

THE OPTIMUM SHAPE Automated Structural Design

Edited by
J. A. BENNETT and M. E. BOTKIN

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. Hörnlein, 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 extended 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

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