Modern Optimisation Techniques in Power Systems

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Modern Optimisation Techniques in Power Systems

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PREFACE

The electric power industry is currently undergoing an unprecedented reform. The deregulation of electricity supply industry has introduced new opportunity for competition to reduce the cost and cut the price. It is a tremendous challenge for utilities to maintain an economical and reliable supply of electricity in such an environment. Faced by an increasingly complicated existence, power utilities need efficient tools and aids to ensure that electrical energy of the desired quality can be provided at the lowest cost. The overall objective, both for short-term and long-term operations, is then to find the best compromise between the requirements of security and economy. That is, effective tools are urgently required to solve highly constrained optimisation problems.

In recent years, several major modern optimisation techniques have been applied to power systems. A large number of papers and reports have been published. In this respect, it is timely to edit a book on this topic with an aim to report the state of the art development internationally in this area. Chapter 1 introduces the subject of the book by commenting on major modern optimisation techniques covered in the book. They are: simulated annealing, tabu search, genetic algorithms, neural networks, fuzzy programming, Lagrangian relaxation, interior point methods, ant colony search and hybrid techniques. From chapters 2 to 10, detailed descriptions of these modern optimisation techniques together with various power system applications are presented, which clearly demonstrate the potential and procedures of applying such techniques in solving complex power system optimisation problems. The final chapter, Chapter 11, gives an industrial view on applications of some of the techniques. The book is structured so that it is useful to a range of readers, covering basic algorithms as well as applications and case studies.

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