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AComIn:
Advanced Computing for Innovation

FP7 Capacity Programme Research Potential of Convergence Regions

EVENT ORGANISATION REPORT

Authors: Ivan Dimov, Prof., D.Sc., Department of Prallel Algorithms

Summary: Report about the organisation of the 8-th International Conference on Numerical Methods and Applications (NMA'14), August 20-24, 2014, Borovets (planned and carried out in the frames of the AComIn project of IICT).

Status: Final report

Distribution: Public

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Start date of the project: 01/10/2012 **Duration: 42 months**

Report about an AComin Organised/Supported Event

Name and type of the event: 8-th International Conference on Numerical Methods and Applications (NMA'14). This conference is an event organized in Bulgaria since 1984 by the Institute of Information and Communication Technologies, Bulgarian Academy of Sciences in cooperation with the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, and the Faculty of Mathematics and Informatics, Sofia University "St. Kliment Ohridski".

Place, dates: Borovets, August 20-24, 2014

Programming and Organisation committees:

Scientific Chair
Svetozar Margenov, *IICT-BAS, Sofia - BG*

Program Committee

A. Andreev (BG)
R. Blaheta (CZ)
R. Ciegis (LT)
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S. Heinrich (DE)
O. Iliev (DE)
S. Korotov (FI)
N. Krejic (RS)
I. Lirkov (BG)
S. Markov (BG)
P. Minev (CA)
M. Nedjalkov (BG)
B. Popov (US)
S. Radev (BG)
K. Sabelfeld (RU)
S. Selberherr (AT)
Khr. Semerdzhiev (BG)
M. Todorov (BG)
P. Vabishchevich (RU)
I. Yotov (US)

Invited Speakers
Acad. Blagovest Sendov, Honorary lecturer, IICT, BAS (Sofia, Bulgaria)
Prof. Vidar Thomée, Chalmers University of Technology (Göteborg, Sweden)
Prof. Peter Minev, University of Alberta (Edmonton, Canada)
Prof. Dr. Stefan Heinrich, Universität Kaiserslautern (Germany)

Prof. Wil Schilders, University of Technology (Eindhoven, The Netherlands)

Local Organizers:

Chairman: Ivan Dimov – IICT, BAS (BG)
Stefka Fidanova - IICT, BAS (BG)
Tzvetan Ostromsky- IICT, BAS (BG)
Rayna Georgieva - IICT, BAS (BG)
Kristina Kapanova - IICT, BAS (BG)
Jean Michel Sellier - IICT, BAS (BG)

Participants /number, types/ : **75**

From IICT: 22
Bulgarian participants outside IICT: 10
Foreign participants: 43, including 4
Plenary Invited Speakers

Short description:

The 8-th International Conference on Numerical Methods and Applications, NMA'2014, 20-24 August, 2014, Borovets, was planned and carried out within the AComIn project focusing on the advanced computing topic. The accepted papers by the Scientific Committee were presented in sessions such as (1) solving large engineering and scientific problems with advanced mathematical models, (2) numerical simulations and back analysis in civil and mechanical engineering, (3) advanced numerical methods for scientific computing, (4) metaheuristic optimization problems, (5) Monte Carlo and Quasi-Monte Carlo methods, (6) Advanced numerical techniques for PDEs and applications, etc.

Thus, the topics of the conference not only represented the main pillar of the project, but were related to the presentation of efficient methods and algorithms for advanced computing, the modeling and therefore understanding the behavior of materials and the underlying phenomena and how those materials could be applied for the advancement of ICT. Furthermore, the topics of the conference were related to advanced computing applied in the development of large-scale environmental models, novel results in CMOS modeling and application of results, new methods and models for computing small sensitivity indices, etc.

Besides the five invited talks, additional 69 papers were presented at the Conference in 6 Special sessions in 11 scientific topics of interest. The participants were coming from 21 countries, namely, Bulgaria, Germany, Austria, UK, China, USA, Belgium, Spain, Czech Republic, Switzerland, Norway, Greece, Turkey, Slovakia, Poland, Russia, Sweden, The Nederland, Denmark, France, and Canada.

There were several contributed talks and plenary sessions by worldwide known scientists, as well as discussion on "Ultimate numerical algorithms for solving advanced problems in physics".

Several PhD students from Bulgaria, Germany, Spain and Austria presented their research from fields such as advanced computing for innovation, computational physics, chemistry and biology and environmental modeling.

Scientific Programme:
The Scientific Programme of the conference is available at:

http://parallel.bas.bg/dpa/NMA_2014/Program-NMA-2014.pdf

Scientific Programme of the *AComIn*-related activities:

The Scientific Programme of the event includes 8 Invited talks, 6 Special Sessions and Sessions of Contributed Talks. All of the Special Sessions are related to the AComIn project activities.

The Invited lecturers gave the following talks:

- **Bl. Sendov**, *Extreme problems in the geometry of polynomials*
- **Vidar Thomée**, *On Positivity Preservation in some Finite Element Methods for the Heat Equation*
- **Stefan Heinrich**, *Multilevel Monte Carlo methods for parametric problems*
- **Asen Asenov**, *Kinetic Monte Carlo Simulation of Statistical Reliability in Nanoscale CMOS*
- **Sylvain Maire,** *Walk on equations and sequential Monte Carlo to solve linear systems*
- **J.L. Guermond** and **P.D. Minev**, *High-order Artificial Compressibility for the Navier-Stokes Equations*
- **Wil Schilders** *Model order reduction in the electronics industry*
- **Bangti Jin, Raytcho Lazarov, Joseph Pasciak, and Zhi Zhou**, *Finite element method for fractional order partial differential equations*

<u>AComIn-related papers presented at the event and published after peer review:</u>

The following **sixteen AComIn-related papers** will be published in the NMA'2014 proceedings to appear as a special volume of Springer LNCS in 2014:

- **Clemens Hofreither**, **Walter Zulehner** *Spectral analysis of geometric multigrid methods for isogeometric analysis*
- **Johannes Kraus, Raytcho Lazarov, Maria Lymbery, Svetozar Margenov, Ludmil Zikatanov,** *MinRes Iteration with Auxiliary Space Multigrid Preconditioning for Darcy problem*
- **Zahari Zlatev, Krassimir Georgiev**, *Some Remarks on the Absolute Stability Properties of the Richardson Extrapolation Combined with Explicit Runge-Kutta Methods*
- **Maria Ganzha, Ivan Lirkov, Marcin Paprzycki,** *An Application of Parallel Algorithm for Solving Tridiagonal Linear Systems*
- **Johann Cervenka**, **Paul Ellinghaus, Mihail Nedjalkov**, *Deterministic Solution of the Discrete Wigner Equation*

- **J.M. Sellier, R. Georgieva, I. Dimov**, *Sensitivity Analysis of Design Parameters for Silicon Diodes*
- **P. Ellinghaus**, **M. Nedjalkov, and S. Selberherr**, *Optimized Particle Regeneration Scheme for the Wigner Monte Carlo Method*
- **Stefka Fidanova**, **Petrica Pop,** *An Ant Algorithm for the Partition Graph Coloring Problem*
- **Irina Georgieva** *Interpolating Solutions of the Poisson Equation in the Disk based on Radon Projections*
- **Tz. Ostromsky**, **I. Dimov, V. Aleksandrov, Z. Zlatev**, *Preparing Input Data for Sensitivity Analysis of an Air Pollution Model by using High-Performance Supercomputers and Algorithms*
- **C. Furst**, **I. Georgiev**, **A. Haider, R. Iankov, S. Margenov***, Numerical Homogenization of Wood Polymer Composite Materials*
- **Vihar P Georgiev**, **Asen Asenov**, *Multi-Scale Computational Framework for Evaluation of the Performance of Molecular Based Flash Cells*
- **Wolfgang Fenz**, **Ivan Georgiev, Johannes Dirnberger, Vania Georgieva, Svetozar Margenov, Elena Nikolova,** *GPU Simulations of Fluid-Structure Interaction Problems with Application to Cerebral Aneurysms* B-51
- **I. Georgiev, S. Margenov, Y. Vutov**, *Numerical Homogenization of Composite Materials*
- **Ivan Dimov, Rayna Georgieva, Venelin Todorov,** *Balancing of Systematic and Stochastic Errors in Monte Carlo Algorithms for Integral Equations*
- **S. Stoykov**, **C. Hofreither, S. Margenov,** *Isogeometric Analysis for Nonlinear Dynamics of Timoshenko Beams*

Assessment of the added-value of the event to the AComIn dissemination objectives:

The support provided by AComIn to NMA2014 enabled to:

- Cover the travel expenses and accommodation of the invited speakers who gave plenary and keynote talks;
- Cover the expenses of 21 participants from IICT;
- The conference organizers provided printed book of abstracts (see attachment "Booklet_NMA2014.pdf"), with all the accepted talks, index of participants and the conference program. Every participant in the conference was provided with it, as well as a conference insignia.
- The post-conference proceedings will be published in Springer under Lecture Notes in Computer Science (LNCS).

The AComIn support is acknowledged in the NMA'14 Book of Abstracts.

Changes in the financial planning of the AComIn support spending (if any):
There were no changes in the budget plan, approved by the AComIn Executive Board.

Reason for the changes during the actual event implementation: N/A

Prof. Ivan Dimov, D.Sc.

/DATE/ **/EVENT ORGANISER/**