

Environmental/Economic Power Dispatch Using Multiobjective Evolutionary Algorithms

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Abstract-- This paper presents a new multiobjective evolutionary algorithm for Environmental/Economic power Dispatch (EED) problem. The EED problem is formulated as a nonlinear constrained multiobjective optimization problem. A new Strength Pareto Evolutionary Algorithm (SPEA) based approach is proposed to handle the EED as a true multiobjective optimization problem with competing and non-commensurable objectives. The proposed approach employs a diversity-preserving mechanism to overcome the premature convergence and search bias problems. A hierarchical clustering algorithm is also imposed to provide the decision maker with a representative and manageable Pareto-optimal set. Moreover, fuzzy set theory is employed to extract the best compromise nondominated solution. Several optimization runs of the proposed approach have been carried out on a standard test system. The results demonstrate the capabilities of the proposed approach to generate well-distributed Pareto-optimal solutions of the multiobjective EED problem in one single run. The comparison with the classical techniques demonstrates the superiority of the proposed approach and confirms its potential to solve the multiobjective EED problem. In addition, the extension of the proposed approach to include more objectives is a straightforward process.

Index Terms— Environmental/Economic power dispatch, multiobjective optimization, evolutionary algorithms, Strength Pareto Evolutionary Algorithm.