



# Modern Heuristic Optimization Techniques: Theory and Applications to Power Systems

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This book explores how developing solutions with heuristic tools offers two major advantages: shortened development time and more robust systems. It begins with an overview of modern heuristic techniques and goes on to cover specific applications of heuristic approaches to power system problems, such as security assessment, optimal power flow, power system scheduling and operational planning, power generation expansion planning, reactive power planning, transmission and distribution planning, network reconfiguration, power system control, and hybrid systems of heuristic methods.

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### Editorial Review

#### Review

This text provides excellent, expert level, treatment of a very important systems engineering topic that will benefit students and practicing engineers. (*IEEE Power Electronics Society Newsletter*, 3rd Quarter, 2008)

#### From the Back Cover

Provides power system engineers with basic knowledge of heuristic optimization techniques

Several heuristic tools have evolved in the last decade that facilitate solving optimization problems that were previously extremely challenging or even impossible to solve. Now, based on a successful tutorial given by the editors at IEEE Power Engineering Society conferences in New York and Toronto, *Modern Heuristic Optimization Techniques* explores how developing solutions with these tools offers two major advantages: shortened development time and more robust systems.

Composed of two parts, the book begins with an overview of modern heuristic techniques, including the fundamentals of evolutionary computation, genetic algorithms, evolutionary programming and strategies, particle swarm optimization, ant colony search algorithm, differential evolution, simulated annealing, tabu search, and hybrid systems of evolutionary computation. Next, it covers specific applications of heuristic approaches to power system problems, such as security assessment, optimal power flow, power system scheduling and operational planning, power generation expansion planning, reactive power planning, transmission and distribution planning, network reconfiguration, power plant control, power system control, and hybrid systems of heuristic methods.

Complemented with scores of drawings, charts, graphs, and tables that help bring the material to life, *Modern Heuristic Optimization Techniques* is the only book of its kind to provide a comprehensive treatment of the subject in a manner that is accessible to students and practitioners alike.

#### About the Author

Kwang Y. Lee, PhD, is a Professor and Chair of Electrical and Computer Engineering at Baylor University (Texas). He is a Fellow of the IEEE. He was an associate editor of *IEEE Transactions on Neural Networks* and is an Editor of *IEEE Transactions on Energy Conversion*. He was also a member of the board of directors of the International Conference on Intelligent System Applications to Power Systems (ISAP).

Mohamed A. El-Sharkawi, PhD, is a Professor of Electrical Engineering at the University of Washington. He is a Fellow of the IEEE, founder of the International Forum on the Application of Neural Networks to Power Systems (ANNPS), and cofounder of the International Conference on Intelligent System Applications to Power Systems (ISAP).

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