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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.

Information and Communication Technology for Competitive Strategies - Simon Fong

2018-08-30

This book contains 74 papers presented at ICTCS 2017: Third International Conference on Information and Communication Technology for Competitive Strategies. The conference was held during 16–17 December 2017, Udaipur, India and organized by Association of Computing

Machinery, Udaipur Professional Chapter in association with The Institution of Engineers (India), Udaipur Local Center and Global Knowledge Research Foundation. This book contains papers mainly focused on ICT for Computation, Algorithms and Data Analytics and IT Security etc.

Intelligent Operation and Control in Next Generation Urban Power Grid - Ke-Jun Li
2022-10-21

Use of Voltage Stability Assessment and Transient Stability Assessment Tools in Grid Operations - Sarma (NDR) Nuthalapati
2021-05-28

This book brings together real-world accounts of using voltage stability assessment (VSA) and transient stability assessment (TSA) tools for grid management. Chapters are written by leading experts in the field who have used these tools to manage their grids and can provide readers with a unique and international perspective. Case

studies and success stories are presented by those who have used these tools in the field, making this book a useful reference for different utilities worldwide that are looking into implementing these tools, as well as students and practicing engineers who are interested in learning the real-time applications of VSA and TSA for grid operation.

Advances in Smart Grid Automation and Industry 4.0 - M. Jaya Bharata Reddy 2021-04-21

This book comprises select proceedings of the International Conference on Emerging Trends for Smart Grid Automation and Industry 4.0 (ICETSGAI4.0 2019). The contents discuss the recent trends in smart grid technology and related applications. The topics covered include data analytics for smart grid operation and control, integrated power generation technologies, green technologies as well as advances in microgrid operation and planning. The book highlights the enhancement in technology in the field of smart grids, and how

IoT, big data, robotics and automation, artificial intelligence, and wide area measurement have become prerequisites for the fourth industrial revolution, also known as Industry 4.0. The book can be a valuable reference for researchers and professionals interested in smart grid automation incorporating features of Industry 4.0.

Embedded Computer Systems: Architectures, Modeling, and Simulation - Alex Orailoglu 2022-08-13

This book constitutes the proceedings of the 22st International Conference on Embedded Computer Systems: Architectures, Modeling, and Simulation, SAMOS 2021, which took place in July 2022 in Samos, Greece. The 21 full papers presented in this volume were carefully reviewed and selected from 44 submissions. The papers are organized in topics as follows: High level synthesis; memory systems; processor architecture; embedded software systems and beyond; deep learning optimization; extra-functional property estimation; innovative

architectures and tools for security; european research projects on digital systems, services, and platforms.

Wide Area Power Systems Stability, Protection, and Security - Hassan Haes Alhelou 2020-09-21

This book proposes new control and protection schemes to improve the overall stability and security of future wide-area power systems. It focuses on the high penetration levels of renewable energy sources and distributed generation, particularly with the trend towards smart grids. The control methods discussed can improve the overall stability in normal and abnormal operation conditions, while the protection methods presented can be used to ensure the secure operation of systems under most severe contingencies. Presenting stability, security, and protection methods for power systems in one concise volume, this book takes the reader on a journey from concepts and fundamentals to the latest and future trends in each topic covered, making it an informative and

intriguing read for researchers, graduate students, and practitioners alike.

Smart Grid Control - Jakob Stoustrup
2018-09-25

This book focuses on the role of systems and control. Focusing on the current and future development of smart grids in the generation and transmission of energy, it provides an overview of the smart grid control landscape, and the potential impact of the various investigations presented has for technical aspects of power generation and distribution as well as for human and economic concerns such as pricing, consumption and demand management. A tutorial exposition is provided in each chapter, describing the opportunities and challenges that lie ahead. Topics in these chapters include: wide-area control; issues of estimation and integration at the transmission; distribution, consumers, and demand management; and cyber-physical security for smart grid control systems. The contributors describe the problems involved with

each topic, and what impact these problems would have if not solved. The tutorial components and the opportunities and challenges detailed make this book ideal for anyone interested in new paradigms for modernized, smart power grids, and anyone in a field where control is applied. More specifically, it is a valuable resource for students studying smart grid control, and for researchers and academics wishing to extend their knowledge of the topic.

Advanced Smart Grid Functionalities Based on PowerFactory - Francisco Gonzalez-Longatt
2017-12-29

This book consolidates some of the most promising advanced smart grid functionalities and provides a comprehensive set of guidelines for their implementation/evaluation using DlgSILENT Power Factory. It includes specific aspects of modeling, simulation and analysis, for example wide-area monitoring, visualization and control, dynamic capability rating, real-time load

measurement and management, interfaces and co-simulation for modeling and simulation of hybrid systems. It also presents key advanced features of modeling and automation of calculations using PowerFactory, such as the use of domain-specific (DSL) and DigSILENT Programming (DPL) languages, and utilizes a variety of methodologies including theoretical explanations, practical examples and guidelines. Providing a concise compilation of significant outcomes by experienced users and developers of this program, it is a valuable resource for postgraduate students and engineers working in power-system operation and planning.

Power System Grid Operation Using Synchrophasor Technology - Sarma (NDR) Nuthalapati 2018-05-29

This book brings together successful stories of deployment of synchrophasor technology in managing the power grid. The authors discuss experiences with large scale deployment of Phasor Measurement Units (PMUs) in power

systems across the world, enabling readers to take this technology into control center operations and develop good operational procedures to manage the grid better, with wide area visualization tools using PMU data.

Monitoring and Control of Electrical Power Systems using Machine Learning Techniques - Emilio Barocio Espejo 2023-01-27

Monitoring and Control of Electrical Power Systems using Machine Learning Techniques bridges the gap between advanced machine learning techniques and their application in the control and monitoring of electrical power systems, particularly relevant for heavily distributed energy systems and real-time application. The book reviews key applications of deep learning, spatio-temporal, and advanced signal processing methods for monitoring power quality. This reference introduces guiding principles for the monitoring and control of power quality disturbances arising from integration of power electronic devices and discusses

monitoring and control of electrical power systems using benchmark test systems for the creation of bespoke advanced data analytic algorithms. Covers advanced applications and solutions for monitoring and control of electrical power systems using machine learning techniques for transmission and distribution systems Provides deep insight into power quality disturbance detection and classification through machine learning, deep learning, and spatio-temporal algorithms Includes substantial online supplementary components focusing on dataset generation for machine learning training processes and open-source microgrid model simulators on GitHub

Power System Fault Diagnosis - Md Shafiullah
2022-01-17

Power System Fault Diagnosis: A Wide Area Measurement Based Intelligent Approach is a comprehensive overview of the growing interests in efficient diagnosis of power system faults to reduce outage duration and revenue losses by

expediting the restoration process. This book illustrates intelligent fault diagnosis schemes for power system networks, at both transmission and distribution levels, using data acquired from phasor measurement units. It presents the power grid modeling, fault modeling, feature extraction processes, and various fault diagnosis techniques, including artificial intelligence techniques, in steps. The book also incorporates uncertainty associated with line parameters, fault information (resistance and inception angle), load demand, renewable energy generation, and measurement noises. Provides step-by-step modeling of power system networks (distribution and transmission) and faults in MATLAB/SIMULINK and real-time digital simulator (RTDS) platforms Presents feature extraction processes using advanced signal processing techniques (discrete wavelet and Stockwell transforms) and an easy-to-understand optimal feature selection method Illustrates comprehensive results in the graphical and tabular formats that can be easily

reproduced by beginners Highlights various utility practices for fault location in transmission networks, distribution systems, and underground cables.

Machine Learning, Optimization, and Data Science - Giuseppe Nicosia 2019-02-16

This book constitutes the post-conference proceedings of the 4th International Conference on Machine Learning, Optimization, and Data Science, LOD 2018, held in Volterra, Italy, in September 2018. The 46 full papers presented were carefully reviewed and selected from 126 submissions. The papers cover topics in the field of machine learning, artificial intelligence, reinforcement learning, computational optimization and data science presenting a substantial array of ideas, technologies, algorithms, methods and applications.

Advancements in Real-Time Simulation of Power and Energy Systems - Panos Kotsampopoulos 2021-05-20

Modern power and energy systems are

characterized by the wide integration of distributed generation, storage and electric vehicles, adoption of ICT solutions, and interconnection of different energy carriers and consumer engagement, posing new challenges and creating new opportunities. Advanced testing and validation methods are needed to efficiently validate power equipment and controls in the contemporary complex environment and support the transition to a cleaner and sustainable energy system. Real-time hardware-in-the-loop (HIL) simulation has proven to be an effective method for validating and de-risking power system equipment in highly realistic, flexible, and repeatable conditions. Controller hardware-in-the-loop (CHIL) and power hardware-in-the-loop (PHIL) are the two main HIL simulation methods used in industry and academia that contribute to system-level testing enhancement by exploiting the flexibility of digital simulations in testing actual controllers and power equipment. This book addresses recent advances in real-time HIL

simulation in several domains (also in new and promising areas), including technique improvements to promote its wider use. It is composed of 14 papers dealing with advances in HIL testing of power electronic converters, power system protection, modeling for real-time digital simulation, co-simulation, geographically distributed HIL, and multiphysics HIL, among other topics.

PowerFactory Applications for Power System Analysis - Francisco M. Gonzalez-Longatt
2014-12-27

This book presents a comprehensive set of guidelines and applications of DigSILENT PowerFactory, an advanced power system simulation software package, for different types of power systems studies. Written by specialists in the field, it combines expertise and years of experience in the use of DigSILENT PowerFactory with a deep understanding of power systems analysis. These complementary approaches therefore provide a fresh perspective on how to

model, simulate and analyse power systems. It presents methodological approaches for modelling of system components, including both classical and non-conventional devices used in generation, transmission and distribution systems, discussing relevant assumptions and implications on performance assessment. This background is complemented with several guidelines for advanced use of DSL and DPL languages as well as for interfacing with other software packages, which is of great value for creating and performing different types of steady-state and dynamic performance simulation analysis. All employed test case studies are provided as supporting material to the reader to ease recreation of all examples presented in the book as well as to facilitate their use in other cases related to planning and operation studies. Providing an invaluable resource for the formal instruction of power system undergraduate/postgraduate students, this book is also a useful reference for engineers

working in power system operation and planning. [Optimizing and Measuring Smart Grid Operation and Control](#) - Reciou, Abdelmadjid 2020-11-13 Smart grid (SG), also called intelligent grid, is a modern improvement of the traditional power grid that will revolutionize the way electricity is produced, delivered, and consumed. Studying key concepts such as advanced metering infrastructure, distribution management systems, and energy management systems will support the design of a cost-effective, reliable, and efficient supply system, and will create a real-time bidirectional communication means and information exchange between the consumer and the grid operator of electric power. [Optimizing and Measuring Smart Grid Operation and Control](#) is a critical reference source that presents recent research on the operation, control, and optimization of smart grids. Covering topics that include phase measurement units, smart metering, and synchrophasor technologies, this book examines all aspects of modern smart grid

measurement and control. It is designed for engineers, researchers, academicians, and students.

Voltage Control and Protection in Electrical Power Systems - Sandro Corsi 2015-06-19

Based on the author's twenty years of experience, this book shows the practicality of modern, conceptually new, wide area voltage control in transmission and distribution smart grids, in detail. Evidence is given of the great advantages of this approach, as well as what can be gained by new control functionalities which modern technologies now available can provide. The distinction between solutions of wide area voltage regulation (V-WAR) and wide area voltage protection (V-WAP) are presented, demonstrating the proper synergy between them when they operate on the same power system as well as the simplicity and effectiveness of the protection solution in this case. The author provides an overview and detailed descriptions of voltage controls, distinguishing between

generalities of underdeveloped, on-field operating applications and modern and available automatic control solutions, which are as yet not sufficiently known or perceived for what they are: practical, high-performance and reliable solutions. At the end of this thorough and complex preliminary analysis the reader sees the true benefits and limitations of more traditional voltage control solutions, and gains an understanding and appreciation of the innovative grid voltage control and protection solutions here proposed; solutions aimed at improving the security, efficiency and quality of electrical power system operation around the globe. Voltage Control and Protection in Electrical Power Systems: from System Components to Wide Area Control will help to show engineers working in electrical power companies and system operators the significant advantages of new control solutions and will also interest academic control researchers studying ways of increasing power system stability and efficiency.

Real-Time Electromagnetic Transient Simulation of AC-DC Networks - Venkata Dinavahi
2021-06-22

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.

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.

Advances in Mechanical Engineering and Technology - Ranganath M. Singari

Handbook of Research on Emergent Applications of Optimization Algorithms -

Vasant, Pandian 2017-10-31

Modern optimization approaches have attracted an increasing number of scientists, decision

makers, and researchers. As new issues in this field emerge, different optimization methodologies must be developed and implemented. The Handbook of Research on Emergent Applications of Optimization Algorithms is an authoritative reference source for the latest scholarly research on modern optimization techniques for solving complex problems of global optimization and their applications in economics and engineering. Featuring coverage on a broad range of topics and perspectives such as hybrid systems, non-cooperative games, and cryptography, this publication is ideally designed for students, researchers, and engineers interested in emerging developments in optimization algorithms.

2018 1st International Conference on Power, Energy and Smart Grid (ICPESG) -

IEEE Staff 2018-04-09

1st International Conference on Power, Energy and Smart Grid (ICPESG 2018) will be held from

April 12-13, 2018 at Mirpur, the historical city of Azad Jammu and Kashmir, (Pakistan) It is the first conference that Department of Electrical (Power) Engineering, MUST is organizing this prestigious event to bring together researchers, scientists, engineers and scholars to share their struggle, ideas, experiments and research results about all the aspects of power and energy systems, renewable energy, smart grid and advance concepts in computational intelligence Energy management, environmental concerns of energy systems and sustainability are the most significant research topics in engineering domain around the globe The conference is a useful opportunity for industrial people to interact with researchers and professionals The significance of the event is also highlighted by the energy crisis of Pakistan and Azad Kashmir

Wireless Personal Communications - Theodore S. Rappaport 2012-12-06

Wireless personal communications, or wireless as it is now being called, has arrived. The hype is

starting to fade, and the hard work of deploying new systems and services for personal communications is underway. In the United States, the FCC propelled the wireless era from infancy to mainstream with a \$7.7 billion auction of 60 MHz of radio spectrum in the 1800-1900 MHz band. With the largest single sale of public property in the history of mankind mostly complete, the resources of the entire world are being called upon to develop inexpensive, rapidly deployable wireless systems and subscriber units for an industry that is adding subscribers at greater than 50% annual rate. This growth is commonplace for wireless service companies throughout the world, and in the U.S., where as many as 7 licensed wireless service providers may be competing for cellular PCS customers within the next couple of years, differentiators in cost, quality, service, and coverage will become critical to customer acceptance and use. Many of these issues are discussed in the papers included in this book.

Electric Power Systems Research - Ying-Yi

Hong 2018-04-06

This book is a printed edition of the Special Issue "Electric Power Systems Research" that was published in Energies

Research Anthology on Smart Grid and Microgrid Development - Management Association, Information Resources 2021-09-24

Smart grid and microgrid technology are growing exponentially as they are adopted throughout the world. These new technologies have revolutionized the way electricity is produced, delivered, and consumed, and offer a plethora of benefits as well as the potential for further growth. It is critical to examine the current stage of smart grid and microgrid development as well as the direction they are headed as they continue to expand in order to ensure that cost-effective, reliable, and efficient systems are put in place. The Research Anthology on Smart Grid and Microgrid Development is an all-encompassing reference source of the latest innovations and

trends within smart grid and microgrid development. Detailing benefits, challenges, and opportunities, it is a crucial resource to fully understand the current opportunities that smart grids and microgrids present around the world. Covering a wide range of topics such as traditional grids, future smart grids, electrical distribution systems, and microgrid integration, it is ideal for engineers, policymakers, systems developers, technologists, researchers, government officials, academicians, environmental groups, regulators, utilities specialists, industry professionals, and students.

Smart Grids - David Bakken 2017-12-19

The utilization of sensors, communications, and computer technologies to create greater efficiency in the generation, transmission, distribution, and consumption of electricity will enable better management of the electric power system. As the use of smart grid technologies grows, utilities will be able to automate meter reading and billing and consumers will be more

aware of their energy usage and the associated costs. The results will require utilities and their suppliers to develop new business models, strategies, and processes. With an emphasis on reducing costs and improving return on investment (ROI) for utilities, Smart Grids: Clouds, Communications, Open Source, and Automation explores the design and implementation of smart grid technologies, considering the benefits to consumers as well as businesses. Focusing on industrial applications, the text: Provides a state-of-the-art account of the smart grid Explains how smart grid technologies are currently being used Includes detailed examples and test cases for real-life implementation Discusses trade-offs associated with the utilization of smart grid technologies Describes smart grid simulation software and offers insight into the future of the smart grid The electric power grid is in the early stages of a sea of change. Nobody knows which business models will survive, but companies heeding the lessons

found in Smart Grids: Clouds, Communications, Open Source, and Automation might just increase their chances for success.

VLSI-SoC: Design and Engineering of Electronics Systems Based on New Computing Paradigms - Nicola Bombieri 2019-06-25

This book contains extended and revised versions of the best papers presented at the 26th IFIP WG 10.5/IEEE International Conference on Very Large Scale Integration, VLSI-SoC 2018, held in Verona, Italy, in October 2018. The 13 full papers included in this volume were carefully reviewed and selected from the 27 papers (out of 106 submissions) presented at the conference. The papers discuss the latest academic and industrial results and developments as well as future trends in the field of System-on-Chip (SoC) design, considering the challenges of nano-scale, state-of-the-art and emerging manufacturing technologies. In particular they address cutting-edge research fields like heterogeneous, neuromorphic and brain-inspired, biologically-

inspired, approximate computing systems.

Wireless Algorithms, Systems, and Applications - Zhe Liu 2021-09-08

The three-volume set constitutes the proceedings of the 16th International Conference on Wireless Algorithms, Systems, and Applications, WASA 2021, which was held during June 25-27, 2021.

The conference took place in Nanjing, China. The 103 full and 57 short papers presented in these proceedings were carefully reviewed and selected from 315 submissions. The contributions in Part II of the set are subdivided into the following topical sections: Scheduling & Optimization II; Security; Data Center Networks and Cloud Computing; Privacy-Aware Computing; Internet of Vehicles; Visual Computing for IoT; Mobile Ad-Hoc Networks.

Advances in Emerging Trends and Technologies - Miguel Botto-Tobar 2019-10-18

This book constitutes the proceedings of the 1st International Conference on Advances in Emerging Trends and Technologies (ICAETT

2019), held in Quito, Ecuador, on 29–31 May 2019, jointly organized by Universidad Tecnológica Israel, Universidad Técnica del Norte, and Instituto Tecnológico Superior Rumiñahui, and supported by SNOTRA. ICAETT 2019 brought together top researchers and practitioners working in different domains of computer science to share their expertise and to discuss future developments and potential collaborations.

Presenting high-quality, peer-reviewed papers, the book discusses the following topics: Technology Trends Electronics Intelligent Systems Machine Vision Communication Security e-Learning e-Business e-Government and e-Participation

Advanced Power Applications for System Reliability Monitoring - Hongming Zhang 2020-11-13

This book examines real-time models and advanced online applications that enhance reliability and resilience of the grid in real-time and near real-time environments. It is written by

Peak Reliability engineers who worked on the creation of the West Wide System Model (WSM) and the implementation of advanced real-time operation situational awareness tools for reliability coordination function. The book looks at how a single Reliability Coordinator for the Western Interconnection did its work under normal and emergency conditions, providing a unique perspective on best practices and lessons learned from Peak's modeling and coordination efforts to create, maintain, and improve state-of-art new technology and algorithms to improve real-time operation situational awareness and Bulk Electric System (BES) grid resilience. Coverage includes practical experience of implementing real-time Energy Management System (EMS) Network Application, real-time voltage stability analysis, online transient stability analysis, synchrophasor technology, Dispatcher Training Simulator and EMS Cybersecurity & Inter-Control Center Communications Protocol (ICCP) implementation

experience in a Reliability Coordinator Control Room setting. Explains how to operate a "green" grid and prevent new blackouts against uncertain operation conditions; Written by Peak Reliability engineers who worked on the creation of the West Wide System Model (WWSM); All material verified in practical system operations, or validated by real system measures and system events.

Modeling and Control of Sustainable Power Systems - Lingfeng Wang 2011-11-09

The concept of the smart grid promises the world an efficient and intelligent approach of managing energy production, transportation, and consumption by incorporating intelligence, efficiency, and optimality into the power grid. Both energy providers and consumers can take advantage of the convenience, reliability, and energy savings achieved by real-time and intelligent energy management. To this end, the current power grid is experiencing drastic changes and upgrades. For instance, more

significant green energy resources such as wind power and solar power are being integrated into the power grid, and higher energy storage capacity is being installed in order to mitigate the intermittency issues brought about by the variable energy resources. At the same time, novel power electronics technologies and operating strategies are being invented and adopted. For instance, Flexible AC transmission systems and phasor measurement units are two promising technologies for improving the power system reliability and power quality. Demand side management will enable the customers to manage the power loads in an active fashion. As a result, modeling and control of modern power grids pose great challenges due to the adoption of new smart grid technologies. In this book, chapters regarding representative applications of smart grid technologies written by world-renowned experts are included, which explain in detail various innovative modeling and control methods.

Intelligent Data Mining and Analysis in Power and Energy Systems - Zita A. Vale 2022-12-13
Intelligent Data Mining and Analysis in Power and Energy Systems A hands-on and current review of data mining and analysis and their applications to power and energy systems In Intelligent Data Mining and Analysis in Power and Energy Systems: Models and Applications for Smarter Efficient Power Systems, the editors assemble a team of distinguished engineers to deliver a practical and incisive review of cutting-edge information on data mining and intelligent data analysis models as they relate to power and energy systems. You'll find accessible descriptions of state-of-the-art advances in intelligent data mining and analysis and see how they drive innovation and evolution in the development of new technologies. The book combines perspectives from authors distributed around the world with expertise gained in academia and industry. It facilitates review work and identification of critical points in the research

and offers insightful commentary on likely future developments in the field. It also provides: A thorough introduction to data mining and analysis, including the foundations of data preparation and a review of various analysis models and methods In-depth explorations of clustering, classification, and forecasting Intensive discussions of machine learning applications in power and energy systems Perfect for power and energy systems designers, planners, operators, and consultants, Intelligent Data Mining and Analysis in Power and Energy Systems will also earn a place in the libraries of software developers, researchers, and students with an interest in data mining and analysis problems.

Issues in Energy Conversion, Transmission, and Systems: 2011 Edition - 2012-01-09

Issues in Energy Conversion, Transmission, and Systems: 2011 Edition is a ScholarlyEditions™ eBook that delivers timely, authoritative, and comprehensive information about Energy

Conversion, Transmission, and Systems. The editors have built Issues in Energy Conversion, Transmission, and Systems: 2011 Edition on the vast information databases of ScholarlyNews.™ You can expect the information about Energy Conversion, Transmission, and Systems in this eBook to be deeper than what you can access anywhere else, as well as consistently reliable, authoritative, informed, and relevant. The content of Issues in Energy Conversion, Transmission, and Systems: 2011 Edition has been produced by the world's leading scientists, engineers, analysts, research institutions, and companies. All of the content is from peer-reviewed sources, and all of it is written, assembled, and edited by the editors at ScholarlyEditions™ and available exclusively from us. You now have a source you can cite with authority, confidence, and credibility. More information is available at <http://www.ScholarlyEditions.com/>. Applied Mathematics, Modeling and Computer

Simulation - C.-H. Chen 2022-02-25

The pervasiveness of computers in every field of science, industry and everyday life has meant that applied mathematics, particularly in relation to modeling and simulation, has become ever more important in recent years. This book presents the proceedings of the 2021 International Conference on Applied Mathematics, Modeling and Computer Simulation (AMMCS 2021), hosted in Wuhan, China, and held as a virtual event from 13 to 14 November 2021. The aim of the conference is to foster the knowledge and understanding of recent advances across the broad fields of applied mathematics, modeling and computer simulation, and it provides an annual platform for scholars and researchers to communicate important recent developments in their areas of specialization to colleagues and other scientists in related disciplines. This year more than 150 participants were able to exchange knowledge and discuss recent developments via the

conference. The book contains 115 peer-reviewed papers, selected from more than 250 submissions and ranging from the theoretical and conceptual to the strongly pragmatic and all addressing industrial best practice. Topics covered include mathematical modeling and applications, engineering applications and scientific computations, and the simulation of intelligent systems. Providing an overview of recent development and with a mix of practical experiences and enlightening ideas, the book will be of interest to researchers and practitioners everywhere.

Dynamic Vulnerability Assessment and Intelligent Control - José Luis Rueda-Torres 2018-03-19

Identifying, assessing, and mitigating electric power grid vulnerabilities is a growing focus in short-term operational planning of power systems. Through illustrated application, this important guide surveys state-of-the-art methodologies for the assessment and enhancement of power system security in short

term operational planning and real-time operation. The methodologies employ advanced methods from probabilistic theory, data mining, artificial intelligence, and optimization, to provide knowledge-based support for monitoring, control (preventive and corrective), and decision making tasks. Key features: Introduces behavioural recognition in wide-area monitoring and security constrained optimal power flow for intelligent control and protection and optimal grid management. Provides in-depth understanding of risk-based reliability and security assessment, dynamic vulnerability assessment methods, supported by the underpinning mathematics. Develops expertise in mitigation techniques using intelligent protection and control, controlled islanding, model predictive control, multi-agent and distributed control systems Illustrates implementation in smart grid and self-healing applications with examples and real-world experience from the WAMPAC (Wide Area Monitoring Protection and Control) scheme.

Dynamic Vulnerability Assessment and Intelligent Control for Power Systems is a valuable reference for postgraduate students and researchers in power system stability as well as practicing engineers working in power system dynamics, control, and network operation and planning.

Advanced Control of AC / DC Power Networks - Abdelkrim Benchaib 2015-10-05

The power engineering domain is facing huge challenges, with an increasing interest in intermittent renewable energies which are imposing major technical limitations. Operating ever closer to their limits, the industry-standard AC power grids are subject to instabilities. This book presents an insight into DC grid systems, offering interesting issues to well controlled power grids, in contrast to current AC systems which provide the simplest and most economic connection method for short distances.

Power Management for Wearable Electronic Devices - Dima Kilani 2020-01-17

This book describes power management

integrated circuits (PMIC), for power converters and voltage regulators necessary for energy efficient and small form factor systems. The authors discuss state-of-the-art PMICs not only for battery powered wearable devices, but also energy harvesting-based devices. The circuits presented support voltage scaling to reduce the overall average power consumption of a wearable device, resulting in longer device operating time. The discussion includes many designs, control techniques and approaches to distribute efficiently the power among different blocks in the device. • Demonstrates for readers how to innovate in designing power management integrated circuits (PMIC) suitable for wearable devices, powered by either battery or harvesting energy; • Introduces a dual outputs switched capacitor, using a single voltage regulator to minimize the area overhead and discusses the effect of having more than two outputs on the area and power efficiency; • Introduces a novel clock-less digital LDO regulator that eliminates

the use of the clocked comparator and serial shift register in the conventional design; • Presents experimental results of energy harvesting-based power management units (PMU), using different combinations of power converters and voltage regulators, providing a guide for designers to select the appropriate option based on device requirements.

Integrated Circuit and System Design. Power and Timing Modeling, Optimization and Simulation - Jose L. Ayala 2011-09-15

This book constitutes the refereed proceedings of the 21st International Conference on Integrated Circuit and System Design, PATMOS 2011, held in Madrid, Spain, in September 2011. The 34 revised full papers presented were carefully reviewed and selected from numerous submissions. The paper feature emerging challenges in methodologies and tools for the design of upcoming generations of integrated circuits and systems and focus especially on timing, performance and power consumption as

well as architectural aspects with particular emphasis on modeling, design, characterization, analysis and optimization.

Smart Grid Handbook, 3 Volume Set - 2016-08-01 Comprehensive, cross-disciplinary coverage of Smart Grid issues from global expert researchers and practitioners. This definitive reference meets the need for a large scale, high quality work reference in Smart Grid engineering which is pivotal in the development of a low-carbon energy infrastructure. Including a total of 83 articles across 3 volumes The Smart Grid Handbook is organized in to 6 sections: Vision and Drivers, Transmission, Distribution, Smart Meters and Customers, Information and Communications Technology, and Socio-Economic Issues. Key features: Written by a team representing smart grid R&D, technology deployment, standards, industry practice, and socio-economic aspects. Vision and Drivers covers the vision, definitions, evolution, and global development of the smart grid as well as

new technologies and standards. The Transmission section discusses industry practice, operational experience, standards, cyber security, and grid codes. The Distribution section introduces distribution systems and the system configurations in different countries and different load areas served by the grid. The Smart Meters and Customers section assesses how smart meters enable the customers to interact with the power grid. Socio-economic issues and information and communications technology requirements are covered in dedicated articles. The Smart Grid Handbook will meet the need for a high quality reference work to support advanced study and research in the field of electrical power generation, transmission and distribution. It will be an essential reference for regulators and government officials, testing laboratories and certification organizations, and engineers and researchers in Smart Grid-related industries.

Artificial Intelligence-based Smart Power Systems

- Sanjeevikumar Padmanaban 2022-12-20

Authoritative resource describing the artificial intelligence and advanced technologies in smart power systems with simulation examples and case studies Artificial Intelligence-based Smart Power Systems presents advanced technologies used in various aspects of smart power systems, especially grid-connected and industrial evolution, covering many new topics such as distribution Phasor management, blockchain technologies for smart power systems, the application of deep learning and reinforced learning, and artificial intelligence techniques. The text also explores the potential consequences of artificial intelligence and advanced technologies in smart power systems in the forthcoming years. To enhance and reinforce learning, the highly qualified editors include many learning resources throughout the text, including MATLAB and HIL codes, end-of-chapter problems, end-of-book solutions,

practical examples, and case studies. Artificial Intelligence-based Smart Power Systems includes specific information on topics such as: Modeling and analysis of smart power systems, covering steady state analysis, dynamic analysis, voltage stability, and more Recent advancement in power electronics for smart power systems, covering power electronic converters for renewable energy sources, electric vehicles, and HDVC/FACTS Distribution Phasor Measurement Units (PMU) in smart power systems, covering the need for PMU in distribution and automation of system reconfigurations Power and energy management systems for microgrids Engineering colleges and universities, along with industry research centers, can use the in-depth subject coverage and the extensive supplementary learning resources found in Artificial Intelligence-based Smart Power Systems to gain a holistic understanding of the subject and be able to harness that knowledge within a myriad of practical applications.