

Performance analysis of distributed power flow controller with ultra-capacitor for regulating the frequency deviations in restructured power system

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ABSTRACT

This paper presents a novel approach for automatic generation control (AGC) of two-area deregulated system with unequal sources for sustaining the frequency and tie-line power at perturbations. The combination of ultra-capacitor (UC) and various FACTS controllers such as Thyristor-controlled series capacitor (TCSC), Static synchronous series compensator (SSSC), Unified power flow controller (UPFC), and Distributed power flow controller (DPFC) have been investigated in AGC of interconnected system with thermal-wind and hydro-diesel generating units. An innovative metaheuristic method called bat algorithm (BA) is used to ascertain the optimal gain parameters of the two degree of freedom (2DOF) controllers using an integral squared error (ISE) criteria. Furthermore, the productive assessment of the bat tuned 2DOF controllers are also compared with teaching learning-based optimization (TLBO) and cuckoo search (CS) methods optimized 2DOF in distinct contract scenarios of the suggested restructured system. The effect of the coordinated performance of UC and DPFC has been mitigated the oscillatory response of the AGC system at various operating circumstances. The investigations disclose that the bat optimized 2DOF-PID yield the productive outcomes with coordination of DPFC and UC in all contract transactions of the restructured system.

KEYWORDS

Automatic generation control; Bat algorithm; Facts controllers; Ultra-capacitor; 2dof controllers; Deregulated power system

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