

# JOURNAL OF FLUIDS AND STRUCTURES

## EDITOR

M. P. PAÏDOUSSIS

*Department of Mechanical Engineering, McGill University, 817 Sherbrooke St. W., Montreal, Québec, Canada H3A 2K6  
FAX:(514) 398 7365*

## ASSOCIATE EDITORS

- M. AMABILI *Dipartimento di Ingegneria Industriale, Università di Parma, Parco Area delle Scienze 181/A, Parma, I 43100, Italy*  
P. W. BEARMAN *Department of Aeronautics, Imperial College of Science, Technology and Medicine, Prince Consort Road, London, SW7 2BY, UK.*  
O. BENDIKSEN *Mechanical and Aerospace Engineering, University of California at Los Angeles (UCLA), Box 951597, 48-121 Engr IV, Los Angeles, CA 90095-1597, USA*  
C. D. BERTRAM *School of Mechanical & Manufacturing Engineering, University of New South Wales, Sydney 2052, Australia*  
M. BRAZA *UMR CNRS/INPT No. 5502, Institut de Mécanique des Fluides de Toulouse, Av. du prof. Camille Soula, 31400 Toulouse, France*  
Y. T. CHEW *Department of Mechanical & Production Engineering, The National University of Singapore, 9 Engineering Drive 1, Singapore 117576*  
C. DALTON *Department of Mechanical Engineering, University of Houston, N207 Engineering Building 1, TX 77204-4006, USA.*  
E. de LANGRE *Hydrodynamics Laboratory - LadHyX, Ecole Polytechnique, 91128 Palaiseau, France*  
E. H. DOWELL *Department of Mechanical Engineering & Materials Science, Duke University, 185 Hudson Hall, Durham, NC 27708, USA.*  
R. EATOCK TAYLOR *Department of Engineering Science, University of Oxford, Parks Road, Oxford OX1 3PJ, UK.*  
C. R. ETHIER *Department of Bioengineering, Imperial College London, South Kensington Campus, London, SW7 2AZ, UK.*  
J. P. GRISVAL *ONERA DDSS/MS, B.P. No. 72, 29 Avenue de la Division Leclerc, F-92322 Châtillon Cedex, France*  
S. HAYAMA *Ohtsugaoka, 3-1-9-203, Shohan, Chiba, 277-0921, Japan*  
D. H. HODGES *School of Aerospace Engineering, Georgia Institute of Technology, PO Box 0150, Atlanta, GA 30332, USA*  
K. HOURIGAN *Department of Mechanical Engineering, Monash University, Clayton, Victoria, 3800 Australia.*  
S. KANEKO *Dept. of Mechanical Engineering, University of Tokyo, 7-3-1 Hongo, 113-0033 Bunkyo-Ku, Japan*  
T. LEWEKE *IPRHE-CNRS/Universités Aix-Marseille, 49, rue Frédéric Joliot-Curie, B.P. 146, F-13884 Marseille, Cedex 13, France.*  
M. MATSUMOTO *Department of Civil and Earth Resources Engineering, Kyoto University, Sakyo-ku, Yoshida Honmachi, Kyoto 606-8501, Japan*  
N. PEAKE *Department of Applied Mathematics and Theoretical Physics (DAMTP), University of Cambridge, Wilberforce Road, Cambridge, CB3 0WA, UK.*  
A. RAMAN *School of Mechanical Engineering, Purdue University, West Lafayette, IN 47907-2088, U.S.A.*  
D. ROCKWELL *Department of Mechanical Engineering and Mechanics, 19 Memorial Drive West, Lehigh University, Bethlehem, PA 18015, USA.*  
D. S. WEAVER *Department of Mechanical Engineering, McMaster University, John Hodgins Engineering Building, Hamilton, Ontario, Canada L8S 4L7*

## EDITORS-AT-LARGE

- E. J. CUI *Beijing Institute of Aerodynamics, PO Box 7215, Beijing 100074, People's Republic of China*  
T. J. PEDLEY *Department of Applied Mathematics and Theoretical Physics, University of Cambridge, Silver Street, Cambridge, CB3 9EW, UK.*  
A. ROSHKO *Graduate Aeronautical Laboratories 105-50, California Institute of Technology, Pasadena, CA 91125, USA.*  
C. H. K. WILLIAMSON *Sibley School of Mechanical and Aerospace Engineering, Upson Hall, Cornell University, Ithaca NY 14853-7501, USA.*

---

**Publication information:** *Journal of Fluids and Structures* (ISSN 0889-9746). For 2009, Volume 25 (8 issues) is scheduled for publication. Subscription prices are available upon request from the Publisher, from the Regional Sales Office nearest you, or from this journal's website (<http://www.elsevier.com/locate/jfs>). Further information is available on this journal and other Elsevier products through Elsevier's website (<http://www.elsevier.com>). Subscriptions are accepted on a prepaid basis only and are entered on a calendar year basis. Issues are sent by standard mail (surface within Europe, air delivery outside Europe). Priority rates are available upon request. Claims for missing issues should be made within six months of the date of dispatch.

**USA mailing notice:** *Journal of Fluids and Structures* (ISSN 0889-9746) is published monthly (except March, June, September, and December) by Elsevier Ltd. (The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK). Periodicals postage paid at Rahway, NJ 07065-9998, USA, and at additional mailing offices. **USA POSTMASTER:** Send change of address to *Journal of Fluids and Structures*, Elsevier Customer Service Department, 3251 Riverport Lane, Maryland Heights, MO 63043, USA. **AIRFREIGHT AND MAILING** in the USA by Mercury International Limited, 365 Blair Road, Avenel, NJ 07001-2231, USA.

**Orders, claims, and journal enquiries:** please contact the Elsevier Customer Service Department nearest you: **St. Louis:** Elsevier Customer Service Department, 3251 Riverport Lane, Maryland Heights, MO 63043, USA; phone: (877) 8397126 [toll free within the USA]; (+1) (314) 4478878 [outside the USA]; fax: (+1) (314) 4478077; e-mail: [JournalCustomerService-usa@elsevier.com](mailto:JournalCustomerService-usa@elsevier.com). **Oxford:** Elsevier Customer Service Department, The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK; phone: (+44) (1865) 843434; fax: (+44) (1865) 843970; e-mail: [JournalsCustomerServiceEMEA@elsevier.com](mailto:JournalsCustomerServiceEMEA@elsevier.com). **Tokyo:** Elsevier Customer Service Department, 4F Higashi-Azabu, 1-Chome Bldg, 1-9-15 Higashi-Azabu, Minato-ku, Tokyo 106-0044, Japan; phone: (+81) (3) 5561 5037; fax: (+81) (3) 5561 5047; e-mail: [JournalsCustomerServiceJapan@elsevier.com](mailto:JournalsCustomerServiceJapan@elsevier.com). **Singapore:** Elsevier Customer Service Department, 3 Killiney Road, #08-01 Winsland House I, Singapore 239519; phone: (+65) 63490222; fax: (+65) 67331510; e-mail: [JournalsCustomerServiceAPAC@elsevier.com](mailto:JournalsCustomerServiceAPAC@elsevier.com).

**Author inquiries:** For inquiries relating to the submission of articles (including electronic submission where available), please visit this journal's homepage at <http://www.elsevier.com/locate/jfs>. You can track accepted articles at <http://www.elsevier.com/trackarticle> and set up e-mail alerts to inform you of when an article's status has changed. Also accessible from here is information on copyright, frequently asked questions, and more. For detailed instructions on the preparation of electronic artwork, please visit <http://www.elsevier.com/artworkinstructions>. Contact details for questions arising after acceptance of an article, especially those relating to proofs, will be provided by the publisher.

**Advertising information:** Advertising orders and inquiries may be sent to Janine Castle, Elsevier Ltd., The Boulevard, Langford Lane, Kidlington, Oxford OX5 1GB, UK; phone: (+44) 1865 843 844; fax: (+44) 1865 853 973; e-mail: [j.castle@elsevier.com](mailto:j.castle@elsevier.com). Customers in the USA and Canada may also contact Tino DeCarlo, Advertising Department, Elsevier Inc., 360 Park Avenue South, New York, NY 10010-1710, USA; phone: (+1) (212) 633 3815; fax: (+1) (212) 633 3820; e-mail: [t.decarlo@elsevier.com](mailto:t.decarlo@elsevier.com).

Printed by Polestar Wheatons Ltd., Exeter, United Kingdom

Ⓢ The paper used in this publication meets the requirements of ANSI/NISO Z39.48-1992 (Permanence of Paper)