Multiobjective Evolutionary Algorithms For Electric Power Dispatch Problem

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IEEE-INST ELECTRICAL ELECTRONICS ENGINEERS INC, IEEE TRANSACTIONS ON EVOLUTIONARY COMPUTATION; pp: 315-329; Vol: 10

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Summary

The potential and effectiveness of the newly developed Pareto-based multiobjective evolutionary algorithms (MOEA) for solving a real-world power system multiobjective nonlinear optimization problem are comprehensively discussed and evaluated in this paper. Specifically, nondominated sorting genetic algorithm, niched Pareto genetic algorithm, and strength Pareto evolutionary algorithm (SPEA) have been developed and successfully applied to an environmental/economic electric power dispatch problem. A new procedure for quality measure is proposed in this paper in order to evaluate different techniques. A feasibility check procedure has been developed and superimposed on MOEA to restrict the search to the feasible region of the problem space. A hierarchical clustering algorithm is also imposed to provide the power system operator with a representative and manageable Pareto-optimal set. Moreover, an approach based on fuzzy set theory is developed to extract one of the Pareto-optimal solutions as the best compromise one. These multiobjective evolutionary algorithms have been individually examined and applied to the standard IEEE 30-bus six-generator test system. Several optimization runs have been carried out on different cases of problem complexity. The results of MOEA have been compared to those reported in the literature. The results confirm the potential and effectiveness of MOEA compared to the traditional multiobjective optimization techniques. In addition, the results demonstrate the superiority of the SPEA as a promising multiobjective evolutionary algorithm to solve different power system

multiobjective optimization problems.

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