Preface

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Biographical notes: Marek Behr received his Doctorate in 1992 from the Department of Aerospace Engineering and Mechanics at the University of Minnesota, Twin Cities. Since 2004, he has been a Full Professor at the RWTH Aachen University. Since 2006, he has served as the Coordinator of the Graduate School of Excellence, Aachen Institute for Advanced Study in Computational Engineering Science. His research interests include computational fluid mechanics, fluid-structure interaction, parallel computing, model development and inverse design in biomedical, aerospace and production engineering.

Arndt Bode received his Doctorate in 1975 in Informatics from Technische Universität Karlsruhe (today: KIT) and his Habilitation in 1984 from the University of Erlangen-Nuremberg. Since 1989, he has been a Full Professor of Informatics at TU München. Since 2009, he has been the Chairman of the Board of the Leibniz-Supercomputer Center of the Bavarian Academy of Sciences and the Humanities. His research interests include computer architecture, parallel and distributed systems, performance evaluation tools, energy efficient supercomputing.

H. Martin Bücker received his PhD in Electrical Engineering from RWTH Aachen University in 1997. He is currently a Full Professor in the Department of Mathematics and Computer Science, Friedrich Schiller University, Jena, which he joined in 2012. Prior to this, he was a researcher at Forschungszentrum Jülich, a visiting scientist at Argonne National Laboratory, and a senior researcher at RWTH Aachen University. His research focuses on parallel algorithms, high-performance computing, combinatorial scientific computing, and automatic differentiation.

Jens Lang received his Diploma and PhD in Mathematics from the Martin-Luther-University of Halle-Wittenberg in Halle, Germany in 1986 and 1988, respectively. From 1984 to 1985, he studied at the University of St. Petersburg, Russia. He joined the Zuse Institute in Berlin in 1990 and received his Habilitation in Mathematics from the Free University of Berlin in 1999. Since 2001, he has been working as a Professor of Numerical Analysis at the Technische Universität Darmstadt, Germany. His major interests are modelling and numerical simulation of non-linear evolution problems described by systems of partial differential equations.

Ernst Rank received his Doctorate from TUM in 1985. Following an employment at Siemens, he assumed a professorship at the University of Dortmund in 1990. Since 1997, he has been a Full Professor at TUM, where he was also the First Vice President from 2002 to 2008. He has been the Founding Director of the International Graduate School of Science and Engineering (IGSSE) since 2006 and was Director of the TUM Graduate School from 2008 to 2013. He conducts research on numerical mechanics, high-order finite element methods, building informatics and the integration of numerical simulation and geometric modelling.

Michael Schäfer received his Doctorate degree in Applied Mathematics from University Erlangen-Nuremberg in 1987. Since 1996, he has been a Full Professor at Technische Universität Darmstadt. He is the Dean of the Graduate School of Excellence in Computational Engineering at TU Darmstadt. His research interests include computational fluid and solid mechanics, fluid-structure interaction, numerical methods for partial differential equations, multigrid methods, parallel computing, numerical optimisation, and computational engineering.

In October 2011, the 2nd International Conference on Computational Engineering took place in Darmstadt, Germany. The conference was organised by the Graduate School of Computational Engineering at TU Darmstadt, together with the International Graduate School of Science and Engineering at TU München and the Aachen Institute for Advanced Study in Computational Engineering Science at RWTH Aachen. The conference focus was on the modelling and simulation of coupled multi-physics problems. Such kinds of problem are gaining more and more importance within the scientific community.

The present special issue comprises selected contributions from the above conference. After the careful review process 13 papers were selected for publication. The individual topics cover quite a wide spectrum within the field: shape optimisation for divertors, an interface for the automatic differentiation tool ADiMat, variable density flows in porous media, magnetohydrodynamics of gas circuit breakers, a finite difference time domain method for the interaction of Helmholtz resonators with acoustic sound, convolution algorithms for contact pressure in lubricated non-smooth point contact, uncertainty quantification for thermo-convective Poiseuille flow by stochastic collocation, a discontinuous Galerkin approach for electro-quasistatic field problems, matrix-free methods for implicit time integration for compressible flows using automatic differentiation, exact Jacobians in an implicit Newton method for multiphase flow in porous media, model hierarchy based optimal control of radiative heat transfer, adjoint-based reconstruction of an entropy source by discrete temperature measurements, as well as coupled simulation of switching arcs considering transient-capacitive effects.

We would like to thank all authors for their contributions. In particular, we appreciate the careful work of the referees ensuring the high quality of the special issue. Further we would like to thank the Editor-in-Chief Professor Kuan-Ching Li for his cooperation in preparing the issue.