

Contents

| | |
|--|-----|
| Introduction | ix |
| Part I: Constrained Optimization, Identification and Control | |
| <i>E. Bänsch and P. Benner</i> | |
| Stabilization of Incompressible Flow Problems by Riccati-based Feedback | 5 |
| <i>L. Blank, M. Butz, H. Garcke, L. Sarbu and V. Styles</i> | |
| Allen-Cahn and Cahn-Hilliard Variational Inequalities Solved with Optimization Techniques | 21 |
| <i>H.G. Bock, A. Potschka, S. Sager and J.P. Schlöder</i> | |
| On the Connection Between Forward and Optimization Problem in One-shot One-step Methods | 37 |
| <i>D. Clever, J. Lang, St. Ulbrich and C. Ziem</i> | |
| Generalized Multilevel SQP-methods for PDAE-constrained Optimization Based on Space-Time Adaptive PDAE Solvers | 51 |
| <i>T. Franke, R.H.W. Hoppe, C. Linsenmann and A. Wixforth</i> | |
| Projection Based Model Reduction for Optimal Design of the Time-dependent Stokes System | 75 |
| <i>N. Gauger, A. Griewank, A. Hamdi, C. Kratzenstein, E. Özkaya and T. Slawig</i> | |
| Automated Extension of Fixed Point PDE Solvers for Optimal Design with Bounded Retardation | 99 |
| <i>M. Gugat, M. Herty, A. Klar, G. Leugering and V. Schleper</i> | |
| Well-posedness of Networked Hyperbolic Systems of Balance Laws | 123 |
| <i>M. Hinze, M. Köster and St. Turek</i> | |
| A Space-Time Multigrid Method for Optimal Flow Control | 147 |
| <i>M. Hinze and M. Vierling</i> | |
| A Globalized Semi-smooth Newton Method for Variational Discretization of Control Constrained Elliptic Optimal Control Problems | 171 |

| | |
|---|-----|
| <i>D. Hoffeld, Ph. Stumm and A. Walther</i> Structure Exploiting Adjoints for Finite Element Discretizations | 183 |
| <i>E. Kostina and O. Kostyukova</i> Computing Covariance Matrices for Constrained Nonlinear Large Scale Parameter Estimation Problems Using Krylov Subspace Methods | 197 |
| Part II: Shape and Topology Optimization | |
| <i>P. Atwal, S. Conti, B. Geihe, M. Pach, M. Rumpf and R. Schultz</i> On Shape Optimization with Stochastic Loadings | 215 |
| <i>L. Blank, H. Garcke, L. Sarbu, T. Srisupattarawanit, V. Styles and A. Voigt</i> Phase-field Approaches to Structural Topology Optimization | 245 |
| <i>C. Brandenburg, F. Lindemann, M. Ulbrich and S. Ulbrich</i> Advanced Numerical Methods for PDE Constrained Optimization with Application to Optimal Design in Navier Stokes Flow | 257 |
| <i>K. Eppler and H. Harbrecht</i> Shape Optimization for Free Boundary Problems – Analysis and Numerics | 277 |
| <i>N. Gauger, C. Ilic, St. Schmidt and V. Schulz</i> Non-parametric Aerodynamic Shape Optimization | 289 |
| Part III: Model Reduction | |
| <i>A. Günther, M. Hinze and M.H. Tber</i> A Posteriori Error Representations for Elliptic Optimal Control Problems with Control and State Constraints | 303 |
| <i>D. Meidner and B. Vexler</i> Adaptive Space-Time Finite Element Methods for Parabolic Optimization Problems | 319 |
| <i>R. Rannacher, B. Vexler and W. Wollner</i> A Posteriori Error Estimation in PDE-constrained Optimization with Pointwise Inequality Constraints | 349 |
| Part IV: Discretization: Concepts and Analysis | |
| <i>T. Apel and D. Sirch</i> A Priori Mesh Grading for Distributed Optimal Control Problems . . . | 377 |
| <i>M. Hinze and A. Rösch</i> Discretization of Optimal Control Problems | 391 |

| | |
|--|-----|
| <i>K. Kohls, A. Rösch and K.G. Siebert</i> | |
| A Posteriori Error Estimators for Control Constrained Optimal Control Problems | 431 |
| <i>D. Meidner and B. Vexler</i> | |
| A Priori Error Estimates for Space-Time Finite Element Discretization of Parabolic Optimal Control Problems | 445 |
| <i>I. Neitzel and F. Tröltzsch</i> | |
| Numerical Analysis of State-constrained Optimal Control Problems for PDEs | 467 |
| Part V: Applications | |
| <i>I. Altrogge, C. Büskens, T. Kröger, H.-O. Peitgen, T. Preusser and H. Tiesler</i> | |
| Modeling, Simulation and Optimization of Radio Frequency Ablation | 487 |
| <i>E. Bänsch, M. Kaltenbacher, G. Leugering, F. Schury and F. Wein</i> | |
| Optimization of Electro-mechanical Smart Structures | 501 |
| <i>N.D. Botkin, K.-H. Hoffmann and V.L. Turova</i> | |
| Freezing of Living Cells: Mathematical Models and Design of Optimal Cooling Protocols | 521 |
| <i>M. Gröschel, G. Leugering and W. Peukert</i> | |
| Model Reduction, Structure-property Relations and Optimization Techniques for the Production of Nanoscale Particles | 541 |
| <i>F. Haußer, S. Janssen and A. Voigt</i> | |
| Control of Nanostructures through Electric Fields and Related Free Boundary Problems | 561 |
| <i>A. Küpper and S. Engell</i> | |
| Optimization of Simulated Moving Bed Processes | 573 |
| <i>R. Pinnau and N. Siedow</i> | |
| Optimization and Inverse Problems in Radiative Heat Transfer | 597 |
| <i>M. Probst, M. Lülfsmann, M. Nicolai, H.M. Bucker, M. Behr and C.H. Bischof</i> | |
| On the Influence of Constitutive Models on Shape Optimization for Artificial Blood Pumps | 611 |

Constrained Optimization and Optimal Control for Partial
Differential Equations

Leugering, G.; Engell, S.; Griewank, A.; Hinze, M.;

Rannacher, R.; Schulz, V.; Ulbrich, M.; Ulbrich, S. (Eds.)

2012, XI, 622 p. 143 illus., 80 illus. in color., Hardcover

ISBN: 978-3-0348-0132-4

A product of Birkhäuser Basel