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## YU SIENA

*Artificial Intelligence in Power System Optimization* Springer-Verlag

Practical Power Plant Engineering offers engineers, new to the profession, a guide to the methods of practical design, equipment selection and operation of power and heavy industrial plants as practiced by experienced engineers. The author—a noted expert on the topic—draws on decades of practical experience working in a number of industries with ever-changing technologies. This comprehensive book, written in 26 chapters, covers the electrical activities from plant design, development to commissioning. It is filled with descriptive examples, brief equipment data sheets, relay protection, engineering calculations, illustrations, and common-sense engineering approaches. The book explores the most relevant topics and reviews the industry standards and established engineering practices. For example, the author leads the reader through the application of MV switchgear, MV controllers, MCCs and distribution lines in building plant power distribution systems, including calculations of interrupting duty for breakers and contactors. The text also contains useful information on the various types of concentrated and photovoltaic solar plants as well as wind farms with DFIG turbines. This important book: • Explains why and how to select the proper ratings for electrical equipment for specific applications • Includes information on the critical requirements for designing power systems to meet the performance requirements • Presents tests of the electrical equipment that prove it is built to the required standards and will meet plant-specific operating requirements Written for both professional engineers early in their career and experienced engineers, Practical Power Plant Engineering is a must-have resource that offers the information needed to apply the concepts of power plant engineering in the real world.

*Power System Economic and Market Operations* Springer Science & Business Media

A mathematically rigorous guide to convex optimization for power systems engineering.

*Electrical Energy Conversion and Transport* John Wiley & Sons

The Enron scandal notwithstanding, it is important for professionals in the electric power industry and related positions gain a solid understanding of electric power systems and how they work. Written by two veteran power company managers and respected experts, this is a real-world view of electric power systems, how they operate, how the organizations are structured, and how electricity is regulated and priced. A comprehensive overview of the electric power industry from the inside Covers electric power system components, electricity consumption, generation, transmission, distribution, electric utility operation, electric system control, power system reliability, government regulation, utility rate making, and financial considerations. Includes an extensive glossary of key terms used in the U.S. and also definitions for terms used worldwide

*Electricity Power Generation* John Wiley & Sons

As the demand for energy continues to grow, optimization has risen to the forefront of power engineering research and development. Continuing in the bestselling tradition of the first edition, *Electric Power System Applications of Optimization, Second Edition* presents the theoretical background of optimization from a practical power system point of view, exploring advanced techniques, new directions, and continuous application problems. The book provides both the analytical formulation of optimization and various algorithmic issues that arise in the application of various methods in power system planning and operation. The second edition adds new functions involving market programs, pricing, reliability, and advances in intelligent systems with implemented algorithms and illustrative examples. It describes recent developments in the field of Adaptive Critics Design and practical applications of approximate dynamic programming. To round out the coverage, the final chapter combines fundamental theories and theorems from functional optimization, optimal control, and dynamic programming to explain new Adaptive Dynamic Programming concepts and variants. With its one-of-a-kind integration of cornerstone optimization principles with application examples, this second edition propels power engineers to new discoveries in providing optimal supplies of energy.

*Electric Power Systems* IGI Global

Grid Integration and Dynamic Impact of Wind Energy details the integration of wind energy resources to the electric grid worldwide. Authors Vijay Vittal and Raja Ayyanar include detailed coverage of the power converters and control used in interfacing electric machines and power converters used in wind generators, and extensive descriptions of power systems operation and control to accommodate large penetration of wind resources. Key concepts will be illustrated through extensive power electronics and power systems simulations using software like MATLAB, Simulink and PLECS. The book addresses real world problems and solutions in the area of grid integration of wind resources, and will be a valuable resource for engineers and researchers working in renewable energy and power.

*Electric Generators Handbook - Two Volume Set* CRC Press

Classic power system dynamics text now with phasor measurement and simulation toolbox This new edition addresses the needs of dynamic modeling and simulation relevant to power system planning, design, and operation, including a systematic derivation of synchronous machine dynamic models together with speed and voltage control subsystems. Reduced-order modeling based on integral manifolds is used as a firm basis for understanding the derivations and limitations of lower-order dynamic models. Following these developments, multi-machine model interconnected through the transmission network is formulated and simulated using numerical simulation methods. Energy function methods are discussed for direct evaluation of stability. Small-signal analysis is used for determining the electromechanical modes and mode-shapes, and for power system stabilizer design. Time-synchronized high-sampling-rate phasor measurement units (PMUs) to monitor power system disturbances have been implemented throughout North America and many other countries. In this second edition, new chapters on synchrophasor measurement and using the Power System Toolbox for dynamic simulation have been added. These new materials will reinforce power system dynamic aspects treated more analytically in the earlier chapters. Key features: Systematic derivation of synchronous machine dynamic models and simplification. Energy function methods with an emphasis on the potential energy boundary surface and the controlling unstable equilibrium point approaches. Phasor computation and synchrophasor data applications. Book companion website for instructors featuring solutions and PowerPoint files. Website for students featuring MATLABM files. Power System Dynamics and Stability, 2nd Edition, with Synchrophasor Measurement and Power System Toolbox combines theoretical as well as practical information for use as a text for formal instruction or for reference by working engineers.

*Computational Methods for Large Sparse Power Systems Analysis* CRC Press

This book discusses the major aspects of load flow, optimization, optimal load flow, and culminates in modern heuristic optimization techniques and evolutionary programming. In the deregulated environment, the economic provision of electrical power to consumers requires knowledge of maintaining a certain power quality and load flow. Many case studies and practical examples are included to emphasize real-world applications. The problems at the end of each chapter can be solved by hand calculations without having to use computer software. The appendices are devoted to calculations of line and cable constants, and solutions to the problems are included throughout the book.

*Electrical Power Systems* John Wiley & Sons

This book offers comprehensive coverage of the operation and maintenance of large hydro generators This book is a practical handbook for engineers and maintenance staff responsible for the upkeep of large salient-pole hydro generators used in electric power plants. Focusing on the physics and maintenance of large vertical salient pole generators, it offers readers real-world experience, problem description, and solutions, while teaching them about the design, modernization, inspections, maintenance, and operation of salient pole machines. Handbook of Large Hydro Generators: Operation and Maintenance provides an introduction to the principles of operation of synchronous machines. It then covers design and construction, auxiliary systems, operation and control, and monitoring and diagnostics of generators. Generator protection, inspection practices and methodology and auxiliaries inspections are also examined. The final two chapters are dedicated to maintenance and testing, and maintenance philosophies, upgrades, and uprates. The handbook includes over 420 color photos and 180 illustrations, forms, and tables to complement the topics covered in the chapters. Written with a machine operator and inspector in mind, Handbook of Large Hydro Generators: Operation and Maintenance: Instructs readers how to perform complete machine inspections, understand what they are doing, and find solutions for any problems encountered Includes real-life, practical, field experiences so that readers can familiarize themselves with aspects of machine operation, maintenance, and solutions to common problems Benefits experienced and new power plant operators, generator design engineers and operations engineers. Is authored by industry experts who participated in the writing and maintenance of IEEE standards (IEEE C50.12 and C50.13) on the subject Handbook of Large Hydro Generators: Operation and Maintenance is an ideal resource for scientists and engineers whose research interest is in electromagnetic and energy conversion. It is also an excellent book for senior undergraduate and graduate students majoring in energy generation, and generator operation and maintenance.

*Operation and Maintenance of Large Turbo-Generators* John Wiley & Sons

This book gathers selected papers presented at International Conference on Machine Learning, Advances in Computing, Renewable Energy and Communication (MARC 2020), held in Krishna Engineering College, Ghaziabad, India, during December 17-18, 2020. This book discusses key concepts, challenges, and potential solutions in connection with established and emerging topics in advanced computing, renewable energy, and network communications.

*Electric Power System Applications of Optimization* John Wiley & Sons

The comprehensive guide for the operation and maintenance of large turbo-generators Operation and Maintenance of Large Turbo-Generators is the ultimate resource for operators and inspectors of large utility and industrial generating facilities who deal with multiple units of disparate size, origin, and vintage. It offers the complete scope of information regarding operation and maintenance of all types of turbine-driven generators built in the world. Based on the authors' combined sixty years of generating station and design work experience, the information presented in the book is designed to inform the reader about actual machine operational problems and failure modes that occur in generating stations and other types of facilities. Readers will find very detailed coverage of: Design and construction of generators and auxiliary systems Generator operation, including interaction with the grid Monitoring, diagnostics, and protection of turbo-generators Inspection practices, including stator, rotor, and auxiliary systems Ideas for improving plant reliability and reducing costs and electrical failures Maintenance testing, including electrical and nondestructive examination Operation and Maintenance of Large Turbo-Generators comes filled with photos and graphs, commonly used inspection forms, and extensive references for each topic. It is an indispensable resource for anyone involved in the design, construction, protection, operation, maintenance, and troubleshooting of large generators in generating stations and industrial power facilities. The book is also an excellent learning tool for students, consultants, and design engineers.

*Power System Restoration* John Wiley & Sons

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

*Understanding Electric Power Systems* MDPI

Fundamental to the planning, design, and operating stages of any electrical engineering endeavor, power system analysis continues to be shaped by dramatic advances and improvements that reflect today's changing energy needs. Highlighting the latest directions in the field, Power System Analysis: Short-Circuit Load Flow and Harmonics, Second Edition includes investigations into arc flash hazard analysis and its migration in electrical systems, as well as wind power generation and its integration into utility systems. Designed to illustrate the practical application of power system analysis to real-world problems, this book provides detailed descriptions and models of major electrical equipment, such as transformers, generators, motors, transmission lines, and power

cables. With 22 chapters and 7 appendices that feature new figures and mathematical equations, coverage includes: Short-circuit analyses, symmetrical components, unsymmetrical faults, and matrix methods Rating structures of breakers Current interruption in AC circuits, and short-circuiting of rotating machines Calculations according to the new IEC and ANSI/IEEE standards and methodologies Load flow, transmission lines and cables, and reactive power flow and control Techniques of optimization, FACT controllers, three-phase load flow, and optimal power flow A step-by-step guide to harmonic generation and related analyses, effects, limits, and mitigation, as well as new converter topologies and practical harmonic passive filter designs—with examples More than 2000 equations and figures, as well as solved examples, cases studies, problems, and references Maintaining the structure, organization, and simplified language of the first edition, longtime power system engineer J.C. Das seamlessly melds coverage of theory and practical applications to explore the most commonly required short-circuit, load-flow, and harmonic analyses. This book requires only a beginning knowledge of the per-unit system, electrical circuits and machinery, and matrices, and it offers significant updates and additional information, enhancing technical content and presentation of subject matter. As an instructional tool for computer simulation, it uses numerous examples and problems to present new insights while making readers comfortable with procedure and methodology.

**Protection & Control Systems of Solar Power Plants: (Small, Medium & Large)** John Wiley & Sons Computational methods in Power Systems require significant inputs from diverse disciplines, such as data base structures, numerical analysis etc. Strategic decisions in sparsity exploitation and algorithm design influence large-scale simulation and high-speed computations. Selection of programming paradigm shapes the design, its modularity and reusability. This has a far reaching effect on software maintenance. Computational Methods for Large Sparse Power Systems Analysis: An Object Oriented Approach provides a unified object oriented (OO) treatment for power system analysis. Sparsity exploitation techniques in OO paradigm are emphasized to facilitate large scale and fast computing. Specific applications like large-scale load flow, short circuit analysis, state estimation and optimal power flow are discussed within this framework. A chapter on modeling and computational issues in power system dynamics is also included. Motivational examples and illustrations are included throughout the book. A library of C++ classes provided along with this book has classes for transmission lines, transformers, substation etc. A CD-ROM with C++ programs is also included. It contains load flow, short circuit analysis and network topology processor applications. Power system data is provided and systems up to 150 buses can be studied. Other Special Features: This book is the first of its kind, covering power system applications designed with an OO perspective. Chapters on object orientation for modeling of power system computations, data structure, large sparse linear system solver, sparse QR decomposition in an OO framework are special features of this book.

**Load Flow Optimization and Optimal Power Flow** PHI Learning Pvt. Ltd.

This book covers the design, analysis, and optimization of the cleanest, most efficient fossil fuel-fired electric power generation technology at present and in the foreseeable future. The book contains a wealth of first principles-based calculation methods comprising key formulae, charts, rules of thumb, and other tools developed by the author over the course of 25+ years spent in the power generation industry. It is focused exclusively on actual power plant systems and actual field and/or rating data providing a comprehensive picture of the gas turbine combined cycle technology from performance and cost perspectives. Material presented in this book is applicable for research and development studies in academia and government/industry laboratories, as well as practical, day-to-day problems encountered in the industry (including OEMs, consulting engineers and plant operators).

**Energy Production Systems Engineering** John Wiley & Sons

A reliable and secure protection and control system is a paramount requirement for any electrical network. This book discusses protection and control schemes of various parts of Solar Power Plants (SPP) namely solar generator, inverter, and SPP network connected to the grid. For this purpose small, medium, and large size of solar power energy sources have been considered. This includes residential, commercial buildings and large power plants. There are significant literature about solar energy, modeling and different aspects of integration of SPP to grids. But there is no book to address directly the setting/design of protection and control schemes, testing techniques and fault findings of solar generators and its networks. The topology and characteristics of solar generators and their networks are different from conventional ones. This has caused the following issues: - Conventional protection & control scheme may fail to detect different type of faults which may occur on solar cells/panels/arrays, DC cables, and inverters. This necessitated the requirement of special schemes for the detection of faults in blind spots, - Fault findings required tests, and testing equipment for solar generators are different from conventional ones, - The fault current contribution from solar generators is low (1.1-1.2 pu) as compared to conventional ones. The above problems have caused significant challenges for appropriate setting and design of protection & control scheme of SPP network which in some cases have resulted to several major plants shut down, safety risks and fire incidents. This book discusses the above challenges and proposes mitigation techniques to rectify the deficiencies of existing industry practices for the protection and control systems of solar generators. Most of the content of this book has been observed or successfully applied in the field for various SPPs projects worldwide and consequently can be used or considered as a practical guideline for future projects. Main Objectives of the Book The main objectives of the book are: - To familiarize engineers, technical officers, testers, and project managers with required power system protection and control schemes of solar power plants (SPP). - To provide a guideline for preparation of standards, technical specification, business case, functional scope, test, and commissioning plan as applicable to the installation of new SPP; - To provide adequate information to electricity companies, consultants, contractors, relay manufacturers, and SPP owners about the requirement of protection and control systems of SPP. Acknowledgment The author wishes to acknowledge that the contents of this book are based on utilizing the following resources: 1) Extensive research of the author for design, specifications, and commissioning of SPPs 2) Experiences of other individuals, electricity companies, and consultants Disclaimer The author is not responsible for the accuracy, completeness, up-to-dateness, or quality of the information provided. The author is therefore not liable for any claims regarding damage caused by the use of any information provided. The information in the book should only be used as a guideline and may not be suitable for a specific case. Copyright The material made available is intended for the customer's personal use only. Author reserves all rights to the book. Therefore the book can not be reproduced or replicated or processed or distributed without the author's written permission.

**Practical Power Plant Engineering** Dr. Maty Ghezelayagh

This text, intended for the students pursuing postgraduate programmes in Electrical Engineering, focuses special attention on the implications of reactive power in voltage stability of transmission systems. The basic concepts of power system stability and other operational aspects have been discussed. Both the advanced and the practical aspects have been highlighted. Modern concepts and applications, theoretical as well as simulated study, have been presented wherever necessary. In brief, the text presents a complete overview of the research and engineering aspects of the problem of stability, suitable both for academics and practising engineers, along with a brief historical review of the concerned topics. In some instances the authors have included some of their own research results while maintaining the uniformity of overall treatment of the book. The text is replete with examples and is backed up by analytical derivations and physical interpretations, wherever considered necessary.

**Power System Analysis: Operation And Control 3Rd Ed.** CRC Press

**ELECTRICAL EQUIPMENT A FIELD GUIDE** A comprehensive guide for all the electrical equipment in plants to understand their basic theories, relevant standards, operation and maintenance, challenges, and scope for future research. This valuable new volume is a must-have for any engineer. Covering almost all electrical equipment, such as generators, motors, transformers, cables, batteries, meters, relays, fuses, lamps, lightning arresters, circuit breakers, and so much more, it covers not only the basic theory, but also mathematical equations, selection guidelines, installation, commissioning, operation and maintenance, and many other practical applications. Equally as importantly, also covered here are all the applicable international standards, such as IEC and IEEE. This book is written in a simple language for easy understanding by field engineers. The rating plate of all the equipment is described in detail. The relevant details of the equipment have been taken from the reputed manufacturers' brochures and their operation manuals. This book serves as a guide for researchers to know the gaps in existing technologies and gives direction for future research. Academics can refer to this book to understand the field requirements and to prepare their curriculum accordingly. This groundbreaking new volume presents these topics and trends, bridging the research gap, and enables wide-scale implementation of efficient and effective operations. Whether for the veteran engineer or the student, this is a must-have for any library. This outstanding new volume: Is a comprehensive, "one stop shop" guidebook for electrical engineers Covers all the electrical machines, switchgear, meters and relays, cables, batteries, and many other types of equipment found on the shop or plant floor Includes all the applicable international standards such as IEEE, IEC, NEMA, NFPA, and others Lists out the gaps in the existing technology and opportunities for future research Audience Electrical engineers, technicians, and other designers, engineers, and scientists who work with electrical equipment.

**Protective Relaying for Power Generation Systems** Cambridge University Press

Der Konferenzband gibt die Beiträge der Tagung von 2016 mit dem Schwerpunkt Netzintegration von erneuerbaren Energie wieder. Alle Beiträge enthalten eine englische und deutsche Zusammenfassung.

**Gas Turbine Combined Cycle Power Plants** Springer

An authoritative guide to the most up-to-date information on power system dynamics The revised third edition of Power System Dynamics and Stability contains a comprehensive, state-of-the-art review of information on the topic. The third edition continues the successful approach of the first and second editions by progressing from simplicity to complexity. It places the emphasis first on understanding the underlying physical principles before proceeding to more complex models and algorithms. The book is illustrated by a large number of diagrams and examples. The third edition of Power System Dynamics and Stability explores the influence of wind farms and virtual power plants, power plants inertia and control strategy on power system stability. The authors—noted experts on the topic—cover a range of new and expanded topics including: Wide-area monitoring and control systems. Improvement of power system stability by optimization of control systems parameters. Impact of renewable energy sources on power system dynamics. The role of power system stability in planning of power system operation and transmission network expansion. Real regulators of synchronous generators and field tests. Selectivity of power system protections at power swings in power system. Criteria for switching operations in transmission networks. Influence of automatic control of a tap changing step-up transformer on the power capability area of the generating unit. Mathematical models of power system components such as HVDC links, wind and photovoltaic power plants. Data of sample (benchmark) test systems. Power System Dynamics: Stability and Control, Third Edition is an essential resource for students of electrical engineering and for practicing engineers and researchers who need the most current information available on the topic.

**Grid Integration and Dynamic Impact of Wind Energy** CRC Press

Analysis of Synchronous Machines, Second Edition is a thoroughly modern treatment of an old subject. Courses generally teach about synchronous machines by introducing the steady-state per phase equivalent circuit without a clear, thorough presentation of the source of this circuit representation, which is a crucial aspect. Taking a different approach, this book provides a deeper understanding of complex electromechanical drives. Focusing on the terminal rather than on the internal characteristics of machines, the book begins with the general concept of winding functions, describing the placement of any practical winding in the slots of the machine. This representation enables readers to clearly understand the calculation of all relevant self- and mutual inductances of the machine. It also helps them to more easily conceptualize the machine in a rotating system of coordinates, at which point they can clearly understand the origin of this important representation of the machine. Provides numerical examples Addresses Park's equations starting from winding functions Describes operation of a synchronous machine as an LCI motor drive Presents synchronous machine transient simulation, as well as voltage regulation Applying his experience from more than 30 years of teaching the subject at the University of Wisconsin, author T.A. Lipo presents the solution of the circuit both in classical form using phasor representation and also by introducing an approach that applies MathCAD®, which greatly simplifies and expands the average student's problem-solving capability. The remainder of the text describes how to deal with various types of transients—such as constant speed transients—as well as unbalanced operation and faults and small signal modeling for transient stability and dynamic stability. Finally, the author addresses large signal modeling using MATLAB®/Simulink®, for complete solution of the non-linear equations of the salient pole synchronous machine. A valuable tool for learning, this updated edition offers thoroughly revised content, adding new detail and better-quality figures.