Computational Methods for Electric Power Systems, Second Edition (Electric Power Engineering Series)

Mariesa L. Crow

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Improve Compensation Strategies for Package Shortcomings

In today's deregulated environment, the nation's electric power network is forced to operate in a manner for which it was not designed. As a result, precision system analysis is essential to predict and continually update network operating status, estimate current power flows and bus voltages, determine stability limits, and minimize costs.

Computational Methods for Electric Power Systems is an introductory overview of computational methods used for analytical studies in power systems and other engineering and scientific fields. As power systems increasingly operate under stressed conditions, techniques such as computer simulation remain integral to control and security assessment. This volume analyzes the algorithms used in commercial analysis packages and presents salient examples of their implementation that are simple and thorough enough to be reproduced easily. Most of the examples were produced using MATLAB® language.

Presents General Theory Applicable to Different Systems
Commercial packages routinely fail or give erroneous results when used to simulate stressed systems, and understanding their underlying numerical algorithms is imperative to correctly interpret their results. This edition paints a broad picture of the methods used in such packages but omits extraneous detail. It includes new chapters that address function approximation and finite element analysis, in addition to new sections on:

- Generalized Minimal Residual (GMRES) methods
- Numerical differentiation
- Secant method
- Homotopy and continuation methods
- Power method for computing dominant eigenvalues
- Singular-value decomposition and pseudoinverses
- Matrix pencil method

This book will enable users to make better choices and improve their grasp of the situations in which methods may fail—instilling greater confidence in the use of commercial packages.

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