

Editors

Professor Cedric Taylor
*Department of Civil Engineering,
University of Wales Swansea,
Swansea, SA2 8PP, U.K.*

Dr. Philip M. Gresho
*Lawrence Livermore National Laboratory,
P.O. Box 808, L-262, Livermore,
California 94551-9900, U.S.A.*

Advisory Editors

Professor O. C. Zienkiewicz
*Department of Civil Engineering,
University of Wales Swansea,
Swansea, SA2 8PP, U.K.*

International Journal for Numerical Methods in FLUIDS

Professor R. H. Gallagher
*Clarkson University, Potsdam, New York, NY 13676,
U.S.A.*

Editorial Board

K. J. Bai
*Department of Naval Architecture and Ocean
Engineering, Seoul National University,
Seoul 151-742, Korea.*

A. J. Baker
*University of Tennessee, Department of
Engineering Science and Mechanics,
317 Perkins Hall, Knoxville,
Tennessee 37916, U.S.A.*

M. Bercovier
*Institute of Computer Science,
The Hebrew University of Jerusalem,
Ross Bldg, Givat Ram,
Jerusalem 91904, Israel.*

P. Bettess
*Department of Naval Architecture
and Shipbuilding,
University of Newcastle upon Tyne,
Queen Victoria Road,
Newcastle upon Tyne,
NE1 7RU, U.K.*

G. de Vahl Davis
*School of Mechanical and
Industrial Engineering,
The University of New South Wales,
P.O. Box 1, Kensington, N.S.W.,
Australia 2033.*

J. Donea
*Applied Mechanics Division,
Joint Research Centre,
Ispra Establishment,
21020 Ispra (Varese), Italy.*

D. J. Evans
*Department of Computer Studies,
University of Technology,
Loughborough, Leicestershire, U.K.*

J. H. Ferziger
*Mechanical Engineering Department,
Stanford University,
Stanford, CA 94305, U.S.A.*

B. A. Finlayson
*Dept. of Chemical Engineering, BF-10,
University of Washington, Seattle,
Washington 98195, U.S.A.*

D. K. Gartling
*Fluid Mechanics and Heat Transfer
Division 5511, Sandia Laboratories,
Albuquerque, New Mexico 87115,
U.S.A.*

R. Glowinski
*Department of Mathematics,
University of Houston,
Houston,
TX 77004, U.S.A.*

D. F. Griffiths
*Department of Mathematics,
University of Dundee,
Dundee DD1 4HN, Scotland.*

W. G. Habashi
*Department of Mechanical Engineering,
Concordia University,
1455 de Meissonneuve Blvd. West,
Montreal, Quebec H3G 1M8, Canada*

T. J. R. Hughes
*Division of Applied Mechanics,
Stanford University,
Stanford, California 94305, U.S.A.*

A. G. Hutton
*Nuclear Electric Plc,
Berkeley Nuclear Laboratories,
Berkeley, Gloucestershire, U.K.*

M. Ikegawa
*Mechanical Engineering Research Laboratory,
Hitachi Ltd., 502 Kandatsu-machi,
Tsuchiura-shi, Ibaraki-ken 300, Japan.*

A. Jameson
*Aerospace Engineering D-302D,
Engineering Quadrangle,
Princeton University,
Princeton, NJ 08544, U.S.A.*

M. Kawahara
*Chuo University,
Department of Civil Engineering,
Kasuga 1-chome 13, Bunkyo-ku,
Tokyo, Japan.*

R. L. Lee
*Lawrence Livermore Laboratory,
Atmospheric and Geophysical Science
Division, Physics Department,
University of California,
Livermore, California 94550, U.S.A.*

B. P. Leonard
*Department of Mechanical Engineering,
The University of Akron,
Akron, OH 44325, U.S.A.*

J. N. Lillington
*A.E.E. Winfrith, Dorchester,
Dorset DT2 8DH, U.K.*

Y. W. Ma
*Institute of Mechanics,
Chinese Academy of Sciences,
15 Zhong Guan Cun Road,
Beijing 100080, China.*

U. Meissner
*T H Darmstadt,
Institut für Numerische Methoden und
Informatik im Bauwesen,
Petersenstrasse 13,
D-64287 Darmstadt,
Germany.*

K. W. Morton
*Numerical Analysis Group,
Oxford University Computing
Laboratory, 8-11 Keble Road,
Oxford OX1 3DD, U.K.*

J. T. Oden
*Texas Institute for Computational and
Applied Mathematics (TICAM),
The University of Texas at Austin,
Taylor Hall 2400,
Austin, Texas 78712, U.S.A.*

M. D. Olson
*The University of British Columbia,
Department of Civil Engineering,
2075 Wesbrook Place, Vancouver,
British Columbia, Canada V6T 1W5.*

G. F. Pinder
*The University of Vermont,
College of Engineering and Mathematics,
101 Votey Building, Burlington,
Vermont 05405-0156, U.S.A.*

O. Pironneau
*Institut National de Recherche en
Informatique et en Automatique,
Domaine de Voluceau, Rocquencourt
BP 105-78153 Le Chesnay Cedex, France.*

C. V. Ramakrishna
*Department of Applied Mechanics,
Indian Institute of Technology,
Hauz Khas, New Delhi 110016,
India.*

J. N. Reddy
*Department of Mechanical Engineering,
Texas A&M University,
College Station,
Texas 77843-3123, U.S.A.*

P. J. Roache
*Ecodynamics, Research Associates Inc.,
P.O. Box 8172, Albuquerque,
New Mexico 87108, U.S.A.*

P. Roe
*Department of Aerospace Engineering,
University of Michigan, Ann Arbor,
Michigan 48109, U.S.A.*

R. L. Sani
*Department of Chemical Engineering,
University of Colorado, Campus Box 424,
Boulder, Colorado 80309, U.S.A.*

L. E. Scriven
*University of Minnesota, Department of
Chemical Engineering and Materials Science,
421 Washington Avenue, SE,
Minneapolis, MN 55455-0132, U.S.A.*

S. F. Shen
*Cornell University,
Sibley School of Mechanical and
Aerospace Engineering,
Upson and Grumman Halls,
Ithaca, New York 14853, U.S.A.*

D. B. Spalding
*Imperial College of Science and
Technology, Department of Mechanical
Engineering, Exhibition Road,
London SW7 2BX, U.K.*

R. L. Taylor
*University of California,
Department of Civil Engineering,
Berkeley, California 94720, U.S.A.*

T. E. Tezduyar
*Aerospace Engineering and Mechanics
Department, 107 Aderman Hall,
110 Union Street, SE,
University of Minnesota, Minneapolis,
Minnesota 55455, U.S.A.*

J. R. Whiteman
*Director, Institute of Computational
Mathematics, Brunel University,
Uxbridge, Middlesex UB8 3PH, U.K.*

K. H. Winters
*Theoretical Physics Division, Harwell
Laboratory, Didcot, Oxon OX11 0RA, U.K.*

M. Wolfshtein
*Technion University,
Aero Engineering Department, Haifa, Israel.*

Cover inset: snapshot of vorticity field for $Re = 250$ —courtesy of Dr. Mark Christon of Lawrence Livermore National Laboratory.

Advertising: To advertise in this journal or to rent the subscription list contact: Caroline Melling, Advertising Sales and Reprint Manager, John Wiley & Sons, Ltd., Baffins Lane, Chichester, West Sussex, PO19 1UD, UK. Telephone: 44 (0)1243 770351, Fax 44 (0)1243 770429, Email: info_assets@wiley.co.uk
Reprints: Bulk reprints of articles published in this journal are available to order. Please contact the above address.

USA Contacts:

Advertising: Roberta Frederick, Advertising Sales Manager, John Wiley & Sons Inc, 605 Third Avenue, New York, NY 10158-0012, USA. Telephone: (212) 850 8832, Fax: (212) 850 8888

Reprints: The Reprint Department, John Wiley & Sons Inc, 605 Third Avenue, New York, NY 10158-0012, USA. Telephone: (212) 850 8776.

To subscribe: *International Journal for Numerical Methods in Fluids* (ISSN 0271-2091/USPS 586-530) is published semi-monthly by John Wiley & Sons Limited, Baffins Lane, Chichester, Sussex, England. 1996 subscription prices: U.S. \$1595.00; bona fide personal subscriptions to UK £675.00; elsewhere U.S. \$1200.00. Second class postage paid at Jamaica, NY 11431. Air Freight and mailing in the U.S.A. by Publications Expediting Services Inc., 200 Meacham Avenue, Elmont, NY 11003. Orders should be addressed to: Subscription Department, John Wiley & Sons Limited, Baffins Lane, Chichester, Sussex, PO19 1UD, England. Copyright © 1996 by John Wiley & Sons Ltd. Typeset in the U.K. by Techem Composition, Ltd, Salisbury, Wiltshire. Printed and bound in Great Britain by Page Bros. Norwich. Printed on acid-free paper.
For further subscription information: please contact Journals Administration Department, John Wiley & Sons, Ltd., 1 Oldlands Way, Bognor Regis, West Sussex, PO22 9SA, UK. Telephone: +44 (0)1243 843288; fax: +44 (0)1243 843232.

U.S.A. POSTMASTER: Send address changes to *International Journal for Numerical Methods in Fluids*, c/o Publications Expediting Services Inc., 200 Meacham Avenue, Elmont, NY 11003.