



## Foreword

# Workshop on Scientific Issues in Multiphase Flow

During 2001, I discussed with the United States Department of Energy the need for a Workshop on Multiphase Flow. The goal was to define basic physical issues whose resolution would improve scientific understanding. An inquiry was sent to 168 people in order to solicit ideas. A proposal was written, and accepted, which was based on the response to this inquiry and which recognized contributions made at previous workshops in Gaithersburg, 1985, Rensselaer Polytechnic Institute, 1987, and London, 1992.

Four study groups were formed to address areas of interest: (1) *Phase Distribution in Gas–Liquid Flows* (Theo Theofanous, chair, Thomas J. Hanratty, co-chair, Jean-Marc Delhay, Geoffrey Hewitt, Mamoru Ishii, Daniel Joseph, Richard T. Lahey, Andrea Prosperetti, Akimi Serizawa); (2) *Disperse Flow* (Sankaran Sundaresan, chair, John Eaton, co-chair, Donald L. Koch, Michel Louge, Julio Ottino, Olivier Simonin, Jennifer S. Curtis, Harry L. Swinney); (3) *Computational Physics* (Andrea Prosperetti, chair, Gretar Tryggvason, co-chair, S. Balachandar, Shiyi Chen, Lance Collins, Howard Hu, Martin Maxey, Theo Theofanous); (4) *Microphysics* (Jean-Marc Delhay, chair, John McLaughlin, co-chair, Vijay Dhir, Truc-Nam Dinh, Mostafa Ghiaasiaan, Gad Hetsroni, Juan Lasheras, Ellen Longmire, Rolf Reitz, Peter C. Wayner). A website was created so as to obtain a wide range of inputs.

Summaries of the deliberations of the Study Groups were presented at a meeting held at the University of Illinois in Champaign-Urbana on May 7–9, 2002. Short presentations were made by members of the Study Groups in support of their conclusions. The proposed research thrusts were further developed by the 47 attendees.

This report summarizes the findings of the Workshop and presents final position papers of the Study Groups. These findings were formulated through interactions amongst the chairs and co-chairs of the different Study Groups. Contributions, by individuals, to the Study Groups and to the website, which are cited in this Report, were distributed in a proceedings volume at the Workshop. Present plans are to publish these in *Multiphase Science and Technology*. The scope had to be limited because only thirty-two people were involved with the preliminary studies. Flows at low Reynolds numbers for which inertia is not important are not treated. The main emphasis is on gas–liquid and solid–fluid flows. (This choice was not meant to minimize the importance of liquid–liquid flows and of three-phase flows.) Granular flows are considered, mainly, in the context of describing concentrated fluid–solid flow systems.

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