

Preface

The ninth international conference in the series “Mathematical Modeling and Computational Physics”, MMCP 2017 (<http://mmcp2017.jinr.ru>), was continuing the firmly established traditions of providing an open forum for exchange of ideas, learning and communication, promotion of future scientific cooperation through strengthened personal relations. On the one hand, the participants’ grasp of new research topics was enhanced by presentations of forerunner reports on challenges in the contemporary research; the excellent perspectives of the mathematical modeling and computational physics have been illustrated with topics generated by big science projects, cross-disciplinary research, the study of new systems and phenomena, the deep knowledge of special functions chapters. On the other hand, this MMCP conference has shown that we may look confidently into the future. The young authors’ original reports covered a significant fraction of the contributions to the conference. For novices who have not finished their academic studies yet, the students’ school “Mathematical Modeling for NICA”, organized as a satellite event of MMCP 2017, has brought a noticeable contribution to the growth of the interest of the young generation to NICA, the flagman project of the Joint Institute for Nuclear Research (JINR) in Dubna, Russia.

The MMCP 2017 and the satellite students’ school took place in Dubna, on July 3–7, 2017. Together with the permanent organizer of the MMCP conferences, the Laboratory of Information Technologies (LIT) of the JINR, the co-organizers of the ninth MMCP edition have been the Horia Hulubei National Institute for R&D in Physics and Nuclear Engineering (IFIN-HH), Bucharest, Romania, and three Institutions from Košice, Slovakia (the Institute of Experimental Physics (IEP) SAS, the Technical University (FEI TU), and the Pavol Jozef Šafárik University (NSF UPJŠ)). The myriad of technical and organizational problems raised during MMCP 2017 have been overcome thanks to the abnegation of the Local Organizing Committee members and of several tens of volunteers. We are grateful to all of them for the in-time and high-level solution of all the foreseen and unforeseen tasks.

The coverage of MMCP 2017 (involving plenary lectures and contributions in parallel sections) included: distributed and parallel computing in science and technology; mathematical methods and application software for complex systems; bioinformatics methods and computational biophysics; mathematical methods and software for experimental data processing; computer algebra and quantum computing.

The unprecedented interest for the conference: 257 participants (80 expected) submitting a total of 215 contributions (invited and proposed) (60 expected), together with an attendance of 54 (30 expected) at the heterogeneous cluster HybriLIT based (<http://hybrilit.jinr.ru>) Students’ School asked for extraordinary organizational measures. With direct consequences for the present volume was the draconian limitation of the number of pages per submitted manuscript.

As a result of a meticulously passed refereeing process (coordinated by the \TeX technical editor Ján Buša, who contacted 212 potential referees), out of the 127 submitted manuscripts, 12 plenary lectures and 88 contributions have been accepted for publication under the covers of the present issue of the EPJ-WoC. Gheorghe Adam made the final critical reading of each accepted manuscript (the authors have had, however, the last word in deciding to accept or not the proposed English corrections).

Apart from the already made remarks, contributions to the success of the MMCP 2017 have been brought by a great many colleagues from various research institutions. Special mention is to be made of the role of the Conference Chairman and all the members of the International Program Committee for their contribution to the definition of the basic aims and the scope of the conference, the proposal, selection, and promotion of invited lectures of the highest interest, the coverage of an important fraction of the reviewing process. The contribution of the 146 independent referees to the quality assessment of the submitted manuscripts is gratefully acknowledged.

To facilitate the lecture, we have found it useful to organize the content of this volume into six chapters: plenary lectures, mathematical modeling and methods, numerical modeling and methods, mathematical and computational support of the experiments, computing tools and software services, optimization and simulation. Within each chapter, the paper are ordered alphabetically following the name of the first/single author.

There is a threefold message emerging from the lecture of these papers. First, the computing is pervasive in the modern physics research. Second, maximum advantage from the possibilities offered by the existing multi-core, many core, many-GPU hardware facilities can be obtained provided specialized software tools are built up. Third, the derivation of computing-based sound solutions needs the concurrence of three competences: deep understanding of the underlying physics, grasp of rigorous mathematical methods, flexibility in the use of the reality of the hardware and software environments.

The editors are convinced of the usefulness of the job done. The readers are warmly invited to explore this resource of valuable information for their current and future activity. We hope that the high standard of the MMCP conferences will be preserved in the future and that these conferences will remain a strong attractor of the worldwide scientific community.

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MMCP 2017

July 3 – 7, 2017

Dubna, Russia

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University of Pavol Jozef Šafárik, Košice, Slovakia
Technical University, Košice, Slovakia
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