

Numerical Mathematics and Advanced Applications 2009

Proceedings of ENUMATH 2009, the 8th European Conference on Numerical Mathematics and Advanced Applications, Uppsala, July 2009

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Preface

The European Conference on Numerical Mathematics and Advanced Applications (ENUMATH) was held from June 29–July 3, 2010, in Uppsala, Sweden. This was the eighth conference in a series of biannual meetings starting in Paris (1995). Subsequent conferences were organized in Heidelberg (1997), Jyväskylä (1999), Ischia (2001), Prague (2003), Santiago de Compostela (2005), and Graz (2007). ENUMATH 2009 attracted over 330 attendees to the scientific programme, with ten invited speakers, one public lecture, 32 minisymposia, and more than 280 presentations. This volume contains a selection of papers by the invited speakers and from the minisymposia and the contributed sessions.

The purpose of the conference was to create a forum for discussion and dissemination of recent results in numerical mathematics and new applications of computational methods. Many subjects were covered in the talks and a few of the topics represented in these proceedings were discontinuous Galerkin methods, finite element methods in different applications, methods for fluid flow, electromagnetism, financial engineering, structural mechanics, optimal control, and biomechanics. The minisymposia listed below with their organizers also give an impression of how broad the scope of the conference was:

- *Adaptivity for non-linear and non-smooth problems*, part I & II, Ralf Kornhuber, Andreas Veiser
- *Advanced techniques in radial basis function approximation for PDEs*, part I & II, Natasha Flyer, Elisabeth Larsson
- *Advances in numerical methods for non-Newtonian flows*, part I & II, Erik Burman, Maxim Olshanskii, Stefan Turek
- *Anisotropic adaptive meshes: error analysis and applications*, part I & II, Thierry Coupez, Simona Perotto
- *Asymptotic linear algebra, numerical methods, and applications*, part I & II, Marco Donatelli, Stefano Serra-Capizzano
- *Biomechanics*, part I & II, Gerhard A. Holzapfel, Axel Klawonn
- *Embedded boundary methods for time-dependent problems*, Daniel Appelö
- *Finite element software development*, Anders Logg
- *Finite elements for convection-diffusion problems*, part I, II & III, Miloslav Feistauer, Petr Knobloch

- *Finite element methods for flow problems*, Johan Hoffman
- *Geometric aspects of the finite element modeling*, part I & II, Sergey Korotov, Tomas Vejchodsky
- *High frequency wave propagation*, Olof Runborg
- *High order methods in CFD*, Bernhard Müller
- *HPC-driven numerical methods and applications*, part I & II, Svetozar Margenov, Maya Neytcheva
- *Multiscale methods for differential equations*, part I & II, Mats Larson, Axel Målqvist
- *Numerical methods for multi-dimensional Lagrangian schemes*, Pierre-Henri Maire, Raphaël Loubere
- *Numerical methods for option pricing*, Cornelis W. Oosterlee, Jari Toivanen
- *Numerical methods for stochastic partial differential equations*, part I & II, Fabio Nobile, Raul Tempone
- *Tensor numerical methods*, Eugene Tyrtshnikov, Boris Khoromskij
- *Theory and applications of non-conforming finite element methods*, Emmanuil Georgoulis, Max Jensen

The conference was organized by the Division of Scientific Computing of the Department of Information Technology at Uppsala University in collaboration with Akademikonferens in Uppsala. Uppsala University is not as old as the universities in Paris, Heidelberg, and Prague, but it is the oldest university in the Nordic countries. It was founded in 1477 and the first professor in mathematics was appointed in 1593. The first professor in numerical analysis, Heinz-Otto Kreiss, started his work in 1965.

The success of the conference was in a large part due to the invited speakers Martin Berggren, Daniele Boffi, Carsten Carstensen, Vit Dolejsi, Charlie Elliott, Claude Le Bris, Christian Lubich, Marco Picasso, Rob Stevenson, and Anna-Karin Tornberg, as well as to Björn Engquist, who delivered the public lecture. The members of the program committee were Franco Brezzi, Miloslav Feistauer, Roland Glowinski, Rolf Jeltsch, Yuri Kuznetsov, Jacques Périaux, Rolf Rannacher, and Endre Süli. They selected the invited speakers and helped by sharing their knowledge of how are organized these conferences.

The scientific committee consisted of Christine Bernardi, Alfredo Bermudez de Castro, Albert Cohen, Claudio Canuto, Michael Griebel, Peter Hansbo, Jaroslav Haslinger, Thomas Huckle, Karl Kunisch, Ulrich Langer, Stig Larsson, Olivier Pironneau, Sergey Repin, Miro Rozloznik, J. J. Sanz-Serna, Stefan Sauter, Stefano Serra Capizzano, Valeria Simoncini, Olaf Steinbach, Rolf Stenberg, Anders Szepessy, Stefan Turek, Kees Vuik, Ragnar Winther, and Barbara Wohlmuth. Members of the committee, Martin Berggren and Bernhard Müller have served as referees for this volume.

The local committee was assisted by PhD students at our Division: Qaisar Abbas, Kenneth Duru, Magnus Gustafsson, Andreas Hellander, Stefan Hellander, Katharina Kormann, Martin Kronbichler, Erik Lehto, Anna Nissen, Elena Sundkvist, Martin Tillenius, Salman Toor, and He Xin. The change between speakers in the sessions would not have been so smooth without their presence in the lecture rooms. Special thanks to Kenneth Duru for helping with the preparations of the proceedings.

The conference received financial support from Centre for Interdisciplinary Mathematics at Uppsala University, City of Uppsala, Comsol, Swedish Foundation for Strategic Research, Swedish Research Council, Uppsala Multidisciplinary Center for Advanced Computational Science (UPPMAX), Wenner-Gren Foundations, and John Wiley & Sons. Their generous contributions helped to lower the fees for the participants.

Last but not least, many thanks to Karin Hornay and Maria Bäckström from Akademikonferens for sharing their invaluable experience in organizing conferences.

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