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Multi objective large power system planning under sever loading condition using learning DE-APSO-PS strategy

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Abstract

This paper introduces an efficient planning strategy using new hybrid interactive differential evolution (DE), adaptive particle swarm optimization (APSO), and pattern search (PS) for solving the security optimal power flow (SOPF) considering multi distributed static VAR compensator (SVC). Three objective functions such as fuel cost, power loss and voltage deviation are considered and optimized considering sever loading conditions. The main idea of the proposed strategy is that variable controls are optimized based on superposition mechanism, the best solutions evaluated by DE and APSO at specified stages are communicated to PS to exploit new regions around this solution, alternatively the new solution achieved by PS is also communicated to DE and APSO, this interactive mechanism search between global and local search is to balance the exploitation and exploration capability which allows individuals from different methods to react more by learning and changing experiences. The robustness of the proposed strategy is tested and validated on large practical power system test (IEEE 118-Bus, IEEE 300-Bus, and 40 units). Comparison results with the standard global optimization methods such as DE, APSO PS and to other recent techniques showed the superiority and perspective of the proposed hybrid technique for solving practical power system problems.

Keywords

- Power quality,Differential evolution,Optimal power flow (OPF) ,Pattern search, Adaptive particle swarm optimization (APSO) ,Hybrid methods , Shunt dynamic compensator (SVC)