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Flexibility in Electric Power Distribution Networks May 31 2022 High penetration of renewable energy sources (RESs) imposes several techno-economic challenges to distribution system operators (DSOs) due to their variability in power generation and, hence, increases the need for additional operational flexibility. Operational flexibility aims at securely covering the possible variations at the minimum cost using emerging flexible alternatives or designing novel local market mechanisms to incentivize flexibility providers. In such a situation, the DSOs can use the potential of flexible options such as energy storages (ESs), demand response (DR), plug-in electric vehicles (PEVs), or on-site fast run generators. However, each of the mentioned flexible resources has its own specific characteristics and requirements that should be taken into account, and this raises the complexity. Optimal network reconfiguration schemes are the other solution for increasing power system flexibility at the distribution level. There is a great research gap related to renewable-based distribution network planning from a flexibility point of view. Therefore, this book aims to discuss the additional flexibility needs introduced by RESs and describe general approaches to analyze the need for and provision of additional flexibility in future distribution networks at both the planning and operational time frames. This book successfully suggests new solutions and techniques to increase the flexibility in distribution systems. It also highlights the needs for moving towards smart distribution grids in order to enhance the flexibility in modern and future power systems.

Future Distribution Networks Sep 10 2020 Future Distribution Networks: Planning, Operation, and Control presents a curated collection of leading information on the planning and operation of smart grids and next-generation distribution networks. It offers a look into the future of electricity networks that enable sustainable energy services and examines how these networks will link small- and medium-scale sources with consumer demand. It discusses how intelligent grid infrastructure provides flexibility for supply and demand. The book contains: -- Structure and clarification to the concept of 'smart grids' offering a clear, agreed-upon definition -- Up-to-date information in smart grids and next-generation energy distribution networks, including industry and academic/laboratory contributions -- Recent developments in planning, operation and control of future distribution networks and smart grids with penetration of renewable energy sources This book is an ideal resource for academic and industry researchers in the energy and energy distribution fields. It is also relevant to professionals working in renewable energy or sustainable development and to undergraduate and graduate students studying electrical power engineering.

Real-time Systems Apr 05 2020 This book is dedicated to Real-time Systems of broad applications, such as autonomous navigation (Kalman Filtering), real-time reconfiguration of distributed networks, real-time bilateral teleoperation control system over imperfect networks, and uniform interfaces for resource-sharing components in hierarchically scheduled real-time systems. In addition to that, wireless technology and its usage in implementing intelligent systems open a wide spectrum of real-time systems and offer great potential for improving people's life: for example, wireless sensor networks used in subways, reduced energy consumption in public buildings, improved security through public surveillance, and high efficiency through industrial automation. Furthermore, electric utilities and multi-core CPU architecture, the driving force of modern life, are part of subjects benefited from the topics covered in this book.

[Energy Storage for Modern Power System Operations](#) Mar 17 2021 ENERGY STORAGE for MODERN POWER SYSTEM OPERATIONS Written and edited by a team of well-known and respected experts in the field, this new volume on energy storage presents the state-of-the-art developments and challenges for modern power systems for engineers, researchers, academicians, industry professionals, consultants, and designers. Energy storage systems have been recognized as the key elements in modern power systems, where they are able to provide primary and secondary frequency controls, voltage regulation, power quality improvement, stability enhancement, reserve service, peak shaving, and so on. Particularly, deployment of energy storage systems in a distributed manner will contribute greatly in the development of smart grids and providing promising solutions for the above issues. The main challenges will be the adoption of new techniques and strategies for the optimal planning, control, monitoring and management of modern power systems with the wide installation of distributed energy storage systems. Thus, the aim of this book is to illustrate the potential of energy storage systems in different applications of modern power systems, with a view toward illuminating recent advances and research trends in storage technologies. This exciting new volume covers the recent advancements and applications of different energy storage technologies that are useful to engineers, scientists, and students in the discipline of electrical engineering. Suitable for the engineers at power companies and energy storage consultants working in the energy storage field, this book offers a cross-disciplinary look across electrical, mechanical, chemical and renewable engineering aspects of energy storage. Whether for the veteran engineer or the student, this is a must-have for any library. **AUDIENCE** Electrical engineers and other designers, engineers, and scientists working in energy storage

[Grid Integration of Electric Vehicles in Open Electricity Markets](#) Mar 05 2020 Presenting the policy drivers, benefits and challenges for grid integration of electric vehicles (EVs) in the open electricity market environment, this book provides a comprehensive overview of existing electricity markets and demonstrates how EVs are integrated into these different markets and power systems. Unlike other texts, this book analyses EV integration in parallel with electricity market design, showing the interaction between EVs and differing electricity markets. Future regulating power market and distribution system operator (DSO) market design is covered, with up-to-date case studies and examples to help readers carry out similar projects across the world. With in-depth analysis, this book describes: the impact of EV charging and discharging on transmission and distribution networks market-driven EV congestion management techniques, for example the day-ahead tariff based congestion management scenario within electric distribution networks optimal EV charging management with the fleet operator concept and smart charging management EV battery technology, modelling and tests the use of EVs for balancing power fluctuations from renewable energy sources, looking at power system operation support, including frequency reserve, power regulation and voltage support An accessible technical book for power engineers and grid/distributed systems operators, this also serves as a reference text for researchers in the area of EVs and power systems. It provides distribution companies with the knowledge they need when facing the challenges introduced by large scale EV deployment, and demonstrates how transmission system operators (TSOs) can develop the existing system service market in order to fully utilize the potential of EV flexibility.

With thorough coverage of the technologies for EV integration, this volume is informative for research professors and graduate students in power systems; it will also appeal to EV manufacturers, regulators, EV market professionals, energy providers and traders, mobility providers, EV charging station companies, and policy makers.

Electric Distribution Network Planning Jun 19 2021 This book highlights the latest research advances in the planning and management of electric distribution networks. It addresses various aspects of distribution network management including planning, operation, customer engagement, and technology accommodation. Given the importance of electric distribution networks in power delivery systems, effectively planning and managing them are vital to satisfying technical, economic, and customer requirements. A new planning and management philosophy, techniques, and methods are essential to handling uncertainties associated with the integration of renewable-based distributed generation, demand forecast, and customer needs. This book covers topics on managing the capacity of distribution networks, while also addressing the future needs of electric systems. The efficient and economical operation of distribution networks is an essential aspect of ensuring the effective use of resources. Accordingly, this book addresses operation and control approaches and techniques suitable for future distribution networks.

Handbook of Optimization in Electric Power Distribution Systems Aug 29 2019 This handbook gathers state-of-the-art research on optimization problems in power distribution systems, covering classical problems as well as the challenges introduced by distributed power generation and smart grid resources. It also presents recent models, solution techniques and computational tools to solve planning problems for power distribution systems and explains how to apply them in distributed and variable energy generation resources. As such, the book therefore is a valuable tool to leverage the expansion and operation planning of electricity distribution networks.

Handbook of Research on Distribution Channels May 07 2020 Distribution channels are the most complex element of the marketing mix to fully grasp and to profitably manage. In this Handbook the authors present cutting-edge research on channel management and design from analytical, conceptual, and empirical perspectives. The breadth of this Handbook makes it appropriate for use in a doctoral course on distribution channels, or as a knowledge-broadening resource for faculty and researchers who wish to understand types of channels research that are outside the scope of their own approach to distribution.

2020 IEEE PES Innovative Smart Grid Technologies Europe (ISGT Europe) Jul 09 2020 The aim of the Conference is to provide an international forum for experts to promote, share, and discuss innovations and developments in the field of smart grid technologies and applications Topics Industry experience in deploying smart grid technologies for power generation, transmission, distribution, energy conversion and storage Transmission system technologies, HVDC and FACTS Distribution system and substation automation Information and communication technologies for smart grids, interoperability and cyber security System integration of distributed energy resources, islanding and microgrids Planning and management of smart grid assets Electric vehicle technologies and interactions with the grid Power electronics, control and protection systems for smart grid applications Smart grid monitoring and advanced metering infrastructures Diagnostics, maintenance, risks, reliability, vulnerability and self healing of smart grids Demand side management

Estimation of Flexibility Potentials in Active Distribution Networks Jun 07 2020 The feasible operation region (FOR) allows capturing the aggregated flexibility potential of DER within radial distribution networks, while respecting the technical restrictions of both plants and grid. This thesis proposes a novel approach to compute the FOR, the Linear Flexibility Aggregation (LFA) method, based on the solution of a sequence of linear OPF. With the objective of reducing the computation time, without compromising the accuracy of the assessed FOR. It is shown that the proposed method provides a considerable reduction in processing time compared to similar methods, e.g. Monte-Carlo simulations or non-linear OPF-based methods.

Active Electrical Distribution Network Jul 29 2019 Active Electrical Distribution Network: Issues, Solution Techniques and Applications is a comprehensive reference that addresses the issues and opportunities across one of the most overlooked sectors of the electrical industry, electrical distribution. The book begins with an introduction to electrical distribution networks, and then explores both present and future developments in the areas of smart grids, electric vehicles, micro grids, demand side response and active distribution networks. The ongoing transition of energy systems is also covered, providing recommendations for a higher penetration of renewable energy, utilization of new equipment and new network configurations, as well as development of new design and operation methods, and applications of new incentives and business models. The book closes with a section on optimizing operational issues, featuring guidance on optimal expansion planning of distribution systems in smart grids and optimization of photovoltaic (PV) systems. Active Electrical Distribution Network is an ideal reference for all those interested in the modeling, analysis, control, operation and planning techniques that are key to addressing the knowledge and information needs of the engineering and research audience. Includes different techniques under DSR concepts and solutions to address home area management system problems Features various smart reactive power compensation techniques used for reactive power support Discusses different smart technologies implemented globally to improve the performance of the active distribution network

Renewable Energy Nov 24 2021 This four-volume set, edited by a leading expert in the field, brings together in one collection a series of papers that have been fundamental to the development of renewable energy as a defined discipline. Some of the papers were first published many years ago, but they remain classics in their fields and retain their relevance to the understanding of current issues. The papers have been selected with the assistance of an eminent international editorial board. The set includes a general introduction and each volume is introduced by a new overview essay, placing the selected papers in context. The range of subject matter is considerable, including coverage of all the main renewable technologies, the fundamental principles by which they function, and the issues around their deployment such as planning, integration and socio-economic assessment. Overall, the set provides students, teachers and researchers, confronted with thousands of journal articles, book chapters and grey literature stretching back decades, with a ready-made selection of and commentary on the most important key writings in renewable energy. It will be an essential reference for libraries concerned with energy, technology and the environment.

Operation of Distributed Energy Resources in Smart Distribution Networks Nov 05 2022 Operation of Distributed Energy Resources in Smart Distribution Networks defines the barriers and challenges of smart distribution networks, ultimately proposing optimal solutions for addressing them. The book considers their use as an important part of future electrical power systems and their ability to improve the local flexibility and reliability of electrical systems. It carefully defines the concept as a radial network with a cluster of distributed energy generations, various types of loads, and energy storage systems. In addition, the book details how the huge penetration of distributed energy resources and the intermittent nature of renewable generations may cause system problems. Readers will find this to be an important resource that analyzes and introduces the features and problems of smart distribution networks from different aspects. Integrates different types of elements, including electrical vehicles, demand response programs, and various renewable energy sources in distribution networks Proposes optimal operational models for the short-term performance and scheduling of a distribution network Discusses the uncertainties of renewable resources and intermittent load in the decision-making process for distribution networks

Advanced Communication and Control Methods for Future Smartgrids Sep 22 2021 Proliferation of distributed generation and the increased ability to monitor different parts of the electrical grid offer unprecedented opportunities for consumers and grid operators. Energy can be generated near the consumption points, which decreases transmission burdens and novel control schemes can be utilized to operate the grid closer to its limits. In other words, the same infrastructure can be used at higher capacities thanks to increased efficiency. Also, new players are integrated into this grid such as smart meters with local control capabilities, electric vehicles that can act as mobile storage devices, and smart inverters that can provide auxiliary support. To achieve stable and safe operation, it is necessary to observe and coordinate all of these components in the smartgrid.

Power Distribution Networks with On-Chip Decoupling Capacitors Apr 29 2022 This book provides insight into the behavior and design of power distribution systems for high speed, high complexity integrated circuits. Also presented are criteria for estimating minimum required on-chip decoupling capacitance. Techniques and algorithms for computer-aided design of on-chip power distribution networks are also described; however, the emphasis is on developing circuit intuition and understanding the principles that govern the design and operation of power distribution systems.

Distributed Topology Inference of Distribution Networks Using the RBTS Jun 27 2019 Reliability of power system depends on the up to date knowledge of the system state for operation and control. Shifting from large conventional production units to small and/ or renewable DG connected in the distribution network means more control and monitoring system require for the Distributed System operator caused by active generation and reactive power consumption by DG. It is technically impossible to continuously model the distribution grid in real time because of tremendous number of nodes distribution and elements system. Therefore it is interesting to explore concepts in fast and scalable topology processors for monitoring and controlling applications such as state estimation, OPF and static and dynamic stability assessment in electrical distribution network the need is evident to validate with meshed network to analyze the overall performance of the proposed methodology Decentralized Topology Inference of Electrical Distribution Networks. The topology inference processor is require minimal prior knowledge of electrical network structure by taking a series of time-stamped process measurements from each bays of each substation

in the network and determine the topology.

Electricity Distribution Network Design Dec 14 2020 When the original edition was published in 1989, it was the first book for decades to be devoted to planning and design of distribution systems. It has now been fully revised, particularly in the light of market conditions exerting stronger pressure on the design engineer, the changing structure of utilities and the increasing penetration of computer-based planning and reliability. The book sets out good distribution practice and includes theoretical and practical aspects relevant to design. There is a paperback edition to satisfy demand from graduate students and engineers in training.

Joint RES and Distribution Network Expansion Planning Under a Demand Response Framework Sep 03 2022 Joint RES and Distribution Network Expansion Planning Under a Demand Response Framework explains the implementation of the algorithms needed for joint expansion planning of distributed generation and distribution network models, discussing how to expand the generation and distribution network by adding renewable generation, demand response, storage units, and new assets (lines and substations) so that the current and future energy supply in islands is served at a minimum cost, and with quality requirements. This book discusses the outcomes of the models discussed, including factors such as the location and size of new generation assets to be installed. It also introduces other issues relevant to the planning of insular distribution systems, including DR and hybrid storage. DR and ESS will play a much more significant role in future expansion planning models, where the present study stresses their relevance, including additional considerations to the planning model. Investigates the costs and benefits of deploying energy storage systems (ESS) and DR Explores distribution and generation expansion planning Analyzes and addresses power flow constraints and the impact of real time pricing mechanisms Details the RES integration challenge at length

Protection of Electricity Distribution Networks Apr 17 2021 High quality electrical service is everyday more stringent in utilities and industrial facilities around the world. One of the main players to achieve this is the protection system, which has to be reliable, fast and with a good cost/benefit ratio. Protection of generation and transmission systems are also treated in the text. References to modern topics such as the Distributed Generation, Smart Grid and Standard IEC 61850 have been introduced. Written by two well experienced engineers who combine a comprehensive theoretical background with examples and exercises, this book will allow the reader to easily follow the ideas explored. The book will be valuable to pre and postgraduate students, design, maintenance and consulting engineers as well as instructors looking for proper references.

Electric Distribution Systems Oct 24 2021 A comprehensive review of the theory and practice for designing, operating, and optimizing electric distribution systems, revised and updated Now in its second edition, Electric Distribution Systems has been revised and updated and continues to provide a two-tiered approach for designing, installing, and managing effective and efficient electric distribution systems. With an emphasis on both the practical and theoretical approaches, the text is a guide to the underlying theory and concepts and provides a resource for applying that knowledge to problem solving. The authors—noted experts in the field—explain the analytical tools and techniques essential for designing and operating electric distribution systems. In addition, the authors reinforce the theories and practical information presented with real-world examples as well as hundreds of clear illustrations and photos. This essential resource contains the information needed to design electric distribution systems that meet the requirements of specific loads, cities, and zones. The authors also show how to recognize and quickly respond to problems that may occur during system operations, as well as revealing how to improve the performance of electric distribution systems with effective system automation and monitoring. This updated edition: • Contains new information about recent developments in the field particularly in regard to renewable energy generation • Clarifies the perspective of various aspects relating to protection schemes and accompanying equipment • Includes illustrative descriptions of a variety of distributed energy sources and their integration with distribution systems • Explains the intermittent nature of renewable energy sources, various types of energy storage systems and the role they play to improve power quality, stability, and reliability Written for engineers in electric utilities, regulators, and consultants working with electric distribution systems planning and projects, the second edition of Electric Distribution Systems offers an updated text to both the theoretical underpinnings and practical applications of electrical distribution systems.

Electrical Distribution Networks Feb 13 2021 This book describes the fundamental aspects of the new generation of electrical distribution grids, taking as its starting point the opportunities that exist for restructuring existing infrastructure. It emphasizes the incorporation of renewable energy sources into the distribution grid and the need for a technological evolution towards the implementation of smartgrids. The book is organized into two parts: the first part analyzes the integration of distributed energy sources into the distribution grid and the impact of these sources on grid operation. After a general description of the general characteristics of distribution grids and renewable energy sources, it then analyzes the economics of electrical energy distribution networks and presents the impact of these sources on grid operation. The second part of the book then analyzes the various functions which allow for safe operation of the grid and realization of the path towards real world application of smartgrids.

Microgrids and Active Distribution Networks Aug 02 2022 Microgrids and Active Distribution Networks offer a potential solution for sustainable, energy-efficient power supply to cater for increasing load growth, supplying power to remote areas, generation of clean power and reduction in emission of greenhouse gases & particulates as per Kyoto protocol.

Electric Distribution Systems Oct 31 2019 This book provides a comprehensive treatment of electric distribution systems. Few books cover specific topics in more depth and there is hardly any book that deals with the key topics of interest to distribution system engineers. The book introduces these topics from two points of view: 1) The practical point of view by providing practical examples and the problems which can be solved. 2) The academic point of view where the analysis and various techniques used for distribution system planning are explained. The most outstanding feature of this book is a combination of practical and academic explanation of its contents. Another outstanding feature is a collection of the traditional and current topics of distribution systems condensed into one book. The reader will gain an understanding of distribution systems from both practical and academic aspects, will be able to outline and design a distribution system for specific loads, cities, zones, etc.. Readers will also be able to recognize the problems which may occur during the operation of distribution systems and be able to propose solutions for these problems.

Distributed Generation Feb 02 2020 The economics and locations of sustainable energy sources have meant that many of these new generators are connected into distribution networks. It is recognized that the information flow and control of distribution networks is inadequate for these future low-carbon electricity supply systems. The future distribution network will change its operation from passive to active, and the distributed generators will be controlled to support the operation of the power system. In many countries this transformation of electricity supply is managed through energy markets and privately owned, regulated transmission and distribution systems. --

The Manager's Guide to Distribution Channels Dec 02 2019 Understanding distribution -- Forces shaping channel strategy -- Supply chain management -- Legal issues and the reseller contract -- Clarifying requirements -- Channel design -- International channel design -- Selecting suitable channel partners -- Understanding the distributors world -- Establishing mutual performance expectations -- Improving channel effectiveness -- Monitoring performance and adjusting plans.

Advances in Energy Systems Aug 10 2020 A guide to a multi-disciplinary approach that includes perspectives from noted experts in the energy and utilities fields Advances in Energy Systems offers a stellar collection of articles selected from the acclaimed journal Wiley Interdisciplinary Review: Energy and Environment. The journal covers all aspects of energy policy, science and technology, environmental and climate change. The book covers a wide range of relevant issues related to the systemic changes for large-scale integration of renewable energy as part of the on-going energy transition. The book addresses smart energy systems technologies, flexibility measures, recent changes in the marketplace and current policies. With contributions from a list of internationally renowned experts, the book deals with the hot topic of systems integration for future energy systems and energy transition. This important resource: Contains contributions from noted experts in the field Covers a broad range of topics on the topic of renewable energy Explores the technical impacts of high shares of wind and solar power Offers a review of international smart-grid policies Includes information on wireless power transmission Presents an authoritative view of micro-grids Contains a wealth of other relevant topics Written forenergy planners, energy market professionals and technology developers, Advances in Energy Systems is an essential guide with contributions from an international panel of experts that addresses the most recent smart energy technologies.

Electricity Distribution Sep 30 2019 This book introduces readers to novel, efficient and user-friendly software tools for power systems studies, to issues related to distributed and dispersed power generation, and to the correlation between renewable power generation and electricity demand. Discussing new methodologies for addressing grid stability and control problems, it also examines issues concerning the safety and protection of transmission and distribution networks, energy storage and power quality, and the application of embedded systems to these networks. Lastly, the book sheds light on the implications of these new methodologies and developments for the economics of the power industry. As such, it offers readers a comprehensive overview of state-of-the-art

research on modern electricity transmission and distribution networks.

Active Electrical Distribution Network Jan 27 2022 ACTIVE ELECTRICAL DISTRIBUTION NETWORK Discover the major issues, solutions, techniques, and applications of active electrical distribution networks with this edited resource Active Electrical Distribution Network: A Smart Approach delivers a comprehensive and insightful guide dedicated to addressing the major issues affecting an often-overlooked sector of the electrical industry: electrical distribution. The book discusses in detail a variety of challenges facing the smart electrical distribution network and presents a detailed framework to address these challenges with renewable energy integration. The book offers readers fulsome analyses of active distribution networks for smart grids, as well as active control approached for distributed generation, electric vehicle technology, smart metering systems, smart monitoring devices, smart management systems, and various storage systems. It provides a treatment of the analysis, modeling, and implementation of active electrical distribution systems and an exploration of the ways professionals and researchers from academia and industry attempt to meet the significant challenges facing them. From smart home energy management systems to approaches for the reconfiguration of active distribution networks with renewable energy integration, readers will also enjoy: A thorough introduction to electrical distribution networks, including conventional and smart networks An exploration of various existing issues related to the electrical distribution network An examination of the importance of harmonics mitigation in smart distribution networks, including active filters A treatment of reactive power compensation under smart distribution networks, including techniques like capacitor banks and smart devices An analysis of smart distribution network reliability assessment and enhancement Perfect for professionals, scientists, technologists, developers, designers, and researchers in smart grid technologies, security, and information technology, Active Electrical Distribution Network: A Smart Approach will also earn a place in the libraries of policy and administration professionals, as well as those involved with electric utilities, electric policy development, and regulating authorities.

Integration of Distributed Generation in the Power System Oct 12 2020 The integration of new sources of energy like wind power, solar-power, small-scale generation, or combined heat and power in the power grid is something that impacts a lot of stakeholders: network companies (both distribution and transmission), the owners and operators of the DG units, other end-users of the power grid (including normal consumers like you and me) and not in the least policy makers and regulators. There is a lot of misunderstanding about the impact of DG on the power grid, with one side (including mainly some but certainly not all, network companies) claiming that the lights will go out soon, whereas the other side (including some DG operators and large parks of the general public) claiming that there is nothing to worry about and that it's all a conspiracy of the large production companies that want to protect their own interests and keep the electricity price high. The authors are of the strong opinion that this is NOT the way one should approach such an important subject as the integration of new, more environmentally friendly, sources of energy in the power grid. With this book the authors aim to bring some clarity to the debate allowing all stakeholders together to move to a solution. This book will introduce systematic and transparent methods for quantifying the impact of DG on the power grid.

High Performance Computing in Power and Energy Systems Jan 15 2021 The twin challenge of meeting global energy demands in the face of growing economies and populations and restricting greenhouse gas emissions is one of the most daunting ones that humanity has ever faced. Smart electrical generation and distribution infrastructure will play a crucial role in meeting these challenges. We would need to develop capabilities to handle large volumes of data generated by the power system components like PMUs, DFRs and other data acquisition devices as well as by the capacity to process these data at high resolution via multi-scale and multi-period simulations, cascading and security analysis, interaction between hybrid systems (electric, transport, gas, oil, coal, etc.) and so on, to get meaningful information in real time to ensure a secure, reliable and stable power system grid. Advanced research on development and implementation of market-ready leading-edge high-speed enabling technologies and algorithms for solving real-time, dynamic, resource-critical problems will be required for dynamic security analysis targeted towards successful implementation of Smart Grid initiatives. This books aims to bring together some of the latest research developments as well as thoughts on the future research directions of the high performance computing applications in electric power systems planning, operations, security, markets, and grid integration of alternate sources of energy, etc.

Embedded Generation Nov 12 2020 Demand for on-site and alternative power generation is growing, fueled by government and public pressure to increase generation from renewable sources and energy efficient plant, and by the potential economic benefits resulting from privatization and deregulation of the supply sector. This book is a practical, course-derived guide that covers all aspects of embedded (or dispersed) generation, from prime mover characteristics to network reliability modelling. Topics include power quality, protection, reliability and economics. It is essential reading for practicing engineers responsible for planning, designing or specifying embedded generation solutions.

Live-Line Operation and Maintenance of Power Distribution Networks May 19 2021 Excellent reference outlining the technical basis and working principles of live-line working, with current application technology, tools and working methods Introduces live-line working technology for the operation and maintenance of medium and low voltage power distribution networks, covering both the methods and techniques of live-line working on distribution networks with O&M field practices and experiences Elaborates the technical basis and working principles of live-line working in detail, with current application technology, tools and working methods Combining theory and practice closely, it provides technical guidance and helpful references to technical personnel who are engaged in distribution operation management, as well as related academics and researchers Written by a team of authors with extensive experience in both industry and academic fields, providing first-hand testimony of the issues facing electricity distribution companies, and offering sound theoretical foundations and rich field experiences

Electrical Distribution Networks Oct 04 2022 This book describes the fundamental aspects of the new generation of electrical distribution grids, taking as its starting point the opportunities that exist for restructuring existing infrastructure. It emphasizes the incorporation of renewable energy sources into the distribution grid and the need for a technological evolution towards the implementation of smart grids. The book is organized into two parts: the first part analyzes the integration of distributed energy sources into the distribution grid and the impact of these sources on grid operation. After a general description of the general characteristics of distribution grids and renewable energy sources, it then analyzes the economic aspects of electrical energy distribution networks and presents the impact of these sources on grid operation. The second part of the book then analyzes the various functions which allow for safe operation of the grid and realization of the path towards real world application of smart grids.

TSO-DSO Interactions and Ancillary Services in Electricity Transmission and Distribution Networks Feb 25 2022 This book presents new and practical solutions to solve the coordination problem faced due to the increasing integration of renewable energy sources into existing electricity transmission networks it addresses how the subsequent technological revolution is not only affecting the structure of the electricity markets, but also the interactions between transmission system operators (TSO) and distribution system operators (DSO). A must-have for smart grid analysis, this book presents models and scenario buildups of complex systems and incorporates the experience of three technological pilots that are analyzing special issues connected to network monitoring and control, and participation to a would-be ancillary services market from special subjects. The reader will benefit from the experience drawn from SmartNet, a major research project encompassing 22 partners from nine EU countries and including input gathered from a significant number of industrial partners.

Smart Grids Aug 22 2021 On a worldwide basis, the development of Smart Grids is a consistent answer to the problem of an efficient and sustainable delivery of electric energy through distribution grids. Smart Grids are a combination of information and communication technologies and new energy technologies. There are many different definitions of the concept of Smart Grids and thus it appears indispensable to gather the knowledge available from both industry and research laboratories in one book. Distributed generation is rightly receiving an increased amount of attention and will become an integral part of urban energy systems, providing consumers and energy providers with safe, affordable, clean, reliable, flexible and readily-accessible energy services. The aim of this book is to describe future electricity networks that will enable all energy services to become sustainable. The traditional design of network control systems with a centralized structure is not in-line with the paradigm of the unbundled electricity system and decentralized control; this is highlighted by looking at how future active networks will efficiently link small- and medium-scale power sources with consumer demands, allowing decisions to be made on how best to operate in real time. It also looks at the level of control required: power flow assessment, voltage control and protection require cost-competitive technologies and new communication systems with more sensors and actuators than presently used, certainly in relation to the distribution systems. To manage active networks, a vision of grid computing is created that assures universal access to computing resources. An intelligent grid infrastructure gives more flexibility concerning demand and supply, providing new instruments for optimal and cost-effective grid operation at the same time.

Intelligent Renewable Energy Systems Jul 21 2021 INTELLIGENT RENEWABLE ENERGY SYSTEMS This collection of papers on artificial intelligence and other methods for improving renewable energy systems, written by industry experts, is a reflection of the state of the art, a must-have for engineers, maintenance personnel, students, and anyone else wanting to stay abreast with current energy systems concepts and technology. Renewable energy is one of the most important subjects being studied, researched, and advanced in today's world. From a macro level, like the stabilization of the entire world's economy,

to the micro level, like how you are going to heat or cool your home tonight, energy, specifically renewable energy, is on the forefront of the discussion. This book illustrates modelling, simulation, design and control of renewable energy systems employed with recent artificial intelligence (AI) and optimization techniques for performance enhancement. Current renewable energy sources have less power conversion efficiency because of its intermittent and fluctuating behavior. Therefore, in this regard, the recent AI and optimization techniques are able to deal with data ambiguity, noise, imprecision, and nonlinear behavior of renewable energy sources more efficiently compared to classical soft computing techniques. This book provides an extensive analysis of recent state of the art AI and optimization techniques applied to green energy systems. Subsequently, researchers, industry persons, undergraduate and graduate students involved in green energy will greatly benefit from this comprehensive volume, a must-have for any library. Audience Engineers, scientists, managers, researchers, students, and other professionals working in the field of renewable energy.

Handbook of Research on New Solutions and Technologies in Electrical Distribution Networks Jul 01 2022 As the electrical industry continues to develop, one sector that still faces a range of concerns is the electrical distribution system. Excessive industrialization and inadequate billing are just a few issues that have plagued this electrical sector as it advances into the smart grid environment. Research is necessary to explore the possible solutions in fixing these problems and developing the distribution sector into an active and smart system. The Handbook of Research on New Solutions and Technologies in Electrical Distribution Networks is a collection of innovative research on the methods and applications of solving major issues within the electrical distribution system. Some issues covered within the publication include distribution losses, improper monitoring of system, renewable energy integration with micro-grid and distributed energy sources, and smart home energy management system modelling. This book is ideally designed for power engineers, electrical engineers, energy professionals, developers, technologists, policymakers, researchers, academicians, industry professionals, and students seeking current research on improving this key sector of the electrical industry.

Water Loss Assessment in Distribution Networks Jan 03 2020 Water utilities worldwide lose 128 billion cubic meters annually, causing annual monetary losses estimated at USD 40 billion. Most of these losses occur in developing countries (74%). This calls for rethinking the challenges facing water utilities in developing countries, foremost of which is the assessment of water losses in intermittent supply networks. Water loss assessment methods were originally developed in continuous supply systems, and their application in intermittently operated networks (in developing countries) is hindered by the widespread use of household water tanks and unauthorised consumption. This study provides an extensive review of existing methods and (software) tools for water loss assessment. In addition, several new methods were developed, which offer improved water loss assessment in intermittent supply. As the volume of water loss varies monthly and annually according to the amount of supplied water, this study proposes procedures to normalise the volume of water loss in order to enable water utilities to monitor and benchmark their performance on water loss management. The study also developed a novel method of estimating apparent losses using routine data of WWTP inflows, enabling future real-time monitoring of losses in networks. Different methods have also been suggested to estimate the unauthorised consumption in networks. This study found that minimum night flow analysis can still be applied in intermittent supply if an area of the network is supplied for several days. Furthermore, this study concluded that water meter performance is enhanced in intermittent supply conditions. However, continuous supply in the presence of float-valves significantly reduces the accuracy of water meters. Finally, this study provides guidance and highlights several knowledge gaps in order to improve the accuracy of water loss assessment in intermittent supply. Accurate assessment of water loss is a prerequisite for reliable leakage modelling and minimisation as well as planning for, and monitoring of water loss management in distribution networks.

Smart Power Distribution Systems Dec 26 2021 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

Electric Distribution Network Management and Control Mar 29 2022 This book highlights the recent research advances in the area of operation, management and control of electricity distribution networks. It addresses various aspects of distribution network management, including operation, customer engagement and technology accommodation. Electricity distribution networks are an important part of the power delivery system, and the smart control and management of distribution networks is vital in order to satisfy technical, economic, and customer requirements. A new management philosophy, techniques, and methods are essential to handle uncertainties, security, and stability associated with the integration of renewable-based distributed generation units, demand forecast and customer needs. This book discusses these topics in the context of managing the capacity of distribution networks while addressing the future needs of electricity systems. Furthermore, the efficient and economic operation of distribution networks is an essential part of management of system for effective use of resources, and as such the also addresses operation and control approaches and techniques suitable for future distribution networks.

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