



Flexible AC Transmission Systems (FACTS): Newton Power-Flow Modeling of Voltage-Sourced Converter-Based Controllers

By Suman Bhowmick

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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.

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Editorial Review

About the Author

Suman Bhowmick, PhD, is an associate professor of electrical engineering in the Department of Electrical Engineering at Delhi Technological University (formerly Delhi College of Engineering), India. He has more than 23 years of experience in both industry and academia. He is also a member of the Institute of Electrical and Electronics Engineers (IEEE). His research interests include flexible AC transmission systems, voltage-sourced converter (VSC)-based high-voltage direct current (HVDC) systems, and their control.

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