Optimal Multiobjective Design Of Robust Power System Stabilizers Using Genetic Algorithms

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Power Systems, IEEE Transactions on;Publication Date: Aug. 2003;Vol: 18,Issue: 3
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Summary

Optimal multiobjective design of robust multimachine power system stabilizers (PSSs) using genetic algorithms is presented in this paper. A conventional speed-based lead-lag PSS is used in this work. The multimachine power system operating at various loading conditions and system configurations is treated as a finite set of plants. The stabilizers are tuned to simultaneously shift the lightly damped and undamped electromechanical modes of all plants to a prescribed zone in the s-plane. A multiobjective problem is formulated to optimize a composite set of objective functions comprising the damping factor, and the damping ratio of the lightly damped electromechanical modes. The problem of robustly selecting the parameters of the power system stabilizers is converted to an optimization problem which is solved by a genetic algorithm with the eigenvalue-based multiobjective function. The effectiveness of the suggested technique in damping local and interarea modes of oscillations in multimachine power systems, over a wide range of loading conditions and system configurations, is confirmed through eigenvalue analysis and nonlinear simulation results.