An essential guide to the stability and control of power systems integrating large-scale renewable energy sources

The rapid development of smart grids and the integration of large scale renewable energy have added daunting new layers of complexity to the long-standing problem of power system stability control. This book offers a systematic stochastic analysis of these nonlinear problems and provides comprehensive countermeasures to improve power system performance and control with large-scale, hybrid power systems.

Power system stability analysis and control is by no means a new topic. But the integration of large scale renewable energy sources has added many new challenges which must be addressed, especially in the areas of time variance, time delay, and uncertainties. Robust, adaptive control strategies and countermeasures are the key to avoiding inadequate, excessive, or lost loads within hybrid power systems. Written by an internationally recognized innovator in the field this book describes the latest theory and methods for handling power system angle stability within power networks. Dr. Jing Ma analyzes and provides control strategies for large scale power systems and outlines state-of-the-art solutions to the entire range of challenges facing today’s power systems engineers.

- Features nonlinear, stochastic analysis of power system stability and control
- Offers proven countermeasures to optimizing power system performance
- Focuses on nonlinear time-variance, long time-delays, high uncertainties and comprehensive countermeasures
- Emphasizes methods for analyzing and addressing time variance and delay when integrating large-scale renewable energy
• Includes rigorous algorithms and simulations for the design of analysis and control modeling

Power System Wide-area Stability Analysis and Control is must-reading for researchers studying power system stability analysis and control, engineers working on power system dynamics and stability, and graduate students in electrical engineering interested in the burgeoning field of smart, wide-area power systems.

ABOUT THE AUTHOR

JING MA, PhD, is a professor in the School of Electrical and Electronic Engineering at North China Electric Power University, Beijing, China. He is a lead member of the National Science and Technology Support Program of China and a consultant with the China Electric Power Research Institute. Dr. Ma pioneered the application of Guardian Map Theory, Perturbation Theory, and the Markov model for the analysis of large time-varying, strong time-delay and high uncertainties into power system stability analysis process. He has innovated robust and adaptive control strategies using Federated Kalman Filters, Dual Youla Parameterization and Classification and Regression Tree to establish a wide-area control system with high accuracy and efficiency.

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