

Preface

This book contains peer-reviewed papers presented during the 10th Annual Meeting of the Bulgarian Section of SIAM (BGSIAM), December 21–22, 2015, Sofia, Bulgaria. The conference was hosted by the Institute of Mathematics and Informatics of the Bulgarian Academy of Science (<http://www.math.bas.bg/IMIdocs/BGSIAM/>).

The conference's topics of interest were as follows:

- Industrial mathematics;
- Scientific computing;
- Numerical methods and algorithms;
- Hierarchical and multilevel methods;
- High performance computing and applications in the industrial mathematics;
- Partial differential equations and their applications;
- Control and uncertain systems;
- Monte Carlo and quasi-Monte Carlo methods;
- Neural networks, metaheuristics, genetic algorithms;
- Financial mathematics.

The list of the plenary invited speakers includes several internationally recognized scientists: *Tzanio Kolev* (Lawrence Livermore National Laboratory, USA); *Johannes Kraus* (Universität Duisburg-Essen, Germany); *Maya Neytcheva* (Uppsala University, Sweden) and *Vladimir Veliiov* (Vienna University of Technology, Austria).

The further development of the society is in deep connection with the successful solution of very challenging and extremely difficult real-life problems. Mathematicians (both theoretical and applied), computer scientists, engineers, physicians, chemists, biologists, etc. are developing and using complicated and robust mathematical and computer models in the attempts to resolve successfully such kind of problems which are appearing very often.

The Industrial Mathematics is one of the most prominent examples of an interdisciplinary area involving mathematics, computer science, scientific computations, engineering, physics, chemistry, medicine etc.

The tools of Industrial Mathematics are usually based on mathematical models and corresponding computer codes that are used to perform virtual experiments to obtain new data or to better understand the existing experimental results.

The modern fast supercomputers are one of the main tools to find accurate enough and fast enough solutions of many of the nowadays large and very complicate problems. However, unfortunately, not in all cases and not for all important problems. *Arthur Jaffe* predicted in 1984 (A. Jaffe, “Ordering the universe: The role of mathematics”, *SIAM Review.*, Vol. 26 (1984), pp. 475–488) *Although the fastest computers can execute millions of operations in one second, they are always too slow. This may seem a paradox, but the heart of the matter is: the bigger and better computers become, the larger are the problems scientists and engineers want to solve.*

We, the editors of this issue, would like to thank all the referees of the presented papers (also the referees of the not published papers) for preparing in time and for their professional reviews and for the constructive criticism which resulted in considerable improvements of the quality of the accepted papers.

Sofia, Bulgaria

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<http://www.springer.com/978-3-319-49543-9>

Advanced Computing in Industrial Mathematics
Revised Selected Papers of the 10th Annual Meeting of
the Bulgarian Section of SIAM December 21-22, 2015,
Sofia, Bulgaria
Georgiev, K.; Todorov, M.; Georgiev, I. (Eds.)
2017, VIII, 262 p. 77 illus., 47 illus. in color., Hardcover
ISBN: 978-3-319-49543-9