

Understanding FACTS. Concepts and Technology of Flexible AC Transmission Systems

Description:

Electrical Engineering Understanding FACTS: Concepts and Technology of Flexible AC Transmission Systems The Flexible AC Transmission System (FACTS) a new technology based on power electronics, offers an opportunity to enhance controllability, stability, and power transfer capability of ac transmission systems. Pioneers in FACTS and leading world experts in power electronics applications, Narain G. Hingorani and Laszlo Gyugyi, have teamed together to bring you the definitive book on FACTS technology. Drs. Hingorani and Gyugyi present a practical approach to FACTS that will enable electrical engineers working in the power industry to understand the principles underlying this advanced system. Understanding FACTS will enhance your expertise in equipment specifications and engineering design, and will offer you an informed view of the future of power electronics in ac transmission systems. This comprehensive reference book provides in-depth discussions on:

- Power semiconductor devices
- Voltage-sourced and current-sourced converters
- Specific FACTS Controllers, including SVC, STATCOM, TCSC, SSSC, UPFC, IPFC plus voltage regulators, phase shifters, and special Controllers with a detailed comparison of their performance attributes
- Major FACTS applications in the U.S.

Understanding FACTS is an authoritative resource that is essential reading for electrical engineers who want to stay on the cusp of the power electronics revolution.

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Understanding Facts Concepts And Technology Of Flexible Ac Transmission Systems

Xiao-Ping Zhang



Understanding Facts Concepts And Technology Of Flexible Ac Transmission Systems:

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Flexible AC Transmission Systems (FACTS) Suman Bhowmick, 2018-09-03 Flexible AC Transmission Systems FACTS Newton Power Flow Modeling of Voltage Sourced Converter Based Controllers introduces different voltage sourced converter VSC based FACTS controllers and VSC based high voltage direct current VSC HVDC systems and their working principles explaining how FACTS controllers exchange real and reactive power with systems Subsequently the book Describes the Newton Raphson method and its application for solving the power flow problem Presents the Newton power flow modeling of the static synchronous series compensator SSSC unified power flow controller UPFC interline power flow controller IPFC generalized unified power flow controller GUPFC and static synchronous compensator STATCOM accommodating the practical device constraint limits because of the unique modeling strategy the existing Newton power flow codes can be reused Develops a unified Newton power flow model of AC systems incorporating multiterminal VSC HVDC systems with pulse width modulation PWM control schemes directly yielding the VSC modulation indices from the power flow solution Provides numerous case studies for validation of Newton power flow models elaborating on the occurrences and checking of unrealistic power flow solutions in isolated cases Includes detailed derivations of all the difficult formulae as well as solved problems on typical VSC based FACTS controllers Flexible AC Transmission Systems FACTS Newton Power Flow Modeling of Voltage Sourced Converter Based Controllers assumes at least an undergraduate level understanding of engineering mathematics network analysis electrical machines electrical power systems and power electronics Thus the book provides a valuable reference for practitioners as well as senior undergraduate and graduate students in electrical engineering and electrical power systems

Application of Flexible AC Transmission System Devices in Wind Energy Conversion Systems Ahmed Abu-Siada, Farhad Shahnia, A. M. Shiddiq Yunus, 2017-09-28 This book presents information about the application of various flexible AC transmission system devices to wind energy conversion systems Devices such as unified power flow controllers superconducting magnetic energy storage and static

synchronous compensators are covered in this book Chapters detail features of the topology and basic control systems of each device Additionally case studies are presented where necessary to demonstrate practical applications This book is a reference for students and technicians studying wind power and AC transmission systems in advanced engineering courses

Understanding Electromagnetic Transients in Power Systems Luiz Cera Zanetta, Jr., 2025-03-26 Understand transients and their roles in linear systems with this essential guide Electromagnetic transients are a fundamental aspect of linear power systems and therefore a key knowledge area for electrical engineers Understanding Electromagnetic Transients in Power Systems provides a comprehensive but accessible overview to transients their underlying theory and mathematics and their impact in electrical power system design Its detailed but clear presentation makes it a must own for students and working engineers alike Readers of Understanding Electromagnetic Transients in Power Systems will also find Deep consideration of the relationship between foundational concepts mathematical calculations and impacts on equipment Detailed discussion of topics including time and frequency domain analysis basic transforms fundamentals of electrical circuit transients and traveling waves overvoltage insulation coordination and many more Dozens of solved simple examples to facilitate understanding Understanding Electromagnetic Transients in Power Systems is ideal for electrical engineers and professionals in utilities and equipment manufacturing as well as for graduate and advanced undergraduate students learning about transients electrical circuits and related subjects

Flexible AC Transmission Systems: Modelling and Control Xiao-Ping Zhang, Christian Rehtanz, Bikash Pal, 2006-03-28 This monograph presents advanced modelling analysis and control techniques of FACTS These topics reflect the recent research and development of FACTS controllers and anticipate the future applications of FACTS in power systems The book covers comprehensively a range of power system control problems from steady state voltage and power flow control to voltage and reactive power control to voltage stability control to small signal stability control using FACTS controllers The book presents the modelling of the latest FACTS controllers for power flow control compensation and power quality IPFC GUPF VSC HVDC and M VSCHVDC etc in power system analysis The selection is evaluated by the actual and likely future practical relevance of each The material is derived mainly from the research and industrial development in which the authors have been heavily involved The book is timely and of great value to power engineering engineers and students of modelling simulations and control design of FACTS for a broad practical range of power system operation planning and control problems

Electrical Generation and Distribution Systems and Power Quality Disturbances Gregorio Romero, Luisa Martinez, 2011-11-21 The utilization of renewable energy sources such as wind energy or solar energy among others is currently of greater interest Nevertheless since their availability is arbitrary and unstable this can lead to frequency variation to grid instability and to a total or partial loss of load power supply being not appropriate sources to be directly connected to the main utility grid Additionally the presence of a static converter as output interface of the generating plants introduces voltage and current harmonics into the electrical system that negatively affect

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