System Optimization

Weerakorn Ongsakul,Vo Ngoc Dieu

Power System Optimization Modeling in GAMS Alireza Soroudi,2017-08-29 This unique book describes how the General Algebraic Modeling System (GAMS) can be used to solve various power system operation and planning optimization problems. This book is the first of its kind to provide readers with a comprehensive reference that includes the solution codes for basic/advanced power system optimization problems in GAMS, a computationally efficient tool for analyzing optimization problems in power and energy systems. The book covers theoretical background as well as the application examples and test case studies. It is a suitable reference for dedicated and general audiences including power system professionals as well as researchers and developers from the energy sector and electrical power engineering community and will be helpful to undergraduate and graduate students.

Sound Systems: Design and Optimization Bob McCarthy,2016-02-26 Sound Systems: Design and Optimization provides an accessible and unique perspective on the behavior of sound systems in the practical world. The third edition reflects current trends in the audio field thereby providing readers with the newest methodologies and techniques. In this greatly expanded new edition, you'll find clearer explanations, a more streamlined organization, increased coverage of current technologies and comprehensive case studies of the author's award-winning work in the field. As the only book devoted exclusively to modern tools and techniques in this emerging field, Sound Systems: Design and Optimization provides the specialized guidance needed to perfect your design skills. This book helps you: Improve your design and optimization decisions by understanding how

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Advances in Energy System Optimization Valentin Bertsch,Wolf Fichtner,Vincent Heuveline,Thomas Leibfried,2017-03-16 The papers presented in this volume address diverse challenges in energy systems, ranging from operational to investment planning problems, from market economics to technical and environmental considerations, from distribution grids to transmission grids and from theoretical considerations to data provision concerns and applied case studies. The International Symposium on Energy System Optimization (ISESO) was held on November 9th and 10th 2015 at the Heidelberg Institute for Theoretical Studies (HITS) and was organized by HITS, Heidelberg University and Karlsruhe Institute of Technology.

Optimization of Energy Systems Ibrahim Dinçer,Marc A. Rosen,Pouria Ahmadi,2017-05-15 An essential resource for optimizing energy systems to enhance design capability, performance and sustainability Optimization of Energy Systems comprehensively describes the thermodynamic modelling, analysis and optimization of numerous types of energy systems in various applications. It provides a new understanding of the system and the process of defining proper objective functions for determination of the most suitable design parameters for achieving enhanced efficiency,

cost effectiveness and sustainability. Beginning with a general summary of thermodynamics, optimization techniques and optimization methods for thermal components, the book goes on to describe how to determine the most appropriate design parameters for more complex energy systems using various optimization methods. The results of each chapter provide potential tools for design, analysis, performance improvement, and greenhouse gas emissions reduction. Key features: Comprehensive coverage of the modelling, analysis and optimization of many energy systems for a variety of applications. Examples, practical applications and case studies to put theory into practice. Study problems at the end of each chapter that foster critical thinking and skill development. Written in an easy-to-follow style, starting with simple systems and moving to advanced energy systems and their complexities. A unique resource for understanding cutting-edge research in the thermodynamic analysis and optimization of a wide range of energy systems, Optimization of Energy Systems is suitable for graduate and senior undergraduate students, researchers, engineers, practitioners, and scientists in the area of energy systems.

Optimization of Power System Operation Jizhong Zhu,2016-12-08 Optimization of Power System Operation, 2nd Edition, offers a practical, hands-on guide to theoretical developments and to the application of advanced optimization methods to realistic electric power engineering problems. The book includes: New chapter on Application of Renewable Energy, and a new chapter on Operation of Smart Grid New topics include wheeling model, multi-area wheeling, and the total transfer capability computation in multiple areas Continues to provide engineers and academics with a complete picture of

the optimization of techniques used in modern power system operation

Thermal System Optimization Vivek K. Patel,Vimal J. Savsani,Mohamed A. Tawhid,2019-02-14 This book presents a wide-ranging review of the latest research and development directions in thermal systems optimization using population-based metaheuristic methods. It helps readers to identify the best methods for their own systems, providing details of mathematical models and algorithms suitable for implementation. To reduce mathematical complexity, the authors focus on optimization of individual components rather than taking on systems as a whole. They employ numerous case studies: heat exchangers; cooling towers; power generators; refrigeration systems; and others. The importance of these subsystems to real-world situations from internal combustion to air-conditioning is made clear. The thermal systems under discussion are analysed using various metaheuristic techniques, with comparative results for different systems. The inclusion of detailed MATLAB® codes in the text will assist readers—researchers, practitioners or students—to assess these techniques for different real-world systems. Thermal System Optimization is a useful tool for thermal design researchers and engineers in academia and industry, wishing to perform thermal system identification with properly optimized parameters. It will be of interest for researchers, practitioners and graduate students with backgrounds in mechanical, chemical and power engineering.

Power System Optimization Haoyong Chen,Honwing Ngan,Yongjun Zhang,2017-03-15 An original look from a microeconomic perspective for power system optimization and its application to electricity markets Presents a new and systematic viewpoint for power

system optimization inspired by microeconomics and game theory A timely and important advanced reference with the fast growth of smart grids Professor Chen is a pioneer of applying experimental economics to the electricity market trading mechanism, and this work brings together the latest research A companion website is available Edit

Online Optimization of Large Scale Systems Martin Grötschel,Sven O. Krumke,Joerg Rambau,2013-03-14 In its thousands of years of history, mathematics has made an extraordinary ca reer. It started from rules for bookkeeping and computation of areas to become the language of science. Its potential for decision support was fully recognized in the twentieth century only, vitally aided by the evolution of computing and communi cation technology. Mathematical optimization, in particular, has developed into a powerful machinery to help planners. Whether costs are to be reduced, profits to be maximized, or scarce resources to be used wisely, optimization methods are available to guide decision making. Opti mization is particularly strong if precise models of real phenomena and data of high quality are at hand - often yielding reliable automated control and decision proce dures. But what, if the models are soft and not all data are around? Can mathematics help as well? This book addresses such issues, e. g. , problems of the following type: - An elevator cannot know all transportation requests in advance. In which order should it serve the passengers? - Wing profiles of aircrafts influence the fuel consumption. Is it possible to con tinuously adapt the shape of a wing during the flight under rapidly changing conditions? - Robots are designed to accomplish specific tasks as efficiently as possible. But what if a robot navigates in an unknown environment? - Energy demand changes quickly and is not easily predictable over time. Some types of power

plants can only react slowly.

Optimization of Power System Problems Mahmoud Pesaran Hajiabbas,Behnam Mohammadi-Ivatloo,2020-01-06 This book presents integrated optimization methods and algorithms for power system problems along with their codes in MATLAB. Providing a reliable and secure power and energy system is one of the main challenges of the new era. Due to the nonlinear multi-objective nature of these problems, the traditional methods are not suitable approaches for solving large-scale power system operation dilemmas. The integration of optimization algorithms into power systems has been discussed in several textbooks, but this is the first to include the integration methods and the developed codes. As such, it is a useful resource for undergraduate and graduate students, researchers and engineers trying to solve power and energy optimization problems using modern technical and intelligent systems based on theory and application case studies. It is expected that readers have a basic mathematical background.

Advanced Optimization for Process Systems Engineering Ignacio E. Grossmann,2021-03-25 A unique text covering basic and advanced concepts of optimization theory and methods for process systems engineers. With examples illustrating key concepts and algorithms, and exercises involving theoretical derivations, numerical problems and modeling systems, it is ideal for single-semester, graduate courses in process systems engineering.

POWER SYSTEM OPTIMIZATION D. P. KOTHARI,J. S. DHILLON,2010-09-25 Power System Optimization is intended to introduce the methods of multi-objective optimization in integrated electric power system operation, covering economic, environmental, security

and risk aspects as well. Evolutionary algorithms which mimic natural evolutionary principles to constitute random search and optimization procedures are appended in this new edition to solve generation scheduling problems. Written in a student-friendly style, the book provides simple and understandable basic computational concepts and algorithms used in generation scheduling so that the readers can develop their own programs in any high-level programming language. This clear, logical overview of generation scheduling in electric power systems permits both students and power engineers to understand and apply optimization on a dependable basis. The book is particularly easy-to-use with sound and consistent terminology and perspective throughout. This edition presents systematic coverage of local and global optimization techniques such as binary- and real-coded genetic algorithms, evolutionary algorithms, particle swarm optimization and differential evolutionary algorithms. The economic dispatch problem presented, considers higher-order nonlinearities and discontinuities in input–output characteristics in fossil fuel burning plants due to valve-point loading, ramp-rate limits and prohibited operating zones. Search optimization techniques presented are those which participate efficiently in decision making to solve the multiobjective optimization problems. Stochastic optimal generation scheduling is also updated in the new edition. Generalized Z-bus distribution factors (GZBDF) are presented to compute the active and reactive power flow on transmission lines. The interactive decision making methodology based on fuzzy set theory, in order to determine the optimal generation allocation to committed generating units, is also discussed. This book is intended to meet the needs of a diverse range of groups interested in the application of optimization

techniques to power system operation. It requires only an elementary knowledge of numerical techniques and matrix operation to understand most of the topics. It is designed to serve as a textbook for postgraduate electrical engineering students, as well as a reference for faculty, researchers, and power engineers interested in the use of optimization as a tool for reliable and secure economic operation of power systems. Key Features The book discusses : Load flow techniques and economic dispatch—both classical and rigorous Economic dispatch considering valve-point loading, ramp-rate limits and prohibited operating zones Real coded genetic algorithms for economic dispatch Evolutionary programming for economic dispatch Particle swarm optimization for economic dispatch Differential evolutionary algorithm for economic dispatch Stochastic multiobjective thermal power dispatch with security Generalized Z-bus distribution factors to compute line flow Stochastic multiobjective hydrothermal generation scheduling Multiobjective thermal power dispatch using artificial neural networks Fuzzy multiobjective generation scheduling Multiobjective generation scheduling by searching weight pattern

Environmental Systems Optimization Douglas A. Haith,1982

Artificial Intelligence in Power System Optimization Weerakorn Ongsakul,Vo Ngoc Dieu,2016-04-19 With the considerable increase of AI applications, AI is being increasingly used to solve optimization problems in engineering. In the past two decades, the applications of artificial intelligence in power systems have attracted much research. This book covers the current level of applications of artificial intelligence to the optimization problems in power systems. This book serves as a textbook for graduate students in

electric power system management and is also useful for those who are interested in using artificial intelligence in power system optimization.

Aerospace System Analysis and Optimization in Uncertainty Loïc Brevault,Mathieu Balesdent,Jérôme Morio,2020-08-26 Spotlighting the field of Multidisciplinary Design Optimization (MDO), this book illustrates and implements state-of-the-art methodologies within the complex process of aerospace system design under uncertainties. The book provides approaches to integrating a multitude of components and constraints with the ultimate goal of reducing design cycles. Insights on a vast assortment of problems are provided, including discipline modeling, sensitivity analysis, uncertainty propagation, reliability analysis, and global multidisciplinary optimization. The extensive range of topics covered include areas of current open research. This Work is destined to become a fundamental reference for aerospace systems engineers, researchers, as well as for practitioners and engineers working in areas of optimization and uncertainty. Part I is largely comprised of fundamentals. Part II presents methodologies for single discipline problems with a review of existing uncertainty propagation, reliability analysis, and optimization techniques. Part III is dedicated to the uncertainty-based MDO and related issues. Part IV deals with three MDO related issues: the multifidelity, the multi-objective optimization and the mixed continuous/discrete optimization and Part V is devoted to test cases for aerospace vehicle design.

Optimization of Dynamic Systems S. K. Agrawal,B.C. Fabien,2013-03-09 This textbook deals with optimization of dynamic systems. The motivation for undertaking this task is as follows: There is an ever increasing need to produce more efficient, accurate,

and lightweight mechanical and electromechanical de vices. Thus, the typical graduating B.S. and M.S. candidate is required to have some familiarity with techniques for improving the performance of dynamic systems. Unfortunately, existing texts dealing with system improvement via optimization remain inaccessible to many of these students and practicing en gineers. It is our goal to alleviate this difficulty by presenting to seniors and beginning graduate students practical efficient techniques for solving engineer ing system optimization problems. The text has been used in optimal control and dynamic system optimization courses at the University of Deleware, the University of Washington and Ohio University over the past four years. The text covers the following material in a straightforward detailed manner: • Static Optimization: The problem of optimizing a function that depends on static variables (i.e., parameters) is considered. Problems with equality and inequality constraints are addressed. • Numerical Methods: Static Optimization: Numerical algorithms for the solution of static optimization problems are presented here. The methods presented can accommodate both the unconstrained and constrained static optimization problems. • Calculus of Variation: The necessary and sufficient conditions for the ex tremum of functionals are presented. Both the fixed final time and free final time problems are considered.

System Design Optimization for Product Manufacturing Masataka Yoshimura,2010-02-28 Readers of System Design Optimization for Product Manufacturing will learn about detailed concepts and practical technologies that enable successful product design and manufacture. These concepts and technologies are based on system optimization methodologies that consider a broad range of mechanical, as well as human,

factors. System Design Optimization for Product Manufacturing explains the methodologies behind current and future product manufacture. Its detailed explanations of key concepts are relevant not only for product design and manufacture, but also for other business fields. These core concepts and methodologies can be applied to practically any field where informed decision-making is important, and where a range of often conflicting factors must be carefully weighed and considered. System Design Optimization for Product Manufacturing can be used as a fundamental reference book by both engineers and students in the fields of manufacturing, design engineering, and product development.

Energy Optimization in Process Systems Stanislaw Sieniutycz,Jacek Jezowski,2009-05-06 Despite the vast research on energy optimization and process integration, there has to date been no synthesis linking these together. This book fills the gap, presenting optimization and integration in energy and process engineering. The content is based on the current literature and includes novel approaches developed by the authors. Various thermal and chemical systems (heat and mass exchangers, thermal and water networks, energy converters, recovery units, solar collectors, and separators) are considered. Thermodynamics, kinetics and economics are used to formulate and solve problems with constraints on process rates, equipment size, environmental parameters, and costs. Comprehensive coverage of dynamic optimization of energy conversion systems and separation units is provided along with suitable computational algorithms for deterministic and stochastic optimization approaches based on: nonlinear programming, dynamic programming, variational calculus, Hamilton-Jacobi-Bellman theory, Pontryagin's

maximum principles, and special methods of process integration. Integration of heat energy and process water within a total site is shown to be a significant factor reducing production costs, in particular costs of utilities for the chemical industry. This integration involves systematic design and optimization of heat exchangers and water networks (HEN and WN). After presenting basic, insight-based Pinch Technology, systematic, optimization-based sequential and simultaneous approaches to design HEN and WN are described. Special consideration is given to the HEN design problem targeting stage, in view of its importance at various levels of system design. Selected, advanced methods for HEN synthesis and retrofit are presented. For WN design a novel approach based on stochastic optimization is described that accounts for both grassroot and revamp design scenarios. Presents a unique synthesis of energy optimization and process integration that applies scientific information from thermodynamics, kinetics, and systems theory Discusses engineering applications including power generation, resource upgrading, radiation conversion and chemical transformation, in static and dynamic systems Clarifies how to identify thermal and chemical constraints and incorporate them into optimization models and solutions

   Optimization in Renewable Energy Systems Ozan Erdinc,2017-02-25 Optimization in Renewable Energy Systems: Recent Perspectives covers all major areas where optimization techniques have been applied to reduce uncertainty or improve results in renewable energy systems (RES). Production of power with RES is highly variable and unpredictable, leading to the need for optimization-based planning and operation in order to maximize economies while sustaining performance. This self-contained book begins

with an introduction to optimization, then covers a wide range of applications in both large and small scale operations, including optimum operation of electric power systems with large penetration of RES, power forecasting, transmission system planning, and DG sizing and siting for distribution and end-user premises. This book is an excellent choice for energy engineers, researchers, system operators, system regulators, and graduate students. Provides chapters written by experts in the field Goes beyond forecasting to apply optimization techniques to a wide variety of renewable energy system issues, from large scale to relatively small scale systems Provides accompanying computer code for related chapters

Optimization Theory for Large Systems Leon S. Lasdon,2013-01-17 Important text examines most significant algorithms for optimizing large systems and clarifying relations between optimization procedures. Much data appear as charts and graphs and will be highly valuable to readers in selecting a method and estimating computer time and cost in problem-solving. Initial chapter on linear and nonlinear programming presents all necessary background for subjects covered in rest of book. Second chapter illustrates how large-scale mathematical programs arise from real-world problems. Appendixes. List of Symbols.

Robust Optimization in Electric Energy Systems Xu Andy Sun,Antonio J. Conejo,2021-11-08 This book covers robust optimization theory and applications in the electricity sector. The advantage of robust optimization with respect to other methodologies for decision making under uncertainty are first discussed. Then, the robust optimization theory is covered in a friendly and tutorial manner. Finally, a number of

insightful short- and long-term applications pertaining to the electricity sector are considered. Specifically, the book includes: robust set characterization, robust optimization, adaptive robust optimization, hybrid robust-stochastic optimization, applications to short- and medium-term operations problems in the electricity sector, and applications to long-term investment problems in the electricity sector. Each chapter contains end-of-chapter problems, making it suitable for use as a text. The purpose of the book is to provide a self-contained overview of robust optimization techniques for decision making under uncertainty in the electricity sector. The targeted audience includes industrial and power engineering students and practitioners in energy fields. The young field of robust optimization is reaching maturity in many respects. It is also useful for practitioners, as it provides a number of electricity industry applications described up to working algorithms (in JuliaOpt).

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