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Abstract

The rate of Iraqi power demand has been increased significantly faster than the infrastructure's development and it becomes very difficult to keep the system stable especially with the current acts of vandalism against the country, so it's very important to improve the power system stability.

The object of this work is to improve the stability of the Iraqi National Super Grid System (INSGS) by installing Flexible Alternating Current Transmission System devices (FACTS) in different optimal locations under fault condition and comparing the results with those of without FACTS under the same condition.

The optimal location of the FACTS device was specified based on Genetic Algorithm (GA) optimization method, it was utilized to search for optimum FACT parameters setting and location based objective function that depends on the power and voltage as a fitness constraints.

The GA program is first applied on IEEE 9-bus system, then after getting the appropriate results the same procedure repeated for the Iraqi grid system which is more complicated.

The results obtained showed that the installation of Unified Power Flow Controller (UPFC) devices at the optimal locations of the Iraqi grid gives an improvement in the stability by damping the voltage and rotor angle oscillations after subjected to the three phase fault to ground at different locations and different cases (temporary fault, permanent fault).

A comparison has been made between these different cases based on the durations of the tested faults, and with the UPFC devices installed in the system; it can remain stable for longer time than without UPFC during fault condition.

Keywords: Unified Power Flow Controller (UPFC). Genetic Algorithm (GA). Power System Analysis Toolbox (PSAT)