

# THE OPTIMUM SHAPE

## Automated Structural Design

Edited by

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*General Motors Research Laboratories*



Springer

# Optimum Shape Automated Structural Design

**Bahram Ravani**

## **Optimum Shape Automated Structural Design:**

**The Optimum Shape** James Bennett, 2012-12-06 This book contains the papers presented at the International Symposium The Optimum Shape Automated Structural Design held at the General Motors Research Laboratories on September 3D October 1 1985 This was the 30th symposium in a series which the Research Laboratories began sponsoring in 1957 Each symposium has focused on a topic that is both under active study at the Research Laboratories and is also of interest to the larger technical community While attempts to produce a structure which performs a certain task with the minimum amount of resources probably predates recorded civilization the idea of coupling formal optimization techniques with computer based structural analysis techniques was first proposed in the early 1960s Although it was recognized at this time that the most fundamental description of the problem would be in terms of the shape or contours of the structure much of the early work described the problem in terms of structural sizing parameters instead of geometrical descriptions Within the past few years several research groups have started to explore this more fundamental area of shape design Initial research has raised many new questions about appropriate selection of design variables methods of calculating derivatives and generation of the underlying analysis problem

**The Optimum Shape** James Bennett, 1986-10-01 **Software**

**Systems for Structural Optimization** H.R. Hörlein, K. Schnittkowski, 2013-03-07 Herbert Hornlein Klaus Schittkowski The finite element method FEM has been used successfully for many years to simulate and analyse mechanical structural problems The results are accepted or rejected by means of comparison of state variables stresses displacements natural frequencies etc and user requirements In further analyses the design variables will be updated until the user specifications are met and the design is feasible This is the primary aim of the design process On this set of feasible designs the additional requirement given by an objective function e g weight stiffness efficiency etc defines the structural optimization problem In recent years more and more finite element based analysis systems were developed and offer now optimization modules They proceed from the design model as defined for structural analysis to perform an internal adaption of design parameters based on formal mathematical methods Despite of many common features there are significant differences in the selected optimization strategy the current implementation and the numerical results

**Advances in Structural Optimization** J.

Herskovits, 2012-12-06 Advances in Structural Optimization presents the techniques for a wide set of applications ranging from the problems of size and shape optimization historically the first to be studied to topology and material optimization Structural models are considered that use both discrete and finite elements Structural materials can be classical or new Emerging methods are also addressed such as automatic differentiation intelligent structures optimization integration of structural optimization in concurrent engineering environments and multidisciplinary optimization For researchers and designers in industries such as aerospace automotive mechanical civil nuclear naval and offshore A reference book for advanced undergraduate or graduate courses on structural optimization and optimum design

**Sensitivity Analysis in**

**Engineering** ,1987 *The 34th AIAA/ASME/ASCE/AHS/ASC Structures, Structural Dynamics and Materials Conference, Adaptive Structures Forum: 93-1520 - 93-1587 ,1993* **Applied Mechanics Reviews** ,1989 *Boundary Element Methods in Engineering* Balkrishna S. Annigeri,Kadin Tseng,2012-12-06 The Boundary Element Method BEM has become established as an effective tool for the solutions of problems in engineering science The salient features of the BEM have been well documented in the open literature and therefore will not be elaborated here The BEM research has progressed rapidly especially in the past decade and continues to evolve worldwide This Symposium was organized to provide an international forum for presentation of current research in BEM for linear and nonlinear problems in solid and fluid mechanics and related areas To this end papers on the following topics were included rotary wing aerodynamics unsteady aerodynamics design and optimization elasticity elasto dynamics and elastoplasticity fracture mechanics acoustics diffusion and wave motion thermal analysis mathematical aspects and boundary finite element coupled methods A special session was devoted to parallel vector supercomputing with emphasis on mas sive parallelism This Symposium was sponsored by United Technologies Research Center UTRC NASA Langley Research Center and the International Association of Boundary Ele ment Methods IAB EM We thank the UTRC management for their permission to host this Symposium In particular we thank Dr Arthur S Kesten and Mr Robert E Olson for their encouragement and support We gratefully acknowledge the support of Dr E Carson Yates Jr of NASA Langley Prof Luigi Morino Dr Thomas A A Collection of Technical Papers ,1993

**International Journal of Systems Automation, Research & Applications** ,1991 **Advances in Design Automation** ,1989 Bahram Ravani,1989 A Collection of Technical Papers: Structures and materials ,1987 **Journal of Aircraft** ,1999 Computer Aided Optimal Design ,1986 **Solid Freeform Fabrication Symposium Proceedings** ,1993 会议记录 (Japan),1900 *Current Topics in Computational Mechanics* James F. Cory,Jerry L. Gordon,1995 Journal of Mechanisms, Transmissions, and Automation in Design ,1989 Nonlinear Computational Mechanics P. Wriggers,W. Wagner (PD Dr.-Ing. habil.),1991 The field of Computational Mechanics has grown very rapidly during the last decade This is due to the fact that modern engineering design needs complex models which can only be analyzed and simulated on powerful computers and workstations using numerical methods like finite element boundary element or finite difference techniques This volume presents an overview of current research areas representing the state of the art in the field of nonlinear computational mechanics The areas considered in more detail include the mathematical theory and numerical algorithms nonlinear finite element procedures boundary element techniques beam plate and shell formulations inelastic constitutive models and contact formulations The reader who is new in the field will get a fresh insight in current research areas which are of worldwide interest For the reader who is already working in the field of Computational Mechanics this volume presents aspects concerning the latest developments within this area **Large Engineering Systems** ,1976

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