## CAMBRIDGE

## JOURNALS

JFM ARCHIVE



Journal of Fluid Mechanics Digital Archive 1956–1996

# *Vital research from the definitive source*

The JFM Digital Archive contains every article from the first 40 years of the journal, scanned and digitised to the highest standards.

Please speak to your librarian about gaining access.

## journals.cambridge.org/jfm

CAMBRIDGE

JOURNALS



# JFM RAPIDS

- Faster publication
- Greater visibility for papers
- Freely available to all for the first year

For more information visit **journals.cambridge.org/rapids** 



JFM FAST

**EVOLVED** 

**TRACK HAS** 

## Journal of Plasma Physics

#### Editors

Bill Dorland, University of Maryland Honors College, USA Alex Schekochihin, University of Oxford, UK

With two new Editors and seven new Associate Editors joining the editorial team *Journal of Plasma Physics* aspires to be the intellectual home of those who think of plasma physics as a fundamental discipline. The journal will particularly focus on publishing research on laboratory plasmas, space physics and plasma astrophysics that takes advantage of the rapid ongoing progress in instrumentation and computing to advance fundamental understanding of multiscale plasma dynamics.



Journal of Plasma Physics is available online at: http://journals.cambridge.org/pla

#### To subscribe contact Customer Services

in Cambridge: Phone +44 (0)1223 326070 Fax +44 (0)1223 325150 Email journals@cambridge.org

in New York: Phone +1 (845) 353 7500 Fax +1 (845) 353 4141 Email subscriptions\_newyork@cambridge.org

## Price information

is available at: http://journals.cambridge.org/pla

### Free email alerts

Keep up-to-date with new material – sign up at http://journals.cambridge.org/pla-alerts

For free online content visit: http://journals.cambridge.org/pla



## The ANZIAM Journal

Published for the Australian Mathematical Society

#### **Editors-in-Chief**

A. Bassom, The University of Western Australia, Australia G. C. Hocking, Murdoch University, Australia

The ANZIAM Journal considers papers in any field of applied mathematics and related mathematical sciences with the aim of rapid publication in print and electronic formats. 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.



ANZIAM Journal is available online at: http://journals.cambridge.org/anz

#### To subscribe contact Customer Services

in Cambridge: Phone +44 (0)1223 326070 Fax +44 (0)1223 325150 Email journals@cambridge.org

in New York: Phone +1 (845) 353 7500 Fax +1 (845) 353 4141 Email subscriptions\_newyork@cambridge.org

Free email alerts

Keep up-to-date with new material – sign up at journals.cambridge.org/register

For free online content visit: http://journals.cambridge.org/anz



## Proceedings of the Edinburgh Mathematical Society

Published for The Edinburgh Mathematical Society

Editorial Management The Secretary, ICMS, Edinburgh, UK

The Edinburgh Mathematical Society was founded in 1883 and over the years, has evolved into the principal society for the promotion of mathematics research in Scotland. The Society has published its Proceedings since 1884. This journal contains research papers on topics in a broad range of pure and applied mathematics, together with a number of topical book reviews.

### Price information

is available at: http://journals.cambridge.org/pem

#### Free email alerts

Keep up-to-date with new material – sign up at http://journals.cambridge.org/pem-alerts

> For free online content visit: http://journals.cambridge.org/pem

#### VOLUME 47 (SERIES ID PART JUNE 2004

Proceedings of the Edinburgh Mathematical Society

#### CAMBRIDGE UNIVERSITY PRESS

Proceedings of the Edinburgh Mathematical Society is available online at: http://journals.cambridge.org/pem

#### To subscribe contact Customer Services

in Cambridge: Phone +44 (0)1223 326070 Fax +44 (0)1223 325150 Email journals@cambridge.org

in New York: Phone +1 (845) 353 7500 Fax +1 (845) 353 4141 Email subscriptions\_newyork@cambridge.org



#### CAMBRIDGE

### JOURNALS

## Glasgow Mathematical Journal

Published for The Glasgow Mathematical Journal Trust

Editor-in-Chief I. A. B. Strachan, University of Glasgow, UK

Glasgow Mathematical Journal publishes original research papers in any branch of pure and applied mathematics. An international journal, its policy is to feature a wide variety of research areas, which in recent issues have included ring theory, group theory, functional analysis, combinatorics, differential equations, differential geometry, number theory, algebraic topology, and the application of such methods in applied mathematics.

Price information is available at: http://journals.cambridge.org/gmj

#### **Free email alerts** Keep up-to-date with new material – sign up at http://journals.cambridge.org/gmj-alerts

For free online content visit: http://journals.cambridge.org/gmj



Volume 56 Part 1 January 2014

CAMBRIDGE UNIVERSITY PRESS

Glasgow Mathematical Journal is available online at: http://journals.cambridge.org/gmj

#### To subscribe contact Customer Services

in Cambridge: Phone +44 (0)1223 326070 Fax +44 (0)1223 325150 Email journals@cambridge.org

in New York: Phone +1 (845) 353 7500 Fax +1 (845) 353 4141 Email subscriptions\_newyork@cambridge.org



## The European Physical Journal -Applied Physics

Marketed and distributed on behalf of ÉDP Sciences

#### **Editor-in-Chief**

B. Drévillon, LPCIM, France

*EPJ-AP* is an international journal devoted to the promotion of the recent progresses in all fields of applied physics. The articles published in *EPJ-AP* span the whole spectrum of applied physics research including semiconductors, organic materials, thin films, nanotechnology, photonics, spintronics, magetism, plasma, energy generation transfer, metrology, fluids and microfluidics, biophysics and biosensors, surfaces and interfaces.



The European Physical Journal -Applied Physics is available online at: http://www.epjap.org

#### To subscribe contact Customer Services

Americas:

Phone +1 (845) 353 7500 Fax +1 (845) 353 4141 Email subscriptions\_newyork@cambridge.org

**Rest of world:** Phone +44 (0)1223 326070 Fax +44 (0)1223 325150 Email journals@cambridge.org

## Price information

is available at: www.epjap.org

### Free email alerts

Keep up-to-date with new material – sign up at http://www.epjap.org/jap-alerts



For free online content visit: http://www.epjap.org

- 523 Weakly nonlinear analysis of thermoacoustic bifurcations in the Rijke tubeA. Orchini, G. Rigas & M. P. Juniper
- 551 Fragmentation of acoustically levitating droplets by laser-induced cavitation bubblesS. R. Gonzalez Avila & C.-D. Ohl
- 577 Texture-driven elastohydrodynamic bouncing T. Chastel, P. Gondret & A. Mongruel
- 591 Faraday instability on a sphere: Floquet analysis
   A. Ebo Adou & L. S. Tuckerman

#### JFM Rapids (online only)

- R1 Multi-particle dispersion during entrainment in turbulent free-shear flows
  T. Watanabe, C. B. da Silva & K. Nagata
- R2 Inertial–Alfvén waves as columnar helices in planetary cores
  O. P. Bardsley & P. A. Davidson
- S indicates supplementary data or movies available online.

- 611 Analyses of external and global intermittency in the logarithmic layer of Ekman flowC. Ansorge & J. P. Mellado
- 636 On the spreading of impacting dropsS. Wildeman, C. W. Visser, C. Sun &D. Lohse
- 656 Large eddy simulation of the velocity-intermittency structure for flow over a field of symmetric dunes
  C. J. Keylock, K. S. Chang & G. S. Constantinescu
- 686 Book Review J. Billingham
- S R3 Observation of resonant interactions among surface gravity waves
  F. Bonnefoy, F. Haudin, G. Michel, B. Semin, T. Humbert, S. Aumaître, M. Berhanu & E. Falcon
  - R4 Exploring the severely confined regime in Rayleigh–Bénard convection
    K. L. Chong & K.-Q. Xia

#### ISSN 0022-1120

805

## Journal of Fluid Mechanics

### 25 October 2016

- Eroding dipoles and vorticity growth for Euler flows in ℝ<sup>3</sup>: axisymmetric flow without swirl
   S. Childress, A. D. Gilbert & P. Valiant
- 31 Higher-order flow modes in turbulent Rayleigh–Bénard convection
  H.-D. Xi, Y.-B. Zhang, J.-T. Hao & K.-Q. Xia
- S 52 Weakly nonlinear analysis of thermoacoustic instabilities in annular combustorsG. Ghirardo, M. P. Juniper & J. P. Moeck
  - 88 Elastic-plated gravity currents with a temperature-dependent viscosity
     C. Thorey & C. Michaut
- 118 An improved macroscale model for gas slip flow in porous media
  D. Lasseux, F. J. Valdés Parada & M. L. Porter
- 147 Thermohaline layering in dynamically and diffusively stable shear flowsT. Radko
- 171 Spectra of energy transport in turbulent channel flows for moderate Reynolds numbers **Y. Mizuno**
- *S* 188 Spontaneous radiation of sound by instability of a highly cooled hypersonic boundary layer **P. V. Chuvakhov & A. V. Fedorov** 
  - 207 Measurement of negative thermophoretic forceR. W. Bosworth, A. L. Ventura,A. D. Ketsdever & S. F. Gimelshein
- 222 Non-Darcy effects in fracture flows of a yield stress fluid
  A. Roustaei, T. Chevalier, L. Talon &
  I. A. Frigaard

Contents continued on inside back cover.

- 262 Instability and transition mechanisms induced by skewed roughness elements in a high-speed laminar boundary layer
   G. Groskopf & M. J. Kloker
- 303 Global effect of local skin friction drag reduction in spatially developing turbulent boundary layer
  A. Stroh, Y. Hasegawa, P. Schlatter & B. Frohnapfel
- 322 Marangoni waves in two-layer films under the action of spatial temperature modulationA. A. Nepomnyashchy & I. B. Simanovskii
- S 355 Shape of retracting foils that model morphing bodies controls shed energy and wake structure
  S. C. Steele, J. M. Dahl, G. D. Weymouth & M. S. Triantafyllou
  - 384 QNSE theory of turbulence anisotropization and onset of the inverse energy cascade by solid body rotationS. Sukoriansky & B. Galperin
  - 422 Bluff body drag manipulation using pulsed jets and Coanda effect
    D. Barros, J. Borée, B. R. Noack, A. Spohn & T. Ruiz
  - 460 A numerical study of turbulence under temporally evolving axisymmetric contraction and subsequent relaxationM. P. Clay & P. K. Yeung
  - 494 Steady shear rheology of a viscous emulsion in the presence of finite inertia at moderate volume fractions: sign reversal of normal stress differences
    P. Srivastava, A. R. Malipeddi & K. Sarkar

Cambridge Journals Online For further information about this journal please go to the journal web site at journals.cambridge.org/flm



MIX Paper from responsible sources FSC® C007785

