Nonlinear Power Flow Control Design: Rush D. Robinett III 2011-08-10
This book presents an innovative control system design process motivated by renewable energy electric grid integration problems. The concepts developed result from the convergence of research and development goals which have important concepts in common: exergy flow, limit cycles, and balance between competing power flows. A unique set of criteria is proposed to design controllers for a class of nonlinear systems. A combination of thermodynamics with Hamiltonian systems provides the theoretical foundation which is then realized in a series of connected case studies. It allows the process of control design to be viewed as a power flow control problem, balancing the power flowing into a system against that being dissipated within it and dependent on the power being stored in it - an interplay between kinetic and potential energies. Human factors and the sustainability of self-organizing systems are dealt with as advanced topics.

Nonlinear Powerflow Control Design presents an innovative control system design process. The text compares the value of different energy resources, presents a new tool for power flow control, and examines the human factors involved with selling power into a distributed, decentralized electric power grid.

Nonlinear Power Flow Control Design- 2011-08-01


Nonlinear Power Flow Control Design of High Penetration Renewable Sources for AC Inverter Based Microgrids- 2016

Application of Flexible AC Transmission System Devices in Wind Energy Conversion Systems-Ahmed Abu-Siada 2017-09-28 This book presents information about the application of various flexible AC transmission system devices to wind energy conversion systems. Devices such as unified power flow controllers, superconducting magnetic energy storage and static synchronous compensators are covered in this book. Chapters detail features of the topology and basic control systems of each device. Additionally, case studies are presented where necessary to demonstrate practical applications. This book is a reference for students and technicians studying wind power and AC transmission systems in advanced engineering courses.

Decentralized Systems with Design Constraints: Magdi S. Mahmoud 2011-02-24 Decentralized Control and Filtering provides a rigorous framework for examining the analysis, stability and control of large-scale systems, addressing the difficulties that arise because dimensionality, information structure constraints, parametric uncertainty and time-delays. This monograph serves three purposes: it reviews past methods and results from a contemporary perspective; it examines presents trends and approaches to and provide future possibilities; and it investigates robust, reliable and/or resilient decentralized design methods based on a

Nonlinear and Adaptive Control with Applications-Alessandro Astolfi 2007-12-06 The authors here provide a detailed treatment of the design of robust adaptive controllers for nonlinear systems with uncertainties. They employ a new tool based on the ideas of system immersion and manifold invariance. New algorithms are delivered for the construction of robust asymptotically-stabilizing and adaptive control laws for nonlinear systems. The methods proposed lead to modular schemes that are easier to tune than their counterparts obtained from Lyapunov redesign.

Flexible AC Transmission Systems: Modelling and Control-Xiao-Ping Zhang 2012-02-24 The extensive and revised second edition of this successful monograph presents advanced modeling, analysis and control techniques of Flexible AC Transmission Systems (FACTS). The book covers comprehensively a range of power-system control problems: from steady-state voltage and power flow control, to voltage and reactive power control, to voltage stability control, small signal stability control using FACTS controllers. In the six years since the first edition of the book has been published research on the FACTS has continued to flourish while renewable energy has developed into a mature and booming global green business. The second edition reflects the new developments in converter configuration, smart grid technologies, super power grid developments worldwide, new approaches for FACTS control design, new controllers for distribution system control, and power electronic controllers in wind generation operation and control. The latest trends of VSC-HVDC with multilevel architecture have been included and four completely new chapters have been added devoted to Multi-Agent Systems for Coordinated Control of FACTS-devices, Power System Stability Control using FACTS with Multiple Operating Points, Control of a Looping Device in a Distribution System, and Power Electronic Control for Wind Generation.

Swarm, Evolutionary, and Memetic Computing-Bijaya Ketan Panigrahi 2011-12-07 Annotation This volume constitutes the refereed proceedings of the Second International Conference on Swarm, Evolutionary, and Memetic Computing, SEMCCO 2011, held in Visakhapatnam, India, in December 2011. The 124 revised full papers presented in both volumes were carefully reviewed and selected from 422 submissions.

Self-Learning Optimal Control of Nonlinear Systems-Qinglai Wei 2017-06-13 This book presents a class of novel, self-learning, optimal control schemes based on adaptive dynamic programming techniques, which quantitatively obtain the optimal control schemes of the systems. It analyzes the properties identified by the programming methods, including the convergence of the iterative value functions and the stability of the system under iterative control laws, helping to guarantee the effectiveness of the methods developed. When the system model is known, self-learning optimal control is designed on the basis of the system model; when the system model is not known, adaptive dynamic programming is implemented according to the system data, effectively making the performance of the system converge to the optimum. With various real-world examples to complement and substantiate the mathematical analysis, the book is a valuable guide for engineers, researchers, and students in control science and engineering.
framework of linear matrix inequalities. As well as providing an overview of large-scale systems theories from the past several decades, the author presents key modern conceptual and efficient techniques. Representative numerical examples, end-of-chapter problems, and typical system applications are included, and theoretical developments and practical applications of large-scale dynamical systems are discussed in depth.

Hybrid Electric Power Train Engineering and Technology: Modeling, Control, and Simulation-Szumanowski, Antoni 2013-05-31 Hybridization is an increasingly popular paradigm in the auto industry, but one that is not fully understood by car manufacturers. In general, hybrid electric vehicles (HEV) are designed without regard to the mechanics of the power train, which is developed similarly to its counterparts in internal combustion engines. Hybrid Electric Power Train Engineering and Technology: Modeling, Control, and Simulation provides readers with an academic investigation into HEV power train design using mathematical modeling and simulation of various hybrid electric motors and control systems. This book explores the construction of the most energy efficient power trains, which is of importance to designers, manufacturers, and students of mechanical engineering. This book is part of the Research Essentials collection.

ICICCT 2019 - System Reliability, Quality Control, Safety, Maintenance and Management-Vinit Kumar Gunjan 2019-06-27 This book discusses reliability applications for power systems, renewable energy and smart grids and highlights trends in reliable communication, fault-tolerant systems, VLSI system design and embedded systems. Further, it includes chapters on software reliability and other computer engineering and software management-related disciplines, and also examines areas such as big data analytics and ubiquitous computing. Outlining novel and creative concepts in applied areas of reliability in electrical, electronics and computer engineering disciplines, it is a valuable resource for researchers and practitioners of reliability theory in circuit-based engineering domains.

Handbook of Research on Novel Soft Computing Intelligent Algorithms-Pandian Vasant 2013-08-31 “This book explores emerging technologies and best practices designed to effectively address concerns inherent in properly optimizing advanced systems, demonstrating applications in areas such as bio-engineering, space exploration, industrial informatics, information security, and nuclear and renewable energies”--Provided by publisher.

Proceedings of the Power Conversion Conference- 2002

Proceedings of the 5th International Conference on Electrical Engineering and Automatic Control-Bo Huang 2016-07-15 On the basis of instrument electrical and automatic control system, the 5th International Conference on Electrical Engineering and Automatic Control (CCEAC) was established at the crossroads of information technology and control technology, and research on intelligent control. The purpose of this conference is to bring together researchers, engineers, and practitioners in these fields to exchange ideas and results on all aspects of intelligent control. The conference will focus on the latest developments in the field, including but not limited to: intelligent control, fuzzy control, neural networks, and neuro-fuzzy systems.

Robust Control of Linear Systems and Nonlinear Control-M. A. Kaashoek 1990 This volume is the second of the three volume publication provided by publisher.

Design Optimization of Wind Energy Conversion Systems with Applications-Karam Maalawi 2020-04-15 Modern and larger horizontal-axis wind turbines with power capacity reaching 15 MW and rotors of more than 235-meter diameter are under continuous development for the merit of minimizing the unit cost of energy production (total annual cost/annual energy produced). Such valuable advances in this competitive source of clean energy have made numerous research contributions in developing wind industry technologies worldwide. This book provides important information on the optimum design of wind energy conversion systems (WECS) with a comprehensive and self-contained handling of design fundamentals of wind turbines. Section I deals with optimal production of energy. Multi-disciplinary optimization of wind turbines, aerodynamics, and structural dynamic optimization and aeroelasticity of the rotating blades. Section II considers operational monitoring, reliability and optimal control of wind turbine components.
Fuel Cells—Bei Gou 2009-08-06 Fuel Cells: Modeling, Control, and Applications describes advanced research results on modeling and control designs for fuel cells and their hybrid energy systems and filled with simulation examples and test results, it provides detailed discussions on fuel cell modeling, analysis, and nonlinear control. The book begins with an introduction to fuel cells and fuel cell power systems as well as the fundamentals of fuel cell systems and their components. It then presents the linear and nonlinear modeling of fuel cell dynamics, before discussing typical approaches to linear and nonlinear modeling and control design methods for fuel cells. The authors also explore the Simulink implementation of fuel cells, including the modeling of PEM fuel cells and control designs. They cover the applications of fuel cells in vehicles, utility power systems, stand-alone systems, and hybrid renewable energy systems. The book concludes with the modeling and analysis of hybrid renewable energy systems, which integrate fuel cells, wind power, and solar power. Mathematical preliminaries on linear and nonlinear control are provided in an appendix. With the need for alternative power well established, we are seeing unprecedented research in fuel cell technology. Written by scientists directly involved with the research, this book presents approaches and achievements in the linear and nonlinear modeling and control design of PEM fuel cells.

Modern Heuristic Optimization Techniques—Kwang Y. Lee 2008-02-08 This book explores how developing solutions with heuristic tools offers two major advantages: shortened development time and more robust systems. It begins with an overview of modern heuristic techniques and goes on to cover specific applications of heuristic approaches to power system problems, such as security assessment, optimal power flow, power system scheduling and operational planning, power generation expansion planning, reactive power planning, transmission and distribution planning, network reconfiguration, power system control, and hybrid systems of heuristic methods.

Smart Flow Control Processes in Micro Scale—Bongt Sunden 2020-12-29 In recent years, microfluidic devices with a large surface-volume ratio have witnessed rapid development, allowing them to be successfully utilized in many engineering applications. A smart control process has been proposed for many years, while many new innovations and enabling technologies have been developed for smart flow control, especially concerning “smart flow control” at the microscale. This Special Issue aims to highlight the current research trends related to this topic, presenting a collection of 33 papers from leading scholars in this field. Among these include studies and demonstrations of flow characteristics in pumps or valves as well as dynamic performance in rolling mill systems or jet systems to the optimal design of special components in smart control systems.

Electrical & Electronics Abstracts—1997

Pneumatic Actuating Systems for Automatic Equipment—Igor Lazar Krivits 2016-04-19 Automation is quickly becoming the standard across nearly every area of manufacturing. Pneumatic actuators play an important role in modern automation systems, yet until now there has been no book that takes into account the recent progress not only in the pneumatic systems themselves but also in the integration of mechatronics, electronic control systems, and modern control algorithms with pneumatic actuating systems. Filling this void, Pneumatic Actuating Systems for Automatic Equipment: Structure and Design describes novel constructions along with many of the most commonly applied pneumatic actuating systems. Covering everything from underlying principles to mechanics, numerical modeling, parameter calculation, and control algorithms, this book uses real-world-tested designs to illustrate the systems and components presented. After an in-depth discussion of the various types of pneumatic actuators and electromechanical control valves, the authors explain how to determine the system state variables and then examine open-loop and closed-loop pneumatic actuating systems in detail. They emphasize both the construction and dynamics of actuators to demonstrate and verify their properties before implementation. Pneumatic Actuating Systems for Automatic Equipment: Structure and Design offers a modern treatment of the subject along with applied knowledge using practical examples and exercises to highlight the concepts. It is an ideal resource to bring you up to date on this critical component of automation.

Analysis, Control and Optimal Operations in Hybrid Power Systems—Nicu Bizon 2013-11-26 The book’s text focuses on explaining and analyzing the dynamic performance of linear and nonlinear systems, in particular for Power Systems (PS) including Hybrid Power Sources (HPS). The system stability is important for both PS operation and planning. Placing emphasis on understanding the underlying stability principles, the book opens with an exploration of basic concepts using mathematical models and case studies from linear and nonlinear system, and continues with complex models and algorithms from field of PS. The book’s features include: (1) progressive approach from simplicity to complexity, (2) deeper look into advanced aspects of stability theory, (3) detailed description of system stability using state space energy conservation principle, (4) review of some research in the field of PS stability analysis, (5) advanced models and algorithms for Transmission Network Expansion Planning (TNEP), (6) Stability enhancement including the use of Power System Stabilizer (PSS) and Flexible Alternative Current Transmission Systems (FACTS), and (7) examination of the influence of nonlinear control on fuel cell HPS dynamics. The book will be easy to read and understand and will be an essential resource for both undergraduate and graduate students in electrical engineering as well as to the Ph.D.s and engineers from this field. It is also a clear and comprehensive reference text for undergraduate students, postgraduate and research students studying power systems, and also for practicing engineers and researchers who are working in electricity companies or in the development of power system technologies. All will appreciate the authors’ accessible approach in introducing the power system dynamics and stability from both a mathematical and engineering viewpoint.

System Identification, Environmental Modelling, and Control System Design—Liuping Wang 2011-10-20 This book is dedicated to Prof. Peter Young on his 70th birthday. Professor Young has been a pioneer in systems and control, and over the past 45 years he has influenced many developments in this field. This volume comprises a collection of contributions by leading experts in system identification, time-series analysis, environmetric modelling and control system design – modern research in topics that remain relevant in our era of defining the digital age. Professor Young’s research career. Recent theoretical developments in and relevant applications of these areas are explored treating the various subjects broadly and in depth. The authoritative and up-to-date research presented here will be of interest to academic researchers in control and disciplines related to environmental research, particularly those to with water systems. The tutorial style in which many of the contributions are composed also makes the book suitable as a source of study material for graduate students in those areas.


Applications of Power Electronics—Fredre Blaabjerg 2019-06-24 Power electronics technology is still an emerging technology, and it has found its way into many applications, from renewable energy generation (i.e., wind and power and solar power) to electrical vehicles (EVs), biomedical devices, and small appliances, such as laptop chargers. In the near future, electrical energy will be provided and handled by power electronics and consumed through power electronics; this not only will intensify the role of power electronics technology in power conversion processes, but also implies that power systems are under a paradigm shift: from a network-based energy distribution to distributed generation. Today, more than 1000 GW of renewable energy generation sources (photovoltaic (PV) and wind) have been installed, all of which are handled by power electronics technology. The main aim of this book is to highlight and address recent breakthroughs in the range of emerging applications in power electronics and in harmonic and electromagnetic interference (EMI) issues at device and system levels as discussed in robust and reliable power electronics technologies, including fault prognosis and diagnosis technique stability of grid-connected converters and smart control of power electronics in devices, microgrids, and at system levels.

Autonomous Control of Unmanned Aerial Vehicles—Victor Becerra 2019-06-24 Unmanned aerial vehicles (UAVs) are being increasingly used in different applications in both military and civilian domains. These applications include surveillance, reconnaissance, remote sensing, target acquisition, border patrol, infrastructure monitoring, aerial imaging, industrial inspection, and emergency medical aid. Vehicles that can be considered autonomous must be able to make decisions and react to events without direct intervention by humans. Although some UAVs are able to perform increasingly complex autonomous manoeuvres, most UAVs are not fully autonomous; instead, they are mostly operated remotely by humans. To make UAVs fully autonomous, many technological and algorithmic developments are still required. For instance, UAVs will need to improve their sensing of obstacles and subsequent avoidance. This becomes particularly important as autonomous UAVs start to operate in civilian airspaces that are occupied by other aircraft. The aim of this volume is to
bring together the work of leading researchers and practitioners in the field of unmanned aerial vehicles with a common interest in their autonomy. The contributions that are part of this volume present key challenges associated with the autonomous control of unmanned aerial vehicles, and propose solution methodologies to address such challenges, analyse the proposed methodologies, and evaluate their performance.

**DOE/RA.** - 1980

**Optimization of the Fuel Cell Renewable Hybrid Power Systems** - Nicu Bizon 2020-02-11
This book offers a comprehensive review of renewable energy sources and optimization strategies in hybrid power systems (HPSs). It analyses the main issues and challenges in the renewable (REW) HPS field, particularly those using fuel cell (FC) systems as their main source of energy. It then offers innovative solutions to these issues, comparing them to solutions currently found in the literature. The book discusses optimization algorithms and energy management strategies. The focus is chiefly on FC net power maximization and fuel economy strategies based on global optimization. The last two chapters discuss energy harvesting from photovoltaic systems and how to mitigate energy variability in REW FC HPS. The main content is supplemented by numerous examples and simulations. Academics, students and practitioners in relevant industrial branches interested in REW HPS finds it of considerable interest, as a reference book or for building their own HPSs based on the examples provided.

**Interconnected Power Systems** - Yong Li 2015-12-23
This book reports on the latest findings in the application of the wide area measurement systems (WAMS) in the analysis and control of power systems. The book collects new research ideas and achievements including a delay-dependent robust design method, a wide area robust coordination strategy, a hybrid assessment and choice method for wide area signals, a free-weighting matrices method and its application, as well as the online identification methods for low-frequency oscillations. The main original research results of this book are a comprehensive summary of the authors’ latest six-year study. The book will be of interest to academic researchers, R&D engineers and graduate students in power systems who wish to learn the core principles, methods, algorithms, and applications of the WAMS.

**Applied Mechanics Reviews** - 1994

**Fluid Power Systems and Technology** - 2002

**Manufacturing Science and Technology, ICMST2011** - Wu Fan 2011-11-22
Volume is indexed by Thomson Reuters CPCI-S (WoS). The objective of ICMST 2011 was to provide a platform where researchers, engineers, academicians and industrial professionals from all over the world could present their research results and discuss developments in Manufacturing Science and Technology. This conference provided opportunities for delegates to exchange new ideas and applications face-to-face, to establish business or research contacts and to find global partners for future collaboration.

**Control of Fuel Cell Power Systems** - Jay T. Pukrushpan 2013-03-09
Presenting the latest research in the control of fuel cell technology, this book will contribute to the commercial viability of the technology. The authors’ background in automotive technology gives the work added authority as a vital element of future planning.

**On Distributed and Cooperative Control Design for Networks of Dynamical Systems** - Georg Seyboth 2016-06-17
This thesis contributes to the development of a cooperative control theory for homogeneous and heterogeneous multi-agent systems consisting of identical and non-identical dynamical agents, respectively. The goal is to explain fundamental effects of non-identical agent dynamics on the behavior of a distributed system and, primarily, to develop suitable control design methods for a wide range of multi-agent coordination problems. Output synchronization problems as well as cooperative disturbance rejection and reference tracking problems in multi-agent systems are investigated. Suitable controller design methods for networks consisting of identical or non-identical linear time-invariant systems, linear parameter-varying systems, and selected classes of nonlinear systems are developed. These controller design methods provide a solution to a wide variety of distributed coordination and cooperative control scenarios.

**Proceedings** - 1996