

**Two-Phase Flow Modelling  
and Experimentation  
2004**



# **Two-Phase Flow Modelling and Experimentation 2004**

Proceedings of the Second International Symposium on  
Two-Phase Flow Modelling and Experimentation  
Pisa, ITALY, 22-25 September, 2004

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## **Volume 1**

2004  
**Edizioni ETS**  
PISA

Edizioni ETS  
P.za Carrara, 16-19  
56126 Pisa, Italy

ISBN: 88-467-1075-4

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Printed in Italy.

## PREFACE

These Volumes contain papers presented at the 3<sup>rd</sup> International Symposium on Two-Phase Flow Modelling and Experimentation, held in Pisa, ITALY, during September 22-25, 2004. Specifically, the volumes contain the texts of the 7 Invited Lectures, and 340 Contributed Papers. The number of the papers and the variety of subjects addressed attest to the continued vitality and vigour of two-phase flow research work. The papers cover a broad spectrum from the experimental investigation of complex fundamental aspects of two-phase flow to the study of practical devices and applications, the modelling of two-phase flow phenomena, and the numerical analysis.

Multiphase flow is one of the most common flows of fluids in nature as well as in industrial applications. It covers gas-solid, liquid-liquid, solid-liquid and gas-liquid flows, and also investigation in three-phase flows has gained increasing popularity in the recent past. As an example, gas-liquid flow, that also embraces the whole subject of boiling and condensation, is a topic of the utmost importance and exists in a wide range of industrial plants including evaporators, boilers, distillation towers, chemical reactors, air ejectors, condensers, turbines, nuclear reactors, etc.

Advancements in the knowledge of multiphase flow phenomena necessitates a close working relationship among experimentalists, modellers and numerical analysts in order to produce the maximum synergism. Computation may provide the direction for the conduct of efficient experimentation while experimentation is necessary to verify complex computational codes and for complex situations for which no reasonably accurate numerical analysis is possible, and as a basis for modellization of phenomena.

The papers contained in these volumes reflect the objectives of this third Symposium, which follows the first one held in Rome, on October 9-11, 1995, and the second held in Pisa, on May 23-26, 1999. They confirm the necessity to gather researchers, designers, experimentalists, modellers and numerical analysts of two-phase flow for the timely dissemination and cross-fertilisation of ideas, needs, results, interactions, to solve highly complex fundamental and applied problems. We strongly believe interchange of ideas between experimentalists and people involved in mathematical modelling to be of the utmost importance for synergism between the two disciplines.

A quick perusal of the papers also indicates that the quality of work is not limited by geography. The contributors to the Volume come from more than 40 countries and provide a clear indication of how well the worldwide scientific community is networked.

An attempt has been made to use a uniform outline and method of presentation of each paper. The International System of Units (SI) is used throughout the proceedings. All invited papers are included first followed by Contributed papers. The latter are grouped in appropriate sections to provide better access to readers. In addition to the Table of Contents at the beginning of the proceedings, an author index is included at the end of the volume.

We are grateful and indebted to the lead scientists of this symposium, experts in the area of two-phase flow, for their contributions in coordinating the evaluation of contributed papers and maintaining the high quality of research papers presented in this proceedings. They were responsible for the selection of the papers and took a very active part in the release of information about the Symposium in their respective countries. Their work and efforts in gathering the papers accepted for presentation at the Symposium and inclusion in the three volumes of the Proceedings has been essential for the success of the Symposium.

We would like to mention here a special acknowledgement for the professional help of over 600 reviewers from all over the world for selection of papers and suggestions for improvement of the content of accepted papers published in the proceedings. Refereeing is a difficult, time consuming and demanding task, often accomplished during the week-end (in spite of the family's demand!), and we very much appreciated this help in assessing the suitability of these papers for inclusion in our Symposium.

Finally, we greatly appreciate the cooperation provided by Ms. Gloria and Sandra Borghini of ETS for their preparation of these fine proceedings in a very timely manner.

Gian Piero Celata  
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