

Introduction to the Special Issue on Recent Developments of Isogeometric Analysis and Its Applications in Structural Optimization

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Isogeometric analysis (IGA), which aims at integrating CAD and CAE models, is one of the most active research topics in both computational mechanics and computer-aided geometric design. The rapidly growing interests in IGA has led to profound developments of relevant theories and applications, one of which being structural optimization. With the rapid growth of researches in IGA, this special issue contributes to highlight recent developments, challenges and opportunities of IGA and IGA-based structural design optimization, with focuses on theory development, numerical implementations and potential applications.

This special issue is organized by six guest editors who have made important contributions in the field of IGA and IGA-based design and structural optimization. There are 13 papers accepted after a critical peer review process. The topics include analysis-suitable parameterization methods, isogeometric shape and topology optimization, multiscale isogeometric structural optimization, and others.

We summarize the accepted papers in this special issue as follows:

In the paper entitled "Data-driven structural design for petal-shaped auxetics using isogeometric analysis" by Wang et al. [1], the authors propose a back-propagation neural network (BPNN) based design framework for petal-shaped auxetics using IGA. The BPNN-based fitting method is used to build the nonlinear relation between the input geometry variables and the effective material properties, which enable an easy analytical sensitivity analysis, in contrast to the generally complex procedures of typical shape and size sensitivity approaches.

Wu et al. [2] present an approach to reuse the basis function evaluations in the numerical integration of IGA in the paper entitled "Reusing the evaluations of basis functions in the integration for isogeometric analysis". The authors classify the bases on the original level and then reuse them on the refined level, which can reduce the time for basis calculations at integration nodes. By using the sum factorization method and the mean value theorem for the integrals, an integration method with high efficiency is proposed.

In the paper "Multiresolution isogeometric topology optimization using moving morphable voids" studied by Du et al. [3], a general and new explicit isogeometric topology optimization approach with moving morphable voids (MMV) is proposed. In this approach, a novel multiresolution scheme with two



Structural Optimization Recent Developments And Applications

Katrin Zwirglmaier



Structural Optimization Recent Developments And Applications:

Structural Optimization Ovadia E. Lev,1981 **Structural Optimization** Uri Kirsch,2012-12-06 This book was developed while teaching a graduate course at several universities in the United States Europe and Israel during the last two decades The purpose of the book is to introduce the fundamentals and applications of optimum structural design Much work has been done in this area recently and many studies have been published The book is an attempt to collect together selected topics of this literature and to present them in a unified approach It meets the need for an introductory text covering the basic concepts of modern structural optimization A previous book by the author on this subject *Optimum Structural Design* published by McGraw Hill New York in 1981 and by Maruzen Tokyo in 1983 has been used extensively as a text in many universities throughout the world The present book reflects the rapid progress and recent developments in this area A major difficulty in studying structural optimization is that integration of concepts used in several areas such as structural analysis numerical optimization and engineering design is necessary in order to solve a specific problem To facilitate the study of these topics the book discusses in detail alternative problem formulations the fundamentals of different optimization methods and various considerations related to structural design The advantages and the limitations of the presented approaches are illustrated by numerous examples Recent Developments and the New Direction in Soft-Computing Foundations and Applications

Shahnaz N. Shahbazova,Janusz Kacprzyk,Valentina Emilia Balas,Vladik Kreinovich,2020-07-10 This book gathers authoritative contributions in the field of Soft Computing Based on selected papers presented at the 7th World Conference on Soft Computing which was held on May 29 31 2018 in Baku Azerbaijan it describes new theoretical advances as well as cutting edge methods and applications New theories and algorithms in fuzzy logic cognitive modeling graph theory and metaheuristics are discussed and applications in data mining social networks control and robotics geoscience biomedicine and industrial management are described This book offers a timely broad snapshot of recent developments including thought provoking trends and challenges that are yielding new research directions in the diverse areas of Soft Computing

Applied Mechanics Reviews ,1986 Scientific and Technical Aerospace Reports ,1989 Proceedings of the Fifth EPMESC Conference, Macao, 1-4 August 1995 Edoardo R. de Arantes e Oliveira,João Bento,1995 **Optimization of Composite Structures** W. Jefferson Stroud,1982 **Publications** ,1989 **ASME Technical Papers** ,1984 **NASA Conference Publication** ,1984 *Structural Design Applications of Mathematical Programming Techniques* North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development. Structures and Materials Panel,1971 The document describes the present state of development of the use of mathematical programming techniques in the optimum design of aerospace and similar structures Although optimization with respect to cost is considered when possible the main emphasis is on the minimization of weight due to the overwhelming importance of this parameter in aerospace applications and also due to the fact that it is one of the few merit functions that can be defined with reasonable precision The use of

mathematical programming techniques in the selection of materials is also discussed to the limited extent meaningful at the present time Author **International Journal of Vehicle Design** ,2001 *Subject Catalog, 1982* Library of Congress,1982 *Abstract Journal in Earthquake Engineering* ,1987 **Annual Report** Pennsylvania Transportation Institute,1982 **New Publications for Architecture Libraries (September 1983)** Mary A. Vance,1983 **A Unified Earthquake-resistant Design Method for Steel Frames Using ARMA Models** I. Takewaki,1990 *Transactions of the American Society of Civil Engineers* American Society of Civil Engineers,2004 Vols 29 30 contain papers of the International Engineering Congress Chicago 1893 v 54 pts A F papers of the International Engineering Congress St Louis 1904 *AGARD Conference Proceedings* North Atlantic Treaty Organization. Advisory Group for Aerospace Research and Development,1973 *Subject Catalog* Library of Congress,1982

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