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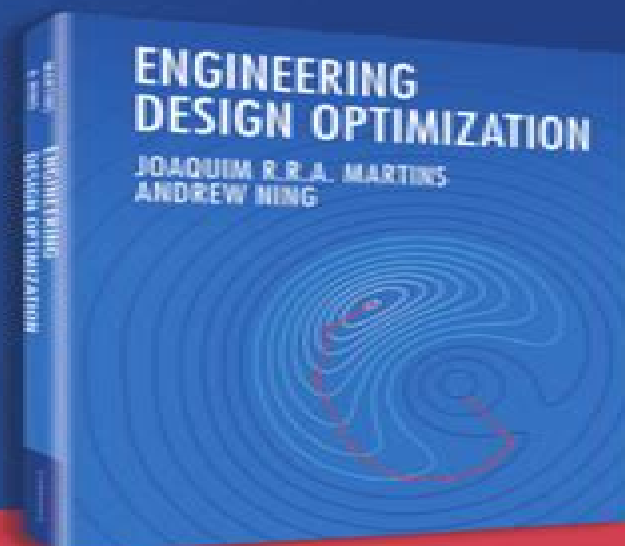
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October 2021 | 246 x 189 mm | 651pp  
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Original Price \$115/£89.99    Discount Price \$92/£71.99

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**Engineering Optimization** Xin-She Yang, 2010-07-20 An accessible introduction to metaheuristics and optimization featuring powerful and modern algorithms for application across engineering and the sciences From engineering and computer science to economics and management science optimization is a core component for problem solving Highlighting the latest developments that have evolved in recent years Engineering Optimization An Introduction with Metaheuristic Applications outlines popular metaheuristic algorithms and equips readers with the skills needed to apply these techniques to their own optimization problems With insightful examples from various fields of study the author highlights key concepts and techniques for the successful application of commonly used metaheuristic algorithms including simulated annealing particle swarm optimization harmony search and genetic algorithms The author introduces all major metaheuristic algorithms and their applications in optimization through a presentation that is organized into three succinct parts Foundations of Optimization and Algorithms provides a brief introduction to the underlying nature of optimization and the common approaches to optimization problems random number generation the Monte Carlo method and the Markov chain Monte Carlo

method Metaheuristic Algorithms presents common metaheuristic algorithms in detail including genetic algorithms simulated annealing ant algorithms bee algorithms particle swarm optimization firefly algorithms and harmony search Applications outlines a wide range of applications that use metaheuristic algorithms to solve challenging optimization problems with detailed implementation while also introducing various modifications used for multi objective optimization Throughout the book the author presents worked out examples and real world applications that illustrate the modern relevance of the topic A detailed appendix features important and popular algorithms using MATLAB and Octave software packages and a related FTP site houses MATLAB code and programs for easy implementation of the discussed techniques In addition references to the current literature enable readers to investigate individual algorithms and methods in greater detail

**Engineering Optimization An Introduction with Metaheuristic Applications** is an excellent book for courses on optimization and computer simulation at the upper undergraduate and graduate levels It is also a valuable reference for researchers and practitioners working in the fields of mathematics engineering computer science operations research and management science who use metaheuristic algorithms to solve problems in their everyday work

**Recent Advances in Structural Engineering**, 2005-02 This book contains state of the art review articles on specific research areas in the civil engineering discipline the areas include geotechnical engineering hydraulics and water resources engineering and structural engineering The articles are written by invited authors who are currently active at the international level in their respective research fields

*Recent Advances in Optimal Structural Design* Scott A. Burns, 2002-01-01 Sponsored by the Technical Committee on Structural Design of the Technical Administrative Committee on Analysis and Computation of the Technical Activities Division of the Structural Engineering Institute of ASCE This report documents the dramatic new developments in the field of structural optimization over the last two decades Changes in both computational techniques and applications can be seen by developments in computational methods and solution algorithms the role of optimization during the various stages of structural design and the stochastic nature of design in relation to structural optimization Topics include methods for discrete variable structural optimization decomposition methods in structural optimization state of the art on the use of genetic algorithms in design of steel structures conceptual design optimization of engineering structures topology and geometry optimization of trusses and frames evolutionary structural optimization design and optimization of semi rigid framed structures optimized performance based design for buildings multi objective optimum design of seismic resistant structures and reliability and cost oriented optimal bridge maintenance planning The book concludes with an extensive bibliography of journal papers on structural optimization published between 1987 and 1999

*Engineering Optimization* Singiresu S. Rao, 2009-07-20 Technology Engineering Mechanical Helps you move from theory to optimizing engineering systems in almost any industry Now in its Fourth Edition Professor Singiresu Rao s acclaimed text Engineering Optimization enables readers to quickly master and apply all the important optimization methods in use today across a broad range of

industries Covering both the latest and classical optimization methods the text starts off with the basics and then progressively builds to advanced principles and applications This comprehensive text covers nonlinear linear geometric dynamic and stochastic programming techniques as well as more specialized methods such as multiobjective genetic algorithms simulated annealing neural networks particle swarm optimization ant colony optimization and fuzzy optimization Each method is presented in clear straightforward language making even the more sophisticated techniques easy to grasp Moreover the author provides Case examples that show how each method is applied to solve real world problems across a variety of industries Review questions and problems at the end of each chapter to engage readers in applying their newfound skills and knowledge Examples that demonstrate the use of MATLAB for the solution of different types of practical optimization problems References and bibliography at the end of each chapter for exploring topics in greater depth Answers to Review Questions available on the author's Web site to help readers to test their understanding of the basic concepts With its emphasis on problem solving and applications Engineering Optimization is ideal for upper level undergraduates and graduate students in mechanical civil electrical chemical and aerospace engineering In addition the text helps practicing engineers in almost any industry design improved more efficient systems at less cost

### **Introduction to Optimum Design**

Jasbir Arora, 2011-08-17 Introduction to Optimum Design is the most widely used textbook in engineering optimization and optimum design courses It is intended for use in a first course on engineering design and optimization at the undergraduate or graduate level within engineering departments of all disciplines but primarily within mechanical aerospace and civil engineering The basic approach of the text is to describe an organized approach to engineering design optimization in a rigorous yet simplified manner illustrate various concepts and procedures with simple examples and demonstrate their applicability to engineering design problems Formulation of a design problem as an optimization problem is emphasized and illustrated throughout the text Excel and MATLAB are featured throughout as learning and teaching aids The 3rd edition has been reorganized and enhanced with new material making the book even more appealing to instructors regardless of the level they teach the course Examples include moving the introductory chapter on Excel and MATLAB closer to the front of the book and adding an early chapter on practical design examples for the more introductory course and including a final chapter on advanced topics for the purely graduate level course Basic concepts of optimality conditions and numerical methods are described with simple and practical examples making the material highly teachable and learnable Applications of the methods for structural mechanical aerospace and industrial engineering problems Introduction to MATLAB Optimization Toolbox Optimum design with Excel Solver has been expanded into a full chapter Practical design examples introduce students to usage of optimization methods early in the book New material on several advanced optimum design topics serves the needs of instructors teaching more advanced courses

Encyclopedia of Business Analytics and Optimization Wang, John, 2014-02-28 As the age of Big Data emerges it becomes necessary to take the five dimensions of Big

Data volume variety velocity volatility and veracity and focus these dimensions towards one critical emphasis value The Encyclopedia of Business Analytics and Optimization confronts the challenges of information retrieval in the age of Big Data by exploring recent advances in the areas of knowledge management data visualization interdisciplinary communication and others Through its critical approach and practical application this book will be a must have reference for any professional leader analyst or manager interested in making the most of the knowledge resources at their disposal

**Data-Driven Evolutionary Modeling in Materials Technology** Nirupam Chakraborti, 2022-09-15 Due to efficacy and optimization potential of genetic and evolutionary algorithms they are used in learning and modeling especially with the advent of big data related problems This book presents the algorithms and strategies specifically associated with pertinent issues in materials science domain It discusses the procedures for evolutionary multi objective optimization of objective functions created through these procedures and introduces available codes Recent applications ranging from primary metal production to materials design are covered It also describes hybrid modeling strategy and other common modeling and simulation strategies like molecular dynamics cellular automata etc Features Focuses on data driven evolutionary modeling and optimization including evolutionary deep learning Include details on both algorithms and their applications in materials science and technology Discusses hybrid data driven modeling that couples evolutionary algorithms with generic computing strategies Thoroughly discusses applications of pertinent strategies in metallurgy and materials Provides overview of the major single and multi objective evolutionary algorithms This book aims at Researchers Professionals and Graduate students in Materials Science Data Driven Engineering Metallurgical Engineering Computational Materials Science Structural Materials and Functional Materials

**Handbook of Fluid Dynamics** Richard W. Johnson, 2016-04-06 Handbook of Fluid Dynamics offers balanced coverage of the three traditional areas of fluid dynamics theoretical computational and experimental complete with valuable appendices presenting the mathematics of fluid dynamics tables of dimensionless numbers and tables of the properties of gases and vapors Each chapter introduces a different fluid dynamics topic discusses the pertinent issues outlines proven techniques for addressing those issues and supplies useful references for further research Covering all major aspects of classical and modern fluid dynamics this fully updated Second Edition Reflects the latest fluid dynamics research and engineering applications Includes new sections on emerging fields most notably micro and nanofluidics Surveys the range of numerical and computational methods used in fluid dynamics analysis and design Expands the scope of a number of contemporary topics by incorporating new experimental methods more numerical approaches and additional areas for the application of fluid dynamics Handbook of Fluid Dynamics Second Edition provides an indispensable resource for professionals entering the field of fluid dynamics The book also enables experts specialized in areas outside fluid dynamics to become familiar with the field

**Proceedings of Seventh International Conference on Bio-Inspired Computing: Theories and Applications (BIC-TA 2012)** Jagdish C. Bansal, Pramod Kumar Singh, Kusum Deep, Millie

Pant,Atulya K. Nagar,2012-12-04 The book is a collection of high quality peer reviewed research papers presented in Seventh International Conference on Bio Inspired Computing BIC TA 2012 held at ABV IIITM Gwalior India These research papers provide the latest developments in the broad area of Computational Intelligence The book discusses wide variety of industrial engineering and scientific applications of nature bio inspired computing and presents invited papers from the inventors originators of novel computational techniques

**Performance-Driven Surrogate Modeling of High-Frequency Structures** Slawomir Koziel,Anna Pietrenko-Dabrowska,2020-02-19 This book discusses surrogate modeling of high frequency structures including antenna and microwave components The focus is on constrained or performance driven surrogates The presented techniques aim at addressing the limitations of conventional modeling methods pertinent to the issues of dimensionality and parameter ranges that need to be covered by the surrogate to ensure its design utility Within performance driven methodologies mitigation of these problems is achieved through appropriate confinement of the model domain focused on the regions promising from the point of view of the relevant design objectives This enables the construction of reliable surrogates at a fraction of cost required by conventional methods and to accomplish the modeling tasks where other techniques routinely fail The book provides a broad selection of specific frameworks extensively illustrated using examples of real world microwave and antenna structures along with numerous design examples Furthermore the book contains introductory material on data driven and physics based surrogates The book will be useful for the readers working in the area of high frequency electronics including microwave engineering antenna design microwave photonics magnetism especially those that utilize electromagnetic EM simulation models in their daily routines Covers performance driven and constrained modeling methods not available in other books to date Discusses of a wide range of practical case studies including a variety of microwave and antenna structures Includes design applications of the presented modeling frameworks including single and multi objective parametric optimization

**Evolutionary Algorithms and Neural Networks** Seyedali Mirjalili,2018-06-26 This book introduces readers to the fundamentals of artificial neural networks with a special emphasis on evolutionary algorithms At first the book offers a literature review of several well regarded evolutionary algorithms including particle swarm and ant colony optimization genetic algorithms and biogeography based optimization It then proposes evolutionary version of several types of neural networks such as feed forward neural networks radial basis function networks as well as recurrent neural networks and multi later perceptron Most of the challenges that have to be addressed when training artificial neural networks using evolutionary algorithms are discussed in detail The book also demonstrates the application of the proposed algorithms for several purposes such as classification clustering approximation and prediction problems It provides a tutorial on how to design adapt and evaluate artificial neural networks as well and includes source codes for most of the proposed techniques as supplementary materials

**Emerging Research on Swarm Intelligence and Algorithm Optimization** Shi, Yuhui,2014-07-31 Throughout time scientists have looked to nature in order to

understand and model solutions for complex real world problems In particular the study of self organizing entities such as social insect populations presents a new opportunity within the field of artificial intelligence Emerging Research on Swarm Intelligence and Algorithm Optimization discusses current research analyzing how the collective behavior of decentralized systems in the natural world can be applied to intelligent system design Discussing the application of swarm principles optimization techniques and key algorithms being used in the field this publication serves as an essential reference for academicians upper level students IT developers and IT theorists

**Innovative Computing Methods and their Applications to Engineering Problems** Nadia Nedjah, Leandro Santos Coelho, Viviana Cocco Mariani, Luiza de Macedo Mourelle, 2011-05-26 The design of most modern engineering systems entails the consideration of a good trade off between the several targets requirements to be satisfied along the system life such as high reliability low redundancy and low operational costs These aspects are often in conflict with one another hence a compromise solution has to be sought Innovative computing techniques such as genetic algorithms swarm intelligence differential evolution multi objective evolutionary optimization just to name few are of great help in founding effective and reliable solution for many engineering problems Each chapter of this book attempts to using an innovative computing technique to elegantly solve a different engineering problem

Introduction to Algorithms for Data Mining and Machine Learning Xin-She Yang, 2019-06-17 Introduction to Algorithms for Data Mining and Machine Learning introduces the essential ideas behind all key algorithms and techniques for data mining and machine learning along with optimization techniques Its strong formal mathematical approach well selected examples and practical software recommendations help readers develop confidence in their data modeling skills so they can process and interpret data for classification clustering curve fitting and predictions Masterfully balancing theory and practice it is especially useful for those who need relevant well explained but not rigorous proofs based background theory and clear guidelines for working with big data Presents an informal theorem free approach with concise compact coverage of all fundamental topics Includes worked examples that help users increase confidence in their understanding of key algorithms thus encouraging self study Provides algorithms and techniques that can be implemented in any programming language with each chapter including notes about relevant software packages

Encyclopedia of Information Science and Technology, Third Edition Khosrow-Pour, D.B.A., Mehdi, 2014-07-31 This 10 volume compilation of authoritative research based articles contributed by thousands of researchers and experts from all over the world emphasized modern issues and the presentation of potential opportunities prospective solutions and future directions in the field of information science and technology Provided by publisher

**Innovative Computational Intelligence: A Rough Guide to 134 Clever Algorithms** Bo Xing, Wen-Jing Gao, 2013-12-13 The first notable feature of this book is its innovation Computational intelligence CI a fast evolving area is currently attracting lots of researchers attention in dealing with many complex problems At present there are quite a lot competing books existing in the market Nevertheless the present book is



markedly different from the existing books in that it presents new paradigms of CI that have rarely mentioned before as opposed to the traditional CI techniques or methodologies employed in other books During the past decade a number of new CI algorithms are proposed Unfortunately they spread in a number of unrelated publishing directions which may hamper the use of such published resources These provide us with motivation to analyze the existing research for categorizing and synthesizing it in a meaningful manner The mission of this book is really important since those algorithms are going to be a new revolution in computer science We hope it will stimulate the readers to make novel contributions or even start a new paradigm based on nature phenomena Although structured as a textbook the book s straightforward self contained style will also appeal to a wide audience of professionals researchers and independent learners We believe that the book will be instrumental in initiating an integrated approach to complex problems by allowing cross fertilization of design principles from different design philosophies The second feature of this book is its comprehensiveness Through an extensive literature research there are 134 innovative CI algorithms covered in this book

*Computational Science - ICCS 2001* Vassil N. Alexandrov, Jack J. Dongarra, Benjoe A. Juliano, Rene S. Renner, C.J. Kenneth Tan, 2003-05-15 LNCS volumes 2073 and 2074 contain the proceedings of the International Conference on Computational Science ICCS 2001 held in San Francisco California May 27 31 2001 The two volumes consist of more than 230 contributed and invited papers that reflect the aims of the conference to bring together researchers and scientists from mathematics and computer science as basic computing disciplines researchers from various application areas who are pioneering advanced application of computational methods to sciences such as physics chemistry life sciences and engineering arts and humanitarian fields along with software developers and vendors to discuss problems and solutions in the area to identify new issues and to shape future directions for research as well as to help industrial users apply various advanced computational techniques

*Computational Intelligence for Water and Environmental Sciences* Omid Bozorg-Haddad, Babak Zolghadr-Asli, 2022-07-08 This book provides a comprehensive yet fresh perspective for the cutting edge CI oriented approaches in water resources planning and management The book takes a deep dive into topics like meta heuristic evolutionary optimization algorithms e g GA PSA etc data mining techniques e g SVM ANN etc probabilistic and Bayesian oriented frameworks fuzzy logic AI deep learning and expert systems These approaches provide a practical approach to understand and resolve complicated and intertwined real world problems that often imposed serious challenges to traditional deterministic precise frameworks The topic caters to postgraduate students and senior researchers who are interested in computational intelligence approach to issues stemming from water and environmental sciences

*Active Vibration & Noise Control: Design Towards Performance Limit* Jiqiang Wang, 2022-08-22 The book is motivated by the pivotal issue what is the performance limit of active control and energy harvesting It aims to develop systematic design methodologies with a visualization technique where the performance limit can be readily determined solely based on visual inspections Modern technological systems have evolved toward high speed heavy load

lightweight flexible operation and extreme conditions as demonstrated in aerospace marine transportation and manufacturing industries The associated vibration and noise issues have become such problematic that they may significantly confine the performance of the systems to say the discomfort at least Through the geometric representation of the performance specifications fundamental issues such as 1 the existence of feasible controllers 2 the optimality of controllers 3 the performance limit of controllers 4 compromisability among the performance specifications 5 the synthesis of controllers and 6 the influence of constraints on optimal solutions can all be resolved within the proposed framework The state of the art is thus refined with a new approach complementary to those optimization based routines where extra effort would have to be exercised to disclose the compromisability of performance specifications The proposed book will result in a new design methodology performance limit oriented active control It was initiated by the author with the project Active Control for Performance Limit ACPL A series of fundamental results are obtained and will be disseminated in this book The results are verified through extensive numerical demonstrations and are expected to provide useful guidance for practical engineering in the vibration and noise industry and research

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