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Introduction to the special issue for EUCCO 2013

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This special issue contains selected contributions to the 3rd European Conference on Computational Optimization (EUCCO), July 17 through July 19, 2013, in Chemnitz, Germany. The aim of the EUCCO conference series is to bring together scientists from the fields optimization with PDEs, algorithms for large scale optimization problems and related applications. Earlier conferences took place in 2004, Dresden, and 2007, Montpellier. The conference in Chemnitz attracted a total of 114 participants from 20 countries. There were five invited plenary talks:

- Christian Kanzow: On the Solution of Quasi-Variational Inequality Problems
- Barbara Kaltenbacher: On the use of State Constraints for Optimal Control of Singular PDEs
- Luis Nunes Vicente: Zero-Order Methods: Global Rates and Randomness
- Katja Mombaur: Challenging Applications for Optimal Control: Motions of Humans, Humanoids and Virtual Characters
- Andreas Wächter: Active Set SQP Algorithms with Inexact Subproblem Solutions for Nonlinear Nonconvex Optimization

The majority of the 83 presentations were given within ten focus sessions:

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- Computational Shape and Topology Optimization: Stephan Schmidt (London), Michael Stingl (Erlangen)
- Mathematical Programs with Equilibrium Constraints: Sonja Steffensen (Aachen), Gerd Wachsmuth (Chemnitz)
- Linear Algebra in Computational Optimization: Martin Stoll (Magdeburg), Bart Vandereycken (Princeton)
- Model Order Reduction in Optimization: Karl Meerbergen (Leuven), Gianluigi Rozza (Triest)
- Optimization under Uncertainties: Claudia Schillings (Zurich), Hanne Tiesler (Bremen)
- Geometric Methods in Optimization: Oliver Sander (Aachen), Anton Schiela (Berlin)
- Optimization in Applications: Martin Weiser (Berlin), Ralf Zimmermann (Braunschweig)
- Discretization of Optimal Control Problems: Mariano Mateos (Oviedo), Ira Neitzel (Munich)
- Algorithms and Adaptivity for PDE-Constrained Optimization: Carsten Gräser (Berlin), Winnifried Wollner (Hamburg)
- Computational Inverse Problems: Christian Clason (Graz), Georg Stadler (Austin)

The selected contributions collected in this volume demonstrate the breadth of the spectrum of topics in the field of PDE constrained optimization and they can be grouped according to the focus sessions. From topology optimization, the paper "Optimizing Fiber Orientation in Fiber-Reinforced Materials using Efficient Upscaling" by Stefan Frei, Heiko Andrä, Rene Pinnau, and Oliver Tse reports on novel strategies for the optimization of composite materials. Equilibrium constraints play a major role in the contribution "The Semismooth Newton Method for the Solution of Quasi-Variational Inequalities" by Francisco Facchinei, Christian Kanzow, Sebastian Karl, and Simone Sagratella. Linear algebra aspects are addressed in the paper "Lossy Compression for PDE-Constrained Optimization: Adaptive Error Control" by Sebastian Götschel and Martin Weiser. Geometric methods play a major role in the articles "Moreau-Yosida Regularization in Shape Optimization with Geometric Constraints" by Moritz Keuthen and Michael Ulbrich, and "Low-rank Retractions: A Survey and New Results" by Pierre-Antoine Absil and Ivan Oseledets. Application issues are addressed in "Optimal Control of Electrorheological Fluids through the Action of Electric Fields" by Juan Carlos de los Reyes and Irwin Yousept. The topic of discretization and adaptivity receives high attention in "Adaptive discontinuous Galerkin methods for state constrained optimal control problems governed by convection diffusion equations" by Hamdullah Yücel and Peter Benner, "Robust Error Estimates for Regularization and Discretization of Bang-Bang Control Problems" by Daniel Wachsmuth and "Boundary Concentrated Finite Elements for Optimal Control Problems with Distributed Observation" by Sven Beuchler, Katharina Hofer, Daniel Wachsmuth, and Jan-Eric Wurst. The paper "Annular and Sectorial Sparsity in Optimal Control of Elliptic Equations" by Roland Herzog, Johannes Obermeier and Gerd Wachsmuth discusses the enforcement of special sparsity patterns in optimal controls and it emphasizes algorithmic aspects. Finally, the topic of inverse problems is treated in "Parameter Identification for Non-

linear Elliptic-Parabolic Systems with Application in Lithium-Ion Battery Modeling" by Oliver Lass and Stefan Volkwein and "Numerical Methods for Parameter Identification in Stationary Radiative Transfer" by Herbert Egger and Matthias Schlottbom. The organizers would like to acknowledge the support by the international scientific committee, consisting of Eduardo Casas, Karl Kunisch, Stefano Lucidi, Alfio Quarteroni, Rolf Rannacher, Jean-Pierre Raymond, Trond Steihaug, and Andrea Walther, as well as the generous financial support by the European Science Foundation grant within the program 'Optimization with PDE Constraints' (Chair: Ronald Hoppe).