

Preface

The application of numerical methods and usage of computers in mathematical modelling of environmental and technological processes has a very long tradition at the University of Latvia - the history of these activities traces back to the end of 50-ies when the *Computing Centre* of University of Latvia was established, and the first mainframe computers appeared there. From the very beginning, physicists were among the most active users of these facilities. These activities lead to the establishment of the chair of *Electrodynamics and Continuum Mechanics* in University of Latvia in 1970. From the very beginning among the founders of that chair were physicists not only from University but also from the *Institute of Physics* and *Institute of Polymer Mechanic* with ideas for different industrial applications of numerical models. The established contacts with researchers in engineer sciences and active collaboration with leading applied research and development institutions in Moscow, Leningrad and Kiev in 70-ies and 80-ies have been very fruitful and maybe were one of the major reasons of the success of this research direction at University of Latvia.

In the beginning of 90-ies, when all organizational structures of research in our country underwent dramatic changes, not all ideas and all institutions managed to adapt successfully to the new conditions. Fortunately, the people who were involved in computer modelling related research were among the most successful - development of already existing and newly established contacts in Western Europe and reorientation of their applied research to the directions actively studied in partner universities was also an important factor for financing our research activities. The first agreement of scientific collaboration with a western university was signed in 1988 – this was the agreement between Faculty of Physics and Mathematics of University of Latvia and the *Institute of Electroheat* of University of Hannover (nowadays *Institute of Electrotechnology* of Leibnitz University Hannover) in field of numerical modelling for solving of different engineering problems in metallurgy and semiconductor industry. As a result, research groups involved in this research successfully joined the international effort related to the application of computer models to industrial processes.

As a logical next step for concentration of research activities in this field at the Faculty of Physics and Mathematics, was foundation of the *Laboratory for mathematical modelling of Environmental and technological processes* in 1994. Currently, the research field of engineering physics, the core of which is the computer modelling of environmental and technological processes, is one of the successfully developing scientific directions at the Department of Physics of University of Latvia.

Continuing the tradition, established by the international scientific colloquiums *Modelling for Material Processing* in Riga in 1999, 2001, 2006, and *Modelling for Electromagnetic Processing* in Hanover in 2003 and 2008, University of Latvia with its long-time cooperation partner *Institute for Electrotechnology* of Leibnitz University of Hanover, organises the current 6-th colloquium *Modelling for Material Processing* in Riga in September 2010.

In the colloquium recent results of numerical and experimental research activities in the field of industrial processing technologies for creating new and alternative materials, materials with highest quality and purity and new innovative products will be presented. The actual papers on numerical and physical modelling in these branches are presented in the current proceedings.

Andris Jakovičs