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ESF-AMIF PCC99 Workshop
BOOK OF ABSTRACTS

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Applied Mathematics for Industrial Flow Problems

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ESF-AMIF

PCC99

Workshop on
**PHASE CHANGE WITH CONVECTION
MODELLING AND VALIDATION**

June 24-26, 1999, Warsaw, Poland

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Preface

The PCC99 AMIF-ESF Workshop on "*Phase Change with Convection: modelling and validation*" is one of several meetings organized in the framework of the ESF program Applied Mathematics for Industrial Flow Problems.

This Workshop aims to create a common platform for different groups working on modelling phase change problems. The Workshop addresses both the theoretical basis for the solution of physical and mathematical problems concerning phase changes, and the numerical algorithms necessary for efficient and robust computer implementations. Special attention is given to validation and verification of codes and their implementation to practical industrial situations. PCC99 should help people working in applied mathematics, numerical modelling and industrial applications to gain knowledge and allow critical assessment of different approaches, numerical methods, physical models and validation methods used in the field.

The booklet contains extended abstracts of the 34 contributed presentations and five keynote lectures prepared by:

- Christoph Beckermann, The University of Iowa
- Dominique Gobin & Patrick Le Quéré, University Paris XI & LIMSI-CNRS
- Eddie Leonardi, The University News South Wales, Sydney
- Jacques Rappaz & J.F. Scheid, Swiss Federal Institute of Technology, Lausanne
- David S. Riley, University of Nottingham

The Colloquium is organized on behalf of the European Science Foundation by the Institute of Fundamental Technological Research Polish Academy of Sciences (IPPT PAN).

I would like to thank all the contributors to this Workshop. Your contribution of up to the minute research will make the Workshop a success.

Tomasz Kowalewski

Warszawa, 9.06.1999

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AMIF Programme

The five year program of the European Science Foundation on *Applied Mathematics for Industrial Flow Problems* was launched in 1997 by Pierre-Louis Lions and Alfio Quarteroni. The field of interest of this program is Fluid and Gas Dynamics, including laminar, turbulent or multiphase flows and free surface problems. Its main goal is the development of research contributions in the following areas:

- development and analysis of mathematical modelling of fluid flows of practical (industrial) relevance
- their simulation by modern numerical methods
- set-up and analysis of effective numerical algorithms in the context of advanced parallel computing.

The program aims to clarify and highlight the mathematical foundations of differential models and numerical methods, to achieve a better understanding of existing models and methods, as well as to enhance the development of new ones. Application of these tools to the simulation of flow problems of industrial interest is a constant concern of the program.

The AMIF research activity includes such problems of fluid flows as:

- Compressible and incompressible flows and design of models and algorithms able to cope with both cases at the same time
- Single- and multi-phase fluid flows
- Reactive and turbulent fluid flows
- Flows in porous media
- Free-surface flows
- Viscoelastic and non-Newtonian fluid flows
- Modelling of turbulent flows (two-equations models, Reynolds stress models, LES)
- Multifields mathematical and numerical models, in particular for the coupling of fluids and solids, viscous and inviscid flows, rotational and irrotational flows, molecular and continuous regimes
- Electrochemistry and simplified models for electromagnetism
- Advanced models for semiconductor devices
- Shape design optimization in aerodynamics

The program helps to bring together mathematicians, physicists and engineers to cooperate on modelling, mathematical analysis, numerical simulation and application to real life situation, of the highlighted problems. These challenging mathematical and computational issues are expected to benefit from a concerted action among several European groups.

AMIF Home Page:

<http://www.esf.org/pp/Amifa.htm>

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