Turbine Generator Synchronization Two Case Studies

Nonlinear Vibrations Excited by Limited Power Sources Jose Manoel Balthazar 2022-04-18 The book covers a wide range of applied engineering research compactly presented in one volume, and shows innovative practical engineering solutions for automotive, marine and aviation industries, as well as power generation related to nonlinear vibrations excited by limited power sources. While targeting primarily the audience of professional scientists and engineers, the book can also be useful for graduate students, and for all of those who are relatively new to the area and are looking for a single source with a good overview of the state-of-the-art as well as up-to-date information on theories, analytical, numerical methods, and their applications in design, simulations, testing, and manufacturing. The readers will find here a rich mixture of approaches, software tools and case studies used to investigate and optimize diverse powertrains, their functional units and separate machine parts based on different physical phenomena, their mathematical model representations, solution algorithms, and experimental validation. Smart Power Grids 2011 Ali Keyhani 2012-01-12 Electric power systems are experiencing significant changes at the worldwide scale in order to become cleaner, smarter, and more reliable. This edited book examines a wide range of topics related to these changes, which are primarily caused by the introduction of information technologies, renewable energy penetration, digitalized equipment, new operational strategies, and so forth. The emphasis will be put on the modeling and control of smart

grid systems. The book addresses research topics such as high efficiency transforrmers, wind turbines and generators, fuel cells, or high speed turbines and generators.

Electric Generators Handbook - Two Volume Set Ion Boldea 2018-10-08 Electric Generators Handbook, Second Edition: Two-Volume Set supplies state-of-the-art tools necessary to design, validate, and deploy the right power generation technologies to fulfill tomorrow's complex energy needs. The first volume, Synchronous Generators, explores large- and medium-power synchronous generator topologies, steady state, modeling, transients, control, design, and testing. Numerous case studies, worked-out examples, sample results, and illustrations highlight the concepts. Fully revised and updated to reflect the last decade's worth of progress in the field, the Second Edition adds coverage of high-power wind generators with fewer or no PMs, PM-assisted DC-excited salient pole synchronous generators, autonomous synchronous generators' control, line switching parameter identification for isolated grids, synthetic back-to-back load testing with inverter supply, and more. The second volume, Variable Speed Generators, provides extensive coverage of variable speed generators in distributed generation and renewable energy applications around the world. Numerous design and control examples illustrate the exposition. Fully revised and updated to reflect the last decade's worth of progress in the field, the Second Edition adds material on doubly fed induction generator control under unbalanced voltage sags and nonlinear loads, interior permanent magnet claw-pole-alternator systems, high power factor Vernier PM generators, PM-assisted reluctance synchronous motors/generators for electric hybrid vehicles, and more.

Fractional Order Control and Synchronization of Chaotic Systems Ahmad Taher Azar 2017-02-27 The book reports on the latest advances in and applications of fractional order control and synchronization of chaotic systems, explaining the concepts

involved in a clear, matter-of-fact style. It consists of 30 original contributions written by eminent scientists and active researchers in the field that address theories, methods and applications in a number of research areas related to fractional order control and synchronization of chaotic systems, such as: fractional chaotic systems, hyperchaotic systems, complex systems, fractional order discrete chaotic systems, chaos control, chaos synchronization, jerk circuits, fractional chaotic systems with hidden attractors, neural network, fuzzy logic controllers, behavioral modeling, robust and adaptive control, sliding mode control, different types of synchronization, circuit realization of chaotic systems, etc. In addition to providing readers extensive information on chaos fundamentals, fractional calculus, fractional differential equations, fractional control and stability, the book also discusses key applications of fractional order chaotic systems, as well as multidisciplinary solutions developed via control modeling. As such, it offers the perfect reference guide for graduate students, researchers and practitioners in the areas of fractional order control systems and fractional order chaotic systems.

Conference Proceedings Dr Sheetal Sharma & Dr Shruti Singh The International Conference on Emerging Socio-cultural and Political Issues: India and Europe is organised by Amity Institute of Social Sciences, Amity University, Noida, Uttar Pradesh in collaboration with Jean Monnet Module and Centre for European Studies, Jawaharlal Nehru University on May 24-25, 2021.The aim of the conference is to develop an understanding of the dynamics of social change and Development taking place in European and Indian society. Both India and Europe are taking firm strides towards cooperation and development specially in the post-pandemic era. In this context the conference aims in developing on working new path for structuring and building new vision and ideas for strong partnership between the two. The main objective of the Conference is to deliver new understanding of various issues ranging from society, culture, politics and environment. It

shall look into these issues from a different prism in the post pandemic era.

Power System Transients Juan A. Martinez-Velasco 2017-12-19 Despite the powerful numerical techniques and graphical user interfaces available in present software tools for power system transients, a lack of reliable tests and conversion procedures generally makes determination of parameters the most challenging part of creating a model. Illustrates Parameter Determination for Real-World Applications Geared toward both students and professionals with at least some basic knowledge of electromagnetic transient analysis, Power System Transients: Parameter Determination summarizes current procedures and techniques for the determination of transient parameters for six basic power components: overhead line, insulated cable, transformer, synchronous machine, surge arrester, and circuit breaker. An expansion on papers published in the IEEE Transactions on Power Delivery, this text helps those using transient simulation tools (e.g., EMTP-like tools) to select the optimal determination method for their particular model, and it addresses commonly encountered problems, including: Lack of information Testing setups and measurements that are not recognized in international standards Insufficient studies to validate models, mainly those used in high-frequency transients Current built-in models that do not cover all requirements Illustrated with case studies, this book provides modeling guidelines for the selection of adequate representations for main components. It discusses how to collect the information needed to obtain model parameters and also reviews procedures for deriving them. Appendices summarize updated techniques for identifying linear systems from frequency responses and review capabilities and limitations of simulation tools. Emphasizing standards, this book is a clear and concise presentation of key aspects in creating an adequate and reliable transient model.

Smart Power Distribution Systems Qiang Yang 2018-10-17

Smart Power Distribution Systems: Control, Communication, and Optimization explains how diverse technologies work to build and maintain smart grids around the globe. Yang, Yang and Li present the most recent advances in the control, communication and optimization of smart grids and provide unique insight into power system control, sensing and communication, and optimization technologies. The book covers control challenges for renewable energy and smart grids, communication in smart power systems, and optimization challenges in smart power system operations. Each area discussed focuses on the scientific innovations relating to the approaches, methods and algorithmic solutions presented. Readers will develop sound knowledge and gain insights into the integration of renewable energy generation in smart power distribution systems. Presents the latest technological advances in electric power distribution networks, with a particular focus on methodologies, approaches and algorithms Provides insights into the most recent research and developments from expert contributors from across the world Presents a clear and methodical structure that guides the reader through discussion and analysis, providing unique insights and sound knowledge along the way

Linear Induction Accelerators for High-Power Microwave Devices Igor Vintizenko 2018-10-03 Linear induction accelerators are successfully used as power supplies for numerous devices of relativistic high-frequency electronics. This book addresses ways to solve physical and engineering problems arising in the calculation, design, modeling and operation of linear induction accelerators intended for supplying relativistic microwave devices. It reviews and analyzes both classic and recent studies on the topic of linear induction accelerators (LIA) for generating and amplifying microwave radiation by relativistic devices.

Application of Time-Synchronized Measurements in Power System Transmission Networks Mladen Kezunovic 2014-07-18 This book illuminates how synchrophasors achieve the

monitoring, protection and control optimizations necessary to expand existing power systems to support increasing amounts of renewable and distributed energy resources. The authors describe synchrophasor techniques that can provide operators with better resolution in capturing dynamic behavior of the power grid. The resulting insights support improved real-time decision making in the face of more generation and load uncertainty, as well as interruptions caused by random acts of nature and malicious attacks. Armed with the information in this cutting-edge resource, grid planners and operators can make optimized, flexible, resilient power systems a reality.

Analytic Research Foundations for the Next-Generation Electric Grid National Academies of Sciences, Engineering, and Medicine 2016-04-15 Electricity is the lifeblood of modern society, and for the vast majority of people that electricity is obtained from large, interconnected power grids. However, the grid that was developed in the 20th century, and the incremental improvements made since then, including its underlying analytic foundations, is no longer adequate to completely meet the needs of the 21st century. The next-generation electric grid must be more flexible and resilient. While fossil fuels will have their place for decades to come, the grid of the future will need to accommodate a wider mix of more intermittent generating sources such as wind and distributed solar photovoltaics. Achieving this grid of the future will require effort on several fronts. There is a need for continued shorter-term engineering research and development, building on the existing analytic foundations for the grid. But there is also a need for more fundamental research to expand these analytic foundations. Analytic Research Foundations for the Next-Generation Electric Grid provide guidance on the longer-term critical areas for research in mathematical and computational sciences that is needed for the next-generation grid. It offers recommendations that are designed to help direct future research as the grid evolves and to give the nation's research and

development infrastructure the tools it needs to effectively develop, test, and use this research.

Green Information and Communication Systems for a Sustainable Future Rajshree Srivastava 2020-11-18 Green Information and Communication Systems for a Sustainable Future covers the fundamental concepts, applications, algorithms, protocols, new trends, challenges, and research results in the area of Green Information and Communication Systems. This book provides the reader with up-to-date information on core and specialized issues, making it highly suitable for both the novice and the experienced researcher in the field. The book covers theoretical and practical perspectives on network design. It includes how green ICT initiatives and applications can play a major role in reducing CO_2 emissions, and focuses on industry and how it can promote awareness and implementation of Green ICT. The book discusses scholarship and research in green and sustainable IT for business and organizations and uses the power of IT to usher sustainability into other parts of an organization. Business and management educators, management researchers, doctoral scholars, university teaching personnel and policy makers as well as members of higher academic research organizations will all discover this book to be an indispensable guide to Green Information and Communication Systems. It will also serve as a key resource for Industrial and Management training organizations all over the world.

Innovation in Electrical Power Engineering, Communication, and Computing Technology Manohar Mishra 2021-12-15 This book features selected high-quality papers from the Second International Conference on Innovation in Electrical Power Engineering, Communication, and Computing Technology (IEPCCT 2021), held at Siksha 'O' Anusandhan (Deemed to be University), Bhubaneswar, India, on 24–26 September 2021. Presenting innovations in power, communication, and computing, it covers topics such as mini, micro, smart and future power

grids; power system economics; energy storage systems; intelligent control; power converters; improving power quality; signal processing; sensors and actuators; image/video processing; high-performance data mining algorithms; advances in deep learning; and optimization methods.

Power Electronics-Enabled Autonomous Power Systems Qing-Chang Zhong 2020-03-03 Power systems worldwide are going through a paradigm shift from centralized generation to distributed generation. This book presents the SYNDEM (i.e., synchronized and democratized) grid architecture and its technical routes to harmonize the integration of renewable energy sources, electric vehicles, storage systems, and flexible loads, with the synchronization mechanism of synchronous machines, to enable autonomous operation of power systems, and to promote energy freedom. This is a game changer for the grid. It is the sort of breakthrough — like the touch screen in smart phones — that helps to push an industry from one era to the next, as reported by Keith Schneider, a New York Times correspondent since 1982. This book contains an introductory chapter and additional 24 chapters in five parts: Theoretical Framework, First-Generation VSM (virtual synchronous machines), Second-Generation VSM, Third-Generation VSM, and Case Studies. Most of the chapters include experimental results. As the first book of its kind for power electronics-enabled autonomous power systems, it • introduces a holistic architecture applicable to both large and small power systems, including aircraft power systems, ship power systems, microgrids, and supergrids • provides latest research to address the unprecedented challenges faced by power systems and to enhance grid stability, reliability, security, resiliency, and sustainability • demonstrates how future power systems achieve harmonious interaction, prevent local faults from cascading into wide-area blackouts, and operate autonomously with minimized cyber-attacks • highlights the significance of the SYNDEM concept for power systems and beyond Power

Electronics-Enabled Autonomous Power Systems is an excellent book for researchers, engineers, and students involved in energy and power systems, electrical and control engineering, and power electronics. The SYNDEM theoretical framework chapter is also suitable for policy makers, legislators, entrepreneurs, commissioners of utility commissions, energy and environmental agency staff, utility personnel, investors, consultants, and attorneys.

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, innovative 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.

Disturbance Analysis for Power Systems Mohamed A. Ibrahim 2011-09-28 More than ninety case studies shed new light on power system phenomena and power system disturbances Based on the author's four decades of experience, this book enables readers to implement systems in order to monitor and perform comprehensive analyses of power system disturbances. Most importantly, readers will discover the latest strategies and techniques needed to detect and resolve problems that could lead to blackouts to ensure the smooth operation and reliability of any power system. Logically organized, Disturbance Analysis for Power Systems begins with an introduction to the power system disturbance analysis function and its implementation. The book then guides readers through the causes and modes of clearing of

phase and ground faults occurring within power systems as well as power system phenomena and their impact on relay system performance. The next series of chapters presents more than ninety actual case studies that demonstrate how protection systems have performed in detecting and isolating power system disturbances in: Generators Transformers Overhead transmission lines Cable transmission line feeders Circuit breaker failures Throughout these case studies, actual digital fault recording (DFR) records, oscillograms, and numerical relay fault records are presented and analyzed to demonstrate why power system disturbances happen and how the sequence of events are deduced. The final chapter of the book is dedicated to practice problems, encouraging readers to apply what they've learned to perform their own system disturbance analyses. This book makes it possible for engineers, technicians, and power system operators to perform expert power system disturbance analyses using the latest tested and proven methods. Moreover, the book's many cases studies and practice problems make it ideal for students studying power systems.

Predictive Analytics for Energy Efficiency and Energy Retailing Konstantin Hopf 2019-07-15
Methods and Concepts for Designing and Validating Smart Grid Systems Thomas I. Strasser 2019-11-20 Energy efficiency and low-carbon technologies are key contributors to curtailing the emission of greenhouse gases that continue to cause global warming. The efforts to reduce greenhouse gas emissions also strongly affect electrical power systems. Renewable sources, storage systems, and flexible loads provide new system controls, but power system operators and utilities have to deal with their fluctuating nature, limited storage capabilities, and typically higher infrastructure complexity with a growing number of heterogeneous components. In addition to the technological change of new components, the liberalization of energy markets and new regulatory rules bring contextual change that

necessitates the restructuring of the design and operation of future energy systems. Sophisticated component design methods, intelligent information and communication architectures, automation and control concepts, new and advanced markets, as well as proper standards are necessary in order to manage the higher complexity of such intelligent power systems that form smart grids. Due to the considerably higher complexity of such cyber-physical energy systems, constituting the power system, automation, protection, information and communication technology (ICT), and system services, it is expected that the design and validation of smart-grid configurations will play a major role in future technology and system developments. However, an integrated approach for the design and evaluation of smart-grid configurations incorporating these diverse constituent parts remains evasive. The currently available validation approaches focus mainly on component-oriented methods. In order to guarantee a sustainable, affordable, and secure supply of electricity through the transition to a future smart grid with considerably higher complexity and innovation, new design, validation, and testing methods appropriate for cyber-physical systems are required. Therefore, this book summarizes recent research results and developments related to the design and validation of smart grid systems.

Studies Combined: Cyber Warfare In Cyberspace - National Defense, Workforce And Legal Issues 2018-01-18 Just a sample of the contents ... contains over 2,800 total pages .... PROSPECTS FOR THE RULE OF LAW IN CYBERSPACE Cyberwarfare and Operational Art CYBER WARFARE GOVERNANCE: EVALUATION OF CURRENT INTERNATIONAL AGREEMENTS ON THE OFFENSIVE USE OF CYBER Cyber Attacks and the Legal Justification for an Armed Response UNTYING OUR HANDS: RECONSIDERING CYBER AS A SEPARATE INSTRUMENT OF NATIONAL POWER Effects-Based Operations in the Cyber Domain Recommendations for Model-

Driven Paradigms for Integrated Approaches to Cyber Defense
MILLENNIAL WARFARE IGNORING A REVOLUTION IN
MILITARY AFFAIRS: THE NEED TO CREATE A SEPARATE
BRANCH OF THE ARMED FORCES FOR CYBER WARFARE
SPECIAL OPERATIONS AND CYBER WARFARE LESSONS FROM
THE FRONT: A CASE STUDY OF RUSSIAN CYBER WARFARE
ADAPTING UNCONVENTIONAL WARFARE DOCTRINE TO
CYBERSPACE OPERATIONS: AN EXAMINATION OF
HACKTIVIST BASED INSURGENCIES Addressing Human Factors
Gaps in Cyber Defense Airpower History and the Cyber Force of
the Future How Organization for the Cyber Domain Outpaced
Strategic Thinking and Forgot the Lessons of the Past THE
COMMAND OF THE TREND: SOCIAL MEDIA AS A WEAPON IN
THE INFORMATION AGE SPYING FOR THE RIGHT REASONS:
CONTESTED NORMS IN CYBERSPACE AIR FORCE
CYBERWORX REPORT: REMODELING AIR FORCE CYBER
COMMAND & CONTROL THE CYBER WAR: MAINTAINING AND
CONTROLLING THE "KEY CYBER TERRAIN" OF THE
CYBERSPACE DOMAIN WHEN NORMS FAIL: NORTH KOREA
AND CYBER AS AN ELEMENT OF STATECRAFT AN
ANTIFRAGILE APPROACH TO PREPARING FOR CYBER
CONFLICT AIR FORCE CYBER MISSION ASSURANCE SOURCES
OF MISSION UNCERTAINTY Concurrency Attacks and Defenses
Cyber Workforce Retention Airpower Lessons for an Air Force
Cyber-Power Targeting ¬Theory IS BRINGING BACK WARRANT
OFFICERS THE ANSWER? A LOOK AT HOW THEY COULD
WORK IN THE AIR FORCE CYBER OPERATIONS CAREER FIELD
NEW TOOLS FOR A NEW TERRAIN AIR FORCE SUPPORT TO
SPECIAL OPERATIONS IN THE CYBER ENVIRONMENT
Learning to Mow Grass: IDF Adaptations to Hybrid Threats
CHINA'S WAR BY OTHER MEANS: UNVEILING CHINA'S QUEST
FOR INFORMATION DOMINANCE THE ISLAMIC STATE'S
TACTICS IN SYRIA: ROLE OF SOCIAL MEDIA IN SHIFTING A
PEACEFUL ARAB SPRING INTO TERRORISM NON-LETHAL

WEAPONS: THE KEY TO A MORE AGGRESSIVE STRATEGY TO COMBAT TERRORISM THOUGHTS INVADE US: LEXICAL COGNITION AND CYBERSPACE The Cyber Threat to Military Just-In-Time Logistics: Risk Mitigation and the Return to Forward Basing PROSPECTS FOR THE RULE OF LAW IN CYBERSPACE Cyberwarfare and Operational Art CYBER WARFARE GOVERNANCE: EVALUATION OF CURRENT INTERNATIONAL AGREEMENTS ON THE OFFENSIVE USE OF CYBER Cyber Attacks and the Legal Justification for an Armed Response UNTYING OUR HANDS: RECONSIDERING CYBER AS A SEPARATE INSTRUMENT OF NATIONAL POWER Effects-Based Operations in the Cyber Domain Recommendations for Model-Driven Paradigms for Integrated Approaches to Cyber Defense MILLENNIAL WARFARE IGNORING A REVOLUTION IN MILITARY AFFAIRS: THE NEED TO CREATE A SEPARATE BRANCH OF THE ARMED FORCES FOR CYBER WARFARE SPECIAL OPERATIONS AND CYBER WARFARE LESSONS FROM THE FRONT: A CASE STUDY OF RUSSIAN CYBER WARFARE ADAPTING UNCONVENTIONAL WARFARE DOCTRINE TO CYBERSPACE OPERATIONS: AN EXAMINATION OF HACKTIVIST BASED INSURGENCIES Addressing Human Factors Gaps in Cyber Defense Airpower History and the Cyber Force of the Future How Organization for the Cyber Domain Outpaced Strategic Thinking and Forgot the Lessons of the Past THE COMMAND OF THE TREND: SOCIAL MEDIA AS A WEAPON IN THE INFORMATION AGE SPYING FOR THE RIGHT REASONS: CONTESTED NORMS IN CYBERSPACE AIR FORCE CYBERWORX REPORT: REMODELING AIR FORCE CYBER COMMAND & CONTROL THE CYBER WAR: MAINTAINING AND CONTROLLING THE "KEY CYBER TERRAIN" OF THE CYBERSPACE DOMAIN WHEN NORMS FAIL: NORTH KOREA AND CYBER AS AN ELEMENT OF STATECRAFT AN ANTIFRAGILE APPROACH TO PREPARING FOR CYBER CONFLICT AIR FORCE CYBER MISSION ASSURANCE SOURCES

OF MISSION UNCERTAINTY Concurrency Attacks and Defenses Cyber Workforce Retention

Control of Power Electronic Converters and Systems Frede Blaabjerg 2021-04-01 Control of Power Electronic Converters and Systems, Volume 3, explores emerging topics in the control of power electronics and converters, including the theory behind control, and the practical operation, modeling, and control of basic power system models. This book introduces the most important controller design methods, including both analog and digital procedures. This reference explains the dynamic characterization of terminal behavior for converters, as well as preserving the stability and power quality of modern power systems. Useful for engineers in emerging applications of power electronic converters and those combining control design methods into different applications in power electronics technology. Addressing controller interactions - in light of increasing renewable energy integration and related challenges with stability and power quality - is becoming more frequent in power converters and passive components. Discusses different applications and their control in integrated renewable energy systems Introduces the most important controller design methods, both in analog and digital Describes different important applications to be used in future industrial products Explains the dynamic characterization of terminal behavior for converters
Computational Intelligence in Power Engineering Bijaya Ketan Panigrahi 2010-09-20 This volume deals with different computational intelligence (CI) techniques for solving real world power industry problems. It will be extremely helpful for the researchers as well as the practicing engineers in the power industry.
A Systems Approach To Social Impact Assessment Lawrence A. Palinkas 2019-04-11 This book provides two case studies that demonstrate the use of systems analysis to forecast the often far-reaching consequences of government policies and economic

development for the social relations and cultural values of different communities. The case studies examine the potential effects of oil development in two rural Alaskan communities, co Permanent Magnet Synchronous Machines Sandra Eriksson 2019-08-20 Interest in permanent magnet synchronous machines (PMSMs) is continuously increasing worldwide, especially with the increased use of renewable energy and the electrification of transports. This book contains the successful submissions of fifteen papers to a Special Issue of Energies on the subject area of "Permanent Magnet Synchronous Machines". The focus is on permanent magnet synchronous machines and the electrical systems they are connected to. The presented work represents a wide range of areas. Studies of control systems, both for permanent magnet synchronous machines and for brushless DC motors, are presented and experimentally verified. Design studies of generators for wind power, wave power and hydro power are presented. Finite element method simulations and analytical design methods are used. The presented studies represent several of the different research fields on permanent magnet machines and electric drives.

U.S. Government Research Reports 1959

Electric System Operations: Evolving to the Modern Grid, Second Edition Subramanian Vadari 2020-01-31 This completely updated second edition includes case studies and a focus on the business of system operations. The broad range of actions under system operations from transmission to distribution are explored. The underpinnings of electric systems operations are highlighted, with an introduction to utilities and power systems. It offers a thorough definition of system operations, identifying and explaining the various systems that support this function and how they integrate into the utility. The book presents a thorough definition of system operations, identifying and explaining the various systems that support this function and how they integrate into the utility. The business perspective on electric systems

operation, and how critical this area is to a utility's ability to provide reliable power to customers is detailed. Readers discover how a utility's network operation is a key contributor to the viable sustainment of its business. The book presents the convergence of the systems used in the grid operations of today and addresses the emerging needs of the smart grid operations of tomorrow. Readers discover how a utility's network operation is a key contributor to the viable sustainment of its business, as well as learn how system operations help to ensure the right levels of safety, reliability and efficiency in everything that relates to transmission and distribution grid management.

Power Industry Computer Applications Conference, PICA 1977

Parallel Dynamic and Transient Simulation of Large-Scale Power Systems Venkata Dinavahi 2022-01-01 This textbook introduces methods of accelerating transient stability (dynamic) simulation and electromagnetic transient simulation on massively parallel processors for large-scale AC-DC grids – two of the most common and computationally onerous studies done by energy control centers and research laboratories for the planning, design, and operation of such integrated grids for ensuring the security and reliability of electric power. Simulation case studies provided in the book range from small didactic test circuits to realistic-sized AC-DC grids, and special emphasis is placed on detailed device-level multi-physics models for power system equipment and decomposition techniques for simulating large-scale systems. Parallel Dynamic and Transient Simulation of Large-Scale Power Systems: A High Performance Computing Solution is a comprehensive state-of-the-art guide for upper-level undergraduate and graduate students in power systems engineering. Practicing engineers, software developers, and scientists working in the power and energy industry will find it to be a timely and valuable reference for solving potential problems in their design and development activities. Detailed device-level electro-thermal modeling for power electronic systems in DC

grids; Provides comprehensive dynamic and transient simulation of integrated large-scale AC-DC grids; Offers detailed models of renewable energy system models.

Power System Dynamics Jan Machowski 2011-08-31 This book is the fully revised and updated second edition of Power System Dynamics and Stability published in 1997. The modified title Power System Dynamics: Stability and Control reflects a slight shift in focus from solely describing power system dynamics to the means of dealing with them. The book has been expanded by about a third to include: a new chapter on wind power generation; a new section on wide-area measurement systems (WAMS) and their application for real-time control; an overview of lessons learned from wide-spread blackouts affecting North America and Europe in 2003, 2004 and 2006; enhanced treatment of voltage stability and control, and frequency stability and control; application of Lyapunov direct method to analyse and enhance stability of multi-machine power systems ; expanded coverage of steady-state stability using eigenvalue analysis, including modal analysis of dynamic equivalents. The book continues the successful approach of the first edition by progressing from simplicity to complexity. It places the emphasis first on understanding the underlying physical principles before proceeding to more complex models and algorithms. The reader will appreciate the authors' accessible approach as the book is illustrated by over 400 diagrams and a large number of examples. Power System Dynamics: Stability and Control, Second Edition is an essential resource for graduates of electrical engineering. It is also a clear and comprehensive reference text for undergraduate students, and for practising engineers and researchers who are working in electricity companies or in the development of power system technologies.

Artificial Intelligence and Evolutionary Computations in Engineering Systems Subhransu Sekhar Dash 2016-02-05 The book is a collection of high-quality peer-reviewed research papers

presented in the first International Conference on International Conference on Artificial Intelligence and Evolutionary Computations in Engineering Systems (ICAIECES -2015) held at Velammal Engineering College (VEC), Chennai, India during 22 – 23 April 2015. The book discusses wide variety of industrial, engineering and scientific applications of the emerging techniques. Researchers from academic and industry present their original work and exchange ideas, information, techniques and applications in the field of Communication, Computing and Power Technologies.

Transient Analysis of Power Systems Juan A. Martinez-Velasco 2020-02-10 A hands-on introduction to advanced applications of power system transients with practical examples Transient Analysis of Power Systems: A Practical Approach offers an authoritative guide to the traditional capabilities and the new software and hardware approaches that can be used to carry out transient studies and make possible new and more complex research. The book explores a wide range of topics from an introduction to the subject to a review of the many advanced applications, involving the creation of custom-made models and tools and the application of multicore environments for advanced studies. The authors cover the general aspects of the transient analysis such as modelling guidelines, solution techniques and capabilities of a transient tool. The book also explores the usual application of a transient tool including over-voltages, power quality studies and simulation of power electronics devices. In addition, it contains an introduction to the transient analysis using the ATP. All the studies are supported by practical examples and simulation results. This important book: Summarises modelling guidelines and solution techniques used in transient analysis of power systems Provides a collection of practical examples with a detailed introduction and a discussion of results Includes a collection of case studies that illustrate how a simulation tool can be used for building environments that can

be applied to both analysis and design of power systems Offers guidelines for building custom-made models and libraries of modules, supported by some practical examples Facilitates application of a transients tool to fields hardly covered with other time-domain simulation tools Includes a companion website with data (input) files of examples presented, case studies and power point presentations used to support cases studies Written for EMTP users, electrical engineers, Transient Analysis of Power Systems is a hands-on and practical guide to advanced applications of power system transients that includes a range of practical examples.

Real-Time Electromagnetic Transient Simulation of AC-DC Networks Venkata Dinavahi 2021-06-14 Explore a comprehensive and state-of-the-art presentation of real-time electromagnetic transient simulation technology by leaders in the field Real-Time Electromagnetic Transient Simulation of AC-DC Networks delivers a detailed exposition of field programmable gate array (FPGA) hardware based real-time electromagnetic transient (EMT) emulation for all fundamental equipment used in AC-DC power grids. The book focuses specifically on detailed device-level models for their hardware realization in a massively parallel and deeply pipelined manner as well as decomposition techniques for emulating large systems. Each chapter contains fundamental concepts, apparatus models, solution algorithms, and hardware emulation to assist the reader in understanding the material contained within. Case studies are peppered throughout the book, ranging from small didactic test circuits to realistically sized large-scale AC-DC grids. The book also provides introductions to FPGA and hardware-in-the-loop (HIL) emulation procedures, and large-scale networks constructed by the foundational components described in earlier chapters. With a strong focus on high-voltage direct-current power transmission grid applications, Real-Time Electromagnetic Transient Simulation of AC-DC Networks covers both system-level and

device-level mathematical models. Readers will also enjoy the inclusion of: A thorough introduction to field programmable gate array technology, including the evolution of FPGAs, technology trends, hardware architectures, and programming tools An exploration of classical power system components, e.g., linear and nonlinear passive power system components, transmission lines, power transformers, rotating machines, and protective relays A comprehensive discussion of power semiconductor switches and converters, i.e., AC-DC and DC-DC converters, and specific power electronic apparatus such as DC circuit breakers An examination of decomposition techniques used at the equipment-level as well as the large-scale system-level for real-time EMT emulation of AC-DC networks Chapters that are supported by simulation results from well-defined test cases and the corresponding system parameters are provided in the Appendix Perfect for graduate students and professional engineers studying or working in electrical power engineering, Real-Time Electromagnetic Transient Simulation of AC-DC Networks will also earn a place in the libraries of simulation specialists, senior modeling and simulation engineers, planning and design engineers, and system studies engineers.

Intelligent Computing & Optimization Pandian Vasant 2021-12-30 This book includes the scientific results of the fourth edition of the International Conference on Intelligent Computing and Optimization which took place at December 30–31, 2021, via ZOOM. The conference objective was to celebrate "Compassion and Wisdom" with researchers, scholars, experts and investigators in Intelligent Computing and Optimization worldwide, to share knowledge, experience, innovation—marvelous opportunity for discourse and mutuality by novel research, invention and creativity. This proceedings encloses the original and innovative scientific fields of optimization and optimal control, renewable energy and sustainability, artificial intelligence and operational research,

economics and management, smart cities and rural planning, meta-heuristics and big data analytics, cyber security and blockchains, IoTs and Industry 4.0, mathematical modelling and simulation, health care and medicine.

Feasibility Studies for Small Scale Hydropower Additions Hydrologic Engineering Center (U.S.) 1979

Advances in Grid-Connected Photovoltaic Power Conversion Systems Yongheng Yang 2018-08-21 Advances in Grid-Connected Photovoltaic Power Conversion Systems addresses the technological challenges of fluctuating and unreliable power supply in grid-connected photovoltaic (PV) systems to help students, researchers, and engineers work toward more PV installations in the grid to make society more sustainable and reliable while complying with grid regulations. The authors combine their extensive knowledge and experience in this book to address both the basics of the power electronic converter technology and the advances of such practical electric power conversion systems. This book includes extensive, step-by-step practical application examples to assist students and engineers to better understand the role of power electronics in modern PV applications and solve the practical issues in grid-connected PV systems. Offers a step-by-step modeling approach to solving the practical issues and technological challenges in grid-connected PV systems Provides practical application examples to assist the reader to better understand the role of power electronics in modern PV applications Extends to the most modern technologies for grid-friendly PV systems

Interconnect-Centric Design for Advanced SOC and NOC Jari Nurmi 2006-03-20 In Interconnect-centric Design for Advanced SoC and NoC, we have tried to create a comprehensive understanding about on-chip interconnect characteristics, design methodologies, layered views on different abstraction levels and finally about applying the interconnect-centric design in system-on-chip design. Traditionally, on-chip communication design has

been done using rather ad-hoc and informal approaches that fail to meet some of the challenges posed by next-generation SOC designs, such as performance and throughput, power and energy, reliability, predictability, synchronization, and management of concurrency. To address these challenges, it is critical to take a global view of the communication problem, and decompose it along lines that make it more tractable. We believe that a layered approach similar to that defined by the communication networks community should also be used for on-chip communication design. The design issues are handled on physical and circuit layer, logic and architecture layer, and from system design methodology and tools point of view. Formal communication modeling and refinement is used to bridge the communication layers, and network-centric modeling of multiprocessor on-chip networks and socket-based design will serve the development of platforms for SoC and NoC integration. Interconnect-centric Design for Advanced SoC and NoC is concluded by two application examples: interconnect and memory organization in SoCs for advanced set-top boxes and TV, and a case study in NoC platform design for more generic applications.

Renewable Energy from Small & Micro Hydro Projects Shambhu Ratan Awasthi 2021-03-24 Energy production and utilization are directly associated with climate change. Harnessing energy from renewables can provide a viable path towards achieving sustainability and reducing carbon footprints, which can help mitigate the harmful effects of climate change. India is endowed with substantial hydropower potential. Under this light, Renewable Energy from Small & Micro Hydro Projects: practical aspects & case studies introduces the process of developing hydropower projects, especially in Indian context. The role of hydroelectric power, as part of water management, in combating climate change also forms the subject matter of this book. Selection of suitable sites, hydro turbines, electrical systems, transportation, and salient features of dam and reservoir

operation are discussed. Cost estimation, feasibility studies, promotional policies of the government, and other organizations involved in hydropower also form the subject matter of the title. The publication also covers the basics of fluid mechanics along with an overview of the hydropower development in India and the world. The book is supplemented with statistical data relevant to development and operation of hydropower projects which makes the text an authentic read. It will be a useful guide and reference to students, designers, planners, consultants, and field engineers engaged in hydro energy sector.

Field-Programmable Logic and Applications International Workshop on Field-Programmable Logic and Applications 1995-08-21 This volume constitutes the proceedings of the Fifth International Workshop on Field-Programmable Logic and Its Applications, FPL '95, held in Oxford, UK in August/September 1995. The volume presents 46 full revised papers carefully selected by the program committee from a large number and wide range of submissions. The papers document the progress achieved since the predecessor conference (see LNCS 849). They are organized in sections on architectures, platforms, tools, arithmetic and signal processing, embedded systems and other applications, and reconfigurable design and models.

Sustainable Power Systems Nava Raj Karki 2017-01-10 This book deals with quantifying and analyzing the risks associated with sustainable energy technology growth in electric power systems, and developing appropriate models and methodologies to mitigate the risks and improve the overall system performance. The rapid increase in the installation of renewable energy sources in electric power systems has given rise to a wide range of problems related to planning and operation of power systems to maintain quality, stability, reliability and efficiency. Additionally, there is a growing global environmental concern regarding increasing emissions from the electric power generation required to meet rising energy needs and support sustainable and inclusive

development. The phenomenon of low voltage ride through (LVRT), common to wind energy systems, is discussed, and ways to tackle the same are proposed in the first chapter. Subsequent chapters propose methods of optimizing a sustainable and smart microgrid, and supplying electricity to remote areas of a developing country with no immediate possibility of national grid extension. The economic benefit and technical challenges of forming localized minigrid are also discussed. The book proposes a method for reliability assessment of a power grid with sustainable power transportation system. The issue of weak link in power system is very important as it will provide the system operators and planners to take necessary measures to strengthen the system. An approach to determine the weak parts of the system and its unreliability is proposed. With increasing installation of HVDC power transmission and development of efficient and low cost power electronic devices, the DC microgrids are becoming a common phenomenon. Their existence together with AC Grids result in Hybrid AC/DC Microgrids, which are discussed in this book. It further presents a method for reliability evaluation of a distribution system with network reconfiguration in the presence of distributed generation. The important problems in sustainable energy growth, and their potential solutions discussed and presented in the book should be of great interest to engineers, policy makers, researchers and academics in the area of electric power engineering.
Submodularity in Dynamics and Control of Networked Systems Andrew Clark 2015-12-21 This book presents a framework for the control of networked systems utilizing submodular optimization techniques. The main focus is on selecting input nodes for the control of networked systems, an inherently discrete optimization problem with applications in power system stability, social influence dynamics, and the control of vehicle formations. The first part of the book is devoted to background information on submodular functions, matroids, and submodular optimization,

and presents algorithms for distributed submodular optimization that are scalable to large networked systems. In turn, the second part develops a unifying submodular optimization approach to controlling networked systems based on multiple performance and controllability criteria. Techniques are introduced for selecting input nodes to ensure smooth convergence, synchronization, and robustness to environmental and adversarial noise. Submodular optimization is the first unifying approach towards guaranteeing both performance and controllability with provable optimality bounds in static as well as time-varying networks. Throughout the text, the submodular framework is illustrated with the help of numerical examples and application-based case studies in biological, energy and vehicular systems. The book effectively combines two areas of growing interest, and will be especially useful for researchers in control theory, applied mathematics, networking or machine learning with experience in submodular optimization but who are less familiar with the problems and tools available for networked systems (or vice versa). It will also benefit graduate students, offering consistent terminology and notation that greatly reduces the initial effort associated with beginning a course of study in a new area.

Power Systems Cybersecurity Hassan Haes Alhelou 2023-03-12 This book covers power systems cybersecurity. In order to enhance overall stability and security in wide-area cyber-physical power systems and defend against cyberattacks, new resilient operation, control, and protection methods are required. The cyberattack-resilient control methods improve overall cybersecurity and stability in normal and abnormal operating conditions. By contrast, cyberattack-resilient protection schemes are important to keep the secure operation of a system under the most severe contingencies and cyberattacks. The main subjects covered in the book are: 1) proposing new tolerant and cyberattack-resilient control and protection methods against cyberattacks for future power systems, 2) suggesting new

methods for cyberattack detection and cybersecurity assessment, and 3) focusing on practical issues in modern power systems.

Cooperative Synchronization in Distributed Microgrid Control Ali Bidram 2017-02-24 This book brings together emerging objectives and paradigms in the control of both AC and DC microgrids; further, it facilitates the integration of renewable-energy and distribution systems through localization of generation, storage and consumption. The control objectives in a microgrid are addressed through the hierarchical control structure. After providing a comprehensive survey on the state of the art in microgrid control, the book goes on to address the most recent control schemes for both AC and DC microgrids, which are based on the distributed cooperative control of multi-agent systems. The cooperative control structure discussed distributes the co-ordination and optimization tasks across all distributed generators. This does away with the need for a central controller, and the control system will not collapse in response to the outage of a single unit. This avoids adverse effects on system flexibility and configurability, as well as the reliability concerns in connection with single points of failure that arise in traditional, centralized microgrid control schemes. Rigorous proofs develop each control methodology covered in the book, and simulation examples are provided to justify all of the proposed algorithms. Given its extensive yet self-contained content, the book offers a comprehensive source of information for graduate students, academic researchers, and practicing engineers working in the field of microgrid control and optimization.

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