

Part II

Shape and Topology Optimization

Introduction to Part II

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In this part, novel results in the field of shape and topology optimization achieved within the special priority program are presented.

Pradeep Atwal, Sergio Conti, Benedict Geihe, Martin Pach, Martin Rumpf and Rüdiger Schultz present, in *On Shape Optimization with Stochastic Loadings*, algorithmic approaches for topology optimization problems within a stochastic framework.

Luise Blank, Harald Garcke, Lavinia Sarbu, Tarin Srisupattarawanit, Vanessa Styles and Axel Voigt compare, in *Phase-field Approaches to Structural Topology Optimization*, Cahn-Hilliard and Allen-Cahn formulations of topology optimization problems.

Christian Brandenburg, Florian Lindemann, Michael Ulbrich and Stefan Ulbrich present, in *Advanced Numerical Methods for PDE Constrained Optimization with Application to Optimal Design in Navier Stokes Flow*, an approach to parametric shape optimization which is based on transformation to a reference domain with continuous adjoint computations and applied to the instationary Navier-Stokes equations.

Karsten Eppler and Helmut Harbrecht solve, in *Shape Optimization for Free Boundary Problems – Analysis and Numerics*, a Bernoulli type free boundary problem by means of shape optimization and characterize well-posed and ill-posed problems by analyzing the shape Hessian.

Nicolas Gauger, Caslav Ilic, Stephan Schmidt and Volker Schulz derive, in *Non-parametric Aerodynamic Shape Optimization*, very efficient numerical schemes by exploiting the arising structures in the shape optimization problems – in particular by approximating arising shape Hessians.

Volker Schulz