## 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.

## 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 Jersusalem, 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, Laughborough, 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 Maissonneuve Blvd. West, Montreal, Quebec H3G 1M8, Canada

## Professor R. H. Gallagher

Clarkson University, Potsdam, New York, NY 13676, U.S.A.

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

Michanical 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 Universität Hannover, Lehrstuhl für Stromungsmechanik, Callinstr, 32, D-3000 Hannover, West Germany.

K. W. Morton Numerical Analysis Group, Oxford University Computing Laboratory, 8–11 Keble Road, Oxford OX1 3QD, 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. Ramakrisna 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: For details contact-

Michael J. Levermore, Advertisement Sales, John Wiley & Sons Ltd., Baffins Lane, Chichester, Sussex, PO19 1UD, England (Telephone 01243 770351; fax 01243 775878; telex 86290).

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. 1995 subscription prices: U.S. \$1395.00; bona fide personal subscriptions to UK 675.00; elsewhere U.S. \$1050.00. 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 @ 1995 by John Wiley & Sons Ltd. Typeset in the U.K. by Techset Composition, Ltd, Salfsbury, Wiltshire. Printed and bound in Great Britain by Page Bros, Norwich. 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.

## International Journal for Numerical Methods in FLUIDS