

# Mechanical Design Optimization Using Advanced Optimization Techniques



# Mechanical Design Optimization Using Advanced Optimization Techniques Springer Series In Advanced Manufacturing

**SJ Ball**

## **Mechanical Design Optimization Using Advanced Optimization Techniques Springer Series In Advanced Manufacturing:**

### **Mechanical Design Optimization Using Advanced Optimization Techniques** R. Venkata Rao,Vimal J.

Savsani,2012-01-15 Mechanical design includes an optimization process in which designers always consider objectives such as strength deflection weight wear corrosion etc depending on the requirements However design optimization for a complete mechanical assembly leads to a complicated objective function with a large number of design variables It is a good practice to apply optimization techniques for individual components or intermediate assemblies than a complete assembly Analytical or numerical methods for calculating the extreme values of a function may perform well in many practical cases but may fail in more complex design situations In real design problems the number of design parameters can be very large and their influence on the value to be optimized the goal function can be very complicated having nonlinear character In these complex cases advanced optimization algorithms offer solutions to the problems because they find a solution near to the global optimum within reasonable time and computational costs Mechanical Design Optimization Using Advanced Optimization Techniques presents a comprehensive review on latest research and development trends for design optimization of mechanical elements and devices Using examples of various mechanical elements and devices the possibilities for design optimization with advanced optimization techniques are demonstrated Basic and advanced concepts of traditional and advanced optimization techniques are presented along with real case studies results of applications of the proposed techniques and the best optimization strategies to achieve best performance are highlighted Furthermore a novel advanced optimization method named teaching learning based optimization TLBO is presented in this book and this method shows better performance with less computational effort for the large scale problems Mechanical Design Optimization Using Advanced Optimization Techniques is intended for designers practitioners managers institutes involved in design related projects applied research workers academics and graduate students in mechanical and industrial engineering and will be useful to the industrial product designers for realizing a product as it presents new models and optimization techniques to make tasks easier logical efficient and effective [Quantitative Methods & Their Application in Multidisciplinary Area \(UUM Press\)](#) Shamshuritawati Sharif,2016-01-01 This book is a guide for researchers who are involved in statistical and decision science analyses Both analyses are explained in detail with samples of real applications in daily life to assist readers to appreciate theoretical and mathematical formulations It covers a wide variety of applications including economic issues i e stock markets quality control in the garment industry customer satisfaction in the banking industry experimental design in electronic firms performance of university web portals daily fat intake the optimization of shrimp catching activities meal planning for nurseries and as well as fairness model in economic games Understanding [Heat Exchangers](#) S. M. Sohel Murshed,Manuel Matos Lopes,2017-04-27 Presenting contributions from renowned experts in the field this book covers

research and development in fundamental areas of heat exchangers which include design and theoretical development experiments numerical modeling and simulations This book is intended to be a useful reference source and guide to researchers postgraduate students and engineers in the fields of heat exchangers cooling and thermal management

**International Conference on Advanced Materials, Modern Manufacturing and Computerized Automation (IAMMCA)** Shanmugam Thillikkani,2024-04-30 Selected peer reviewed extended articles based on abstracts presented at the International conference on Advanced Materials Modern Manufacturing and Computerized Automation IAMMCA 2023 Aggregated Book **Processing and Application of Engineering Materials** Bruno Castanie,Ramesh K. Agarwal,Sandip A. Kale,Shanmugam Thillikkani,2024-04-18 Special topic volume with invited peer reviewed papers only *Designing Engineering Structures using Stochastic Optimization Methods* Levent Aydin,H. Seçil Artem,Selda Oterkus,2020-04-27 Among all aspects of engineering design is the most important step in developing a new product A systematic approach to managing design issues can only be accomplished by applying mathematical optimization methods Furthermore due to the practical issues in engineering problems there are limitations in using traditional methods As such stochastic optimization methods such as differential evolution simulated annealing and genetic algorithms are preferable in finding solutions in design optimization problems This book reviews mechanical engineering design optimization using stochastic methods It introduces students and design engineers to practical aspects of complicated mathematical optimization procedures and outlines steps for wide range of selected engineering design problems It shows how engineering structures are systematically designed Many new engineering design applications based on stochastic optimization techniques in automotive energy military naval manufacturing process and fluids heat transfer are described in the book For each design optimization problem described background is provided for understanding the solutions There are very few books on optimization that include engineering applications They cover limited applications and that too of well known design problems of advanced and niche nature Common problems are hardly addressed Thus the subject has remained fairly theoretical To overcome this each chapter in this book is contributed by at least one academic and one industrial expert researcher *Critical Developments and Applications of Swarm Intelligence* Shi, Yuhui,2018-02-28 Artificial intelligence is a constantly advancing field that requires models in order to accurately create functional systems The use of natural acumen to create artificial intelligence creates a field of research in which the natural and the artificial meet in a new and innovative way Critical Developments and Applications of Swarm Intelligence is a critical academic publication that examines developing research technologies and function regarding natural and artificial acumen specifically in regards to self organized systems Featuring coverage on a broad range of topics such as evolutionary algorithms optimization techniques and computational comparison this book is geared toward academicians students researchers and engineers seeking relevant and current research on the progressive research based on the implementation of swarm intelligence in self organized

systems    **Advanced Modeling and Optimization of Manufacturing Processes** R. Venkata Rao,2010-12-01 Advanced Modeling and Optimization of Manufacturing Processes presents a comprehensive review of the latest international research and development trends in the modeling and optimization of manufacturing processes with a focus on machining It uses examples of various manufacturing processes to demonstrate advanced modeling and optimization techniques Both basic and advanced concepts are presented for various manufacturing processes mathematical models traditional and non traditional optimization techniques and real case studies The results of the application of the proposed methods are also covered and the book highlights the most useful modeling and optimization strategies for achieving best process performance In addition to covering the advanced modeling optimization and environmental aspects of machining processes Advanced Modeling and Optimization of Manufacturing Processes also covers the latest technological advances including rapid prototyping and tooling micromachining and nano finishing Advanced Modeling and Optimization of Manufacturing Processes is written for designers and manufacturing engineers who are responsible for the technical aspects of product realization as it presents new models and optimization techniques to make their work easier more efficient and more effective It is also a useful text for practitioners researchers and advanced students in mechanical industrial and manufacturing engineering

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