

## Editors

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

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

# International Journal for Numerical Methods in FLUIDS

## Editorial Board

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

**M. Bercovier**  
Division of Applied Mathematics,  
School of Applied Science and  
Technology, The Hebrew University of  
Jerusalem, Givat Ram, Jerusalem,  
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.

**M. Godet**  
I.N.S.A., Laboratoire de Mecanique  
des Contacts Bt 113,  
20 Avenue Albert Einstein,  
69621 Villeurbanne Cedex, Lyons,  
France.

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

**W. G. Habashi**  
Department of Mechanical Engineering,  
Concordia University,  
1455 de Maisonneuve 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.

**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.

**U. Meissner**  
Universitat Hannover,  
Lehrstuhl fur Stromungsmechanik,  
Callinstr. 32, D-3000 Hannover,  
West Germany.

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

**J. T. Oden**  
Engineering Mechanics,  
The University of Texas at Austin,  
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.

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

**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**  
CIRES, Campus Box 449,  
University of Colorado at Boulder,  
Boulder, Colorado 80309. 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.

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

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

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

**Advertising:** For details contact—  
Michael J. Levermore, Advertisement Sales, John Wiley & Sons Ltd., Baffins Lane, Chichester, Sussex, PO19 1UD, England (Telephone 0243 770351; fax 0243 775878; telex 86290).

**To subscribe:** International Journal for Numerical Methods in Fluids (ISSN 0271-2091) is published semi-monthly by John Wiley & Sons Limited, Baffins Lane, Chichester, Sussex, England. 1992 subscription prices: U.S. \$975.00; bona fide personal subscriptions to UK £400.00; elsewhere U.S. \$735.00. 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: Subscriptions Department, John Wiley & Sons Limited, Baffins Lane, Chichester, Sussex, PO19 1UD, England. Copyright © 1992 by John Wiley & Sons Ltd. Photo Typeset by Macmillan India Ltd. Printed and bound in Great Britain by Page Bros (Norwich) Ltd, Norwich, Norfolk. Printed on acid-free paper.

**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.