Parallel Numerical Algorithms

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Robust and efficient parallel numerical algorithms and their implementation in easy-to-use portable software components are crucial for computational science and engineering applications. They are strongly influenced by the remarkable progress in the development of parallel computer systems. This imposes to adapt or re-design already existing algorithms, or to find new algorithmic approaches, in order to effectively exploit the power that is offered by emerging parallel architectures. On the other hand, the use of numerical algorithms and software in more and more complex applications, to make simulations and computational experiments with a very high level of detail, demands for increasing computing power, thus giving new stimulating impulses to parallel computer developers.

The aim of Topic 10 is to provide a forum for the presentation and discussion of recent advances in the field of parallel and distributed numerical algorithms. Different aspects of their design and implementation are addressed, ranging from fundamental algorithmic concepts, through their efficient implementation on modern parallel architectures, up to software design and prototyping in scientific computing and simulation software environments, and to performance analysis.

Overall, 17 papers were submitted to this topic, with authors from Austria, China, Egypt, France, Germany, Greece, India, Italy, Lebanon, The Netherlands, Russia, Spain, Sweden and the United States of America. Each paper received at least three reviews and, finally, we were able to select 6 regular papers. The accepted papers discuss parallel algorithms for ordinary differential equations, partial differential equations, linear algebra and fast Fourier transforms.

We grouped the accepted papers into two sessions. In the session on *differential equations*, M. Korch, T. Rauber and C. Scholtes analyze several parallel implementations of explicit extrapolation methods for the solution of systems of ODEs; M. Fournier, N. Rennon and D. Ruiz describe the integration of the parallel linear system solver Mumps into the Getfem++ finite element library and its application in CFD simulations; M. Emans presents an approach to reduce latency effects in algebraic multigrid applications on clusters.

In the session on *linear algebra and FFT*, E. Romero and J. Roman propose a robust and efficient parallel implementation of the Jacobi-Davidson eigensolver for complex non-Hermitian matrices; M. Roderus, A. Berariu, H.-J. Bungartz, S. Krüger, A. Matveev and N. Rösch describe the use of scheduling algorithms to improve the scalability of parallel eigenvalue computations in quantum chemistry; Y. Zhang, J. Liu, E. Kultursay, M. T. Kandemir, N. Pitsianis and X. Sun

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discuss the parallelization of the data translation phase for non-uniform FFT methods.

The previous papers show a wide diversity of themes, approaches and applications related to the field of parallel numerical algorithms. We are convinced that they represent valuable contributions to Euro-Par 2010 and their presentation at the conference will be of interest for a broad audience of participants.

Finally, we would like to take the opportunity of thanking all the authors for their submissions, the referees for their competent and useful comments, as well as the Euro-Par Organizing Committee for a smooth coordination of Topic 10.