

Interactive DE for solving combined security environmental economic dispatch considering FACTS technology

Frontiers in Energy

December 2013, Volume 7, Issue 4, pp 429-447

Belkacem Mahdad, and K. Srairi, "Interactive DE for solving combined security environmental economic dispatch considering FACTS technology," *Journal of Frontiers in Energy, Springer, Vol. 7, N° 2013*

Abstract

This paper presents an efficient interactive differential evolution (IDE) to solve the multi-objective security environmental/economic dispatch (SEED) problem considering multi shunt flexible AC transmission system (FACTS) devices. Two sub problems are proposed. The first one is related to the active power planning to minimize the combined total fuel cost and emissions, while the second is a reactive power planning (RPP) using multi shunt FACTS device based static VAR compensator (SVC) installed at specified buses to make fine corrections to the voltage deviation, voltage phase profiles and reactive power violation. The migration operation inspired from biogeography-based optimization (BBO) algorithm is newly introduced in the proposed approach, thereby effectively exploring and exploiting promising regions in a space search by creating dynamically new efficient partitions. This new mechanism based migration between individuals from different subsystems makes the initial partitions to react more by changing experiences. To validate the robustness of the proposed approach, the proposed algorithm is tested on the Algerian 59-bus electrical network and on a large system, 40 generating units considering valve-point loading effect. Comparison of the results with recent global optimization methods show the superiority of the proposed IDE approach and confirm its potential for solving practical optimal power flow in terms of solution quality and convergence characteristics.