COMPUTATIONAL METHODS IN MULTIPHASE FLOW IV

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Wessex Institute of Technology, UK
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WIT Transactions on Engineering Sciences

WIT Transactions on Engineering Sciences

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Carlos Brebbia
Wessex Institute of Technology
Ashurst Lodge, Ashurst
Southampton SO40 7AA, UK
Email: carlos@wessex.ac.uk

Editorial Board

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EDITORS

A.A. Mammoli
University of New Mexico, USA

C.A. Brebbia
Wessex Institute of Technology, UK

WIT PRESS Southampton, Boston

Editors:

A.A. Mammoli
University of New Mexico, USA

C.A. Brebbia
Wessex Institute of Technology, UK

Published by

WIT Press
Ashurst Lodge, Ashurst, Southampton, SO40 7AA, UK
Tel: 44 (0) 238 029 3223; Fax: 44 (0) 238 029 2853
E-Mail: witpress@witpress.com
http://www.witpress.com

For USA, Canada and Mexico

Computational Mechanics Inc
25 Bridge Street, Billerica, MA 01821, USA
Tel: 978 667 5841; Fax: 978 667 7582
E-Mail: infousa@witpress.com
http://www.witpress.com

British Library Cataloguing-in-Publication Data

A Catalogue record for this book is available
from the British Library

ISBN: 978-1-84564-079-8
ISSN: 1746-4471 (print)
ISSN: 1743-3533 (on-line)

The texts of the papers in this volume were set individually by the authors or under their supervision. Only minor corrections to the text may have been carried out by the publisher.

Printed in Great Britain by Athenaeum Press Ltd.

Preface

Multiphase flow remains one of the unsolved problems in fluid mechanics. There are many factors which make it difficult to deal with such flows. First, they are very diverse in nature, and as a consequence the laws governing them are similarly varied. In addition, there are generally several length scales at play, and they are in many cases fully coupled.

Although constitutive equations and simulation methods for treating simple 'model' flows have been developed with partial success, it is still extremely difficult to develop equations which describe realistic multiphase flows at the macroscopic scale, and even when such models are developed, it is difficult to calibrate them by experiment or simulation. However, as large-scale computation becomes more prevalent, it is becoming possible to dissect various features of a flow which would be difficult to examine experimentally, increasing our understanding of the important features that must be treated in a model. For example, it is possible to characterize spatial distributions of components in great detail by simulation, while by experiment one can only obtain overall features. It has become apparent that flow-induced structure must be treated by a realistic constitutive model. Close-range interactions between dispersed phase particles are also important in determining large-scale flow behavior.

It remains to be seen whether large-scale simulation will continue to enable constitutive modelling, as has traditionally been the case, or whether simulation will become the only step in the treatment of multiphase flow problems, as computational power continues to increase and computational techniques become more efficient.

Complementing the interesting mathematical and numerical problems that multiphase flows pose is an equally interesting array of real-life problems which are characterized by multiphase flow: groundwater transport, river and sea-bed sedimentation, boiling and condensation, sprays and aerosols, combustion processes in power generation equipment, and many others.

This conference is all-inclusive, representing a very broad spectrum of the many features of multiphase flows. Papers in the proceedings cover several of the mathematical and numerical aspects of multiphase flows, as well as many practical applications. Because of the diversity of papers, we are confident that many fruitful interactions between researchers will occur as a result of this meeting.

As always, we would like to thank the contributors for their excellent work and the scientific advisory committee for their help with the review and selection process.

The Editors
Bologna, Italy
2007

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