



Power System Optimization

D.P. Kothari, J.S. Dhillon

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Power System Optimization is intended to introduce the methods of multi-objective optimization in integrated electric power system operation, covering economic, environmental, security and risk aspects as well. Evolutionary algorithms which mimic natural evolutionary principles to constitute random search and optimization procedures are appended in this new edition to solve generation scheduling problems. Written in a student-friendly style, the book provides simple and understandable basic computational concepts and algorithms used in generation scheduling so that the readers can develop their own programs in any high-level programming language. This clear, logical overview of generation scheduling in electric power systems permits both students and power engineers to understand and apply optimization on a dependable basis. The book is particularly easy-to-use with sound and consistent terminology and perspective throughout.

This edition presents systematic coverage of local and global optimization techniques such as binary- and real-coded genetic algorithms, evolutionary algorithms, particle swarm optimization and differential evolutionary algorithms. The economic dispatch problem presented, considers higherorder nonlinearities and discontinuities in input–output characteristics in fossil fuel burning plants due to valvepoint loading, ramp-rate limits and prohibited operating zones. Search optimization techniques presented are those which participate efficiently in decision making to solve the multi-objective optimization problems. Stochastic optimal generation scheduling is also updated in the new edition. Generalized Z-bus distribution factors (GZBDF) are presented to compute the active and reactive power flow on transmission lines. The interactive decision making methodology based on fuzzy set theory, in order to determine the optimal generation allocation to committed generating units, is also discussed.

This book is intended to meet the needs of a diverse range of groups interested in the application of optimization techniques to power system operation. It requires only an elementary knowledge of numerical techniques and matrix operation to understand most of the topics. It is designed to serve as a textbook for postgraduate electrical engineering students, as well as a reference for faculty, researchers, and power engineers interested in the use of optimization as a tool for reliable and secure economic operation of power systems.

KEY FEATURES

The book discusses:

- Load flow techniques and economic dispatch—both classical and rigorous
- Economic dispatch considering valve-point loading, ramp-rate limits and prohibited operating zones
- Real coded genetic algorithms for economic dispatch
- Evolutionary programming for economic dispatch
- Particle swarm optimization for economic dispatch
- Differential evolutionary algorithm for economic dispatch
- Stochastic multiobjective thermal power dispatch with security
- Generalized Z-bus distribution factors to compute line flow
- Stochastic multiobjective hydrothermal generation scheduling
- Multiobjective thermal power dispatch using artificial neural networks
- Fuzzy multiobjective generation scheduling
- Multiobjective generation scheduling by searching weight pattern

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