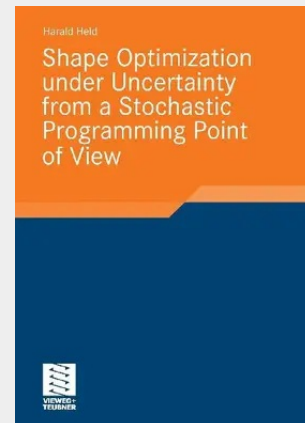


Shape Optimization under Uncertainty from a Stochastic Programming Point of View

The author applies a gradient method using the shape derivative and the topological gradient to minimize, e.g., the compliance and shows that the obtained solutions strongly depend on the initial guess, in particular its topology. The stochastic programming perspective also allows incorporating risk measures into the model which might be a more appropriate objective in many practical applications.

Optimization problems whose constraints involve partial differential equations (PDEs) are relevant in many areas of technical, industrial, and economic applications. At the same time, they pose challenging mathematical research problems in numerical analysis and optimization. The present text is among the first in the research literature addressing stochastic uncertainty in the context of PDE constrained optimization. The focus is on shape optimization for elastic bodies under stochastic loading. Analogies to finite dimensional two-stage stochastic programming drive the treatment, with shapes taking the role of nonanticipative decisions. The main results concern level set-based stochastic shape optimization with gradient methods involving shape and topological derivatives. The special structure of the elasticity PDE enables the numerical solution of stochastic shape optimization problems with an arbitrary number of scenarios without increasing the computational effort significantly. Both risk neutral and risk averse models are investigated. This monograph is based on a doctoral dissertation prepared during 2004-2008 at the Chair of Discrete Mathematics and Optimization in the Department of Mathematics of the University of Duisburg-Essen. The work was supported by the Deutsche Forschungsgemeinschaft (DFG) within the Priority Program 'Optimization with Partial Differential Equations'. Rüdiger Schultz Acknowledgments I owe a great deal to my supervisors, colleagues, and friends who have always supported, encouraged, and enlightened me through their own research, comments, and questions.



53,49 €

49,99 € (zzgl. MwSt.)

Lieferfrist: bis zu 10 Tage

Artikelnummer: 9783834809094

Medium: Buch

ISBN: 978-3-8348-0909-4

Verlag: Vieweg+Teubner Verlag

Erscheinungstermin: 28.07.2009

Sprache(n): Englisch

Auflage: 2009

Serie: Stochastic Programming

Produktform: Kartoniert

Gewicht: 225 g

Seiten: 148

Format (B x H): 148 x 210 mm

