
Department of Physics and
Mathematical Physics
The University of Adelaide
SA 5005
ahurst@physics.adelaide.edu.au

V. JEYAKUMAR
School of Mathematics
University of New South Wales
Sydney NSW 2052
jeya@maths.unsw.edu.au

P. E. KLOEDEN
Fachbereich Mathematik
Johann Wolfgang Goethe
Universität
D-60054 Frankfurt am Main
Germany
kloeden@math.uni-frankfurt.de

M. KRISHNAMOORTHY
CSIRO Mathematical and
Information Sciences
Private Bag 10
Clayton South MDC
VIC 3169
Mohan.Krishnamoorthy@csiro.au

R. MCKIBBIN
Institute of Information
and Mathematical Sciences
Massey University
College of Sciences
Private Bag 102 904
North Shore Mail Centre
Auckland
New Zealand
R.McKibbin@massey.ac.nz

W. MCLEAN
Department of Applied
Mathematics
University of New South Wales
Sydney NSW 2052
W.Mclean@unsw.edu.au

P. K. POLLETT
Department of Mathematics
The University of Queensland
QLD 4072
pkp@maths.uq.edu.au

D. RALPH
The Judge Institute of
Management Studies
Cambridge University
Trumpington St
Cambridge CB2 1AG
England
dr241@cam.ac.uk

H. M. SRIVASTAVA
Department of Mathematics
and Statistics
University of Victoria
Victoria B.C. V8W 3P4
Canada
hmsri@uvvm.uvic.ca

K. L. TEO
Department of Mathematics
and Statistics
Curtin University
of Technology
GPO Box U 1987, Perth
WA 6845
K.L.Teo@curtin.edu.au

A. TORDESILLAS
Department of Mathematics
The University of Melbourne
VIC 3010
A.Tordesillas@ms.unimelb.edu.au

J.-M. VANDEN-BROECK
School of Mathematics
The University of East Anglia
Norwich NR4 7TJ, England
J.Vanden-Broeck@uea.ac.uk

G. C. WAKE
Centre for Mathematics
in Industry
Massey University at Albany
P. B. 102 904
North Shore MC
Auckland, New Zealand
g.c.wake@massey.ac.nz

G. J. WEIR
Applied Mathematics Centre
Industrial Research Ltd
PO Box 31310
Lower Hutt
New Zealand
g.weir@irl.cri.nz

Cover design by HILARY BOOTH.

THE ANZIAM JOURNAL

Volume 48 Part 1

JULY 2006

Freely forming groups: Trying to be rare	
Michael Baake, Uwe Grimm and Harald Jockusch	1
Parallelisation of sparse grids for large scale data analysis	
Jochen Garcke, Markus Hegland and Ole Nielsen	11
Wavelet and discrete cosine transforms for inserting information into BMP images	
I. Orea-Flores, M. A. Acevedo and J. López-Bonilla	23
Blowup properties for several diffusion systems with localised sources	
Zhaoyin Xiang, Qiong Chen and Chunlai Mu	37
Travelling waves for the population genetics model with delay	
Guojian Lin and Rong Yuan	57
Explicit eigenvalues and inverses of several Toeplitz matrices	
Wen-Chyuan Yueh and Sui Sun Cheng	73
The exponential of a constant matrix on time scales	
A. Zafer	99
Water wave scattering by two submerged nearly vertical barriers	
B. N. Mandal and Soumen De	107
SEIR epidemic model with delay	
Ping Yan and Shengqiang Liu	119
On the discrete asymptotic stability conditions of perturbed linear discrete systems with periodic coefficients	
Kemal Uslu	135
Some multivariable Gaussian hypergeometric extensions of the Preece theorem	
M. I. Qureshi, M. Sadiq Khan, M. A. Pathan and N. U. Khan	143

Set by the Australian Mathematical Publishing Association Inc.

Printed by Instant Colour Press, Canberra, Australia.

The Journal of the Australian Mathematical Society began publication in 1959, and from 1975 appeared in two series, Series A (Pure Mathematics and Statistics) and Series B (Applied Mathematics). Series B is now The ANZIAM Journal and is published in volumes comprising four quarterly parts. There is also a fifth (electronic) part designed for rapid publication (<http://jamsb.austms.org.au/>). Editor: A. J. ROBERTS, Department of Mathematics & Computing, University of Southern Queensland, Toowoomba, QLD 4350; aroberts@usq.edu.au. All five parts are refereed. All accepted papers have the option of publication in the electronic part. Information about Series A and other publications of the Society may be found on the inside back cover.

It is the editorial policy of The ANZIAM Journal to consider papers in any field of applied mathematics and related mathematical sciences. Novel applications of mathematics in real situations are especially welcomed. All papers should include some indication of applicability, and an introduction that can be understood by non-specialist readers from the whole applied mathematical community.

Manuscripts (four copies) for publication should be sent to the editor or to an appropriate associate editor at the address given on the inside front cover. 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. Please do not make initial submissions electronically.

Authors are asked to read the section "Preparation of Manuscripts" on the last page.

Irrespective of the number of authors, 20 free offprints of each copy 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.

The ANZIAM Journal (ISSN 1446-1811) is published quarterly for A\$347.60 (Members A\$56.10) per annum by the Australian Mathematical Society, Mathematics Department, Australian National University, ACT 0200, Australia. Send address change notices to Dr A. Howe, Journal of the Australian Mathematical Society, Mathematics Department, Australian National University, ACT 0200, Australia.