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Thesis Title	Optimal Location of Static Synchronous Compensator (STATCOM) for Iraqi National (400kV) Super High Voltage Grid using Genetic Algorithm
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Abstract	Transmission networks of modern power systems are becoming increasingly stressed because of the growing demand and restrictions on constructions new lines. One of the consequences of such a stressed system is the threat of losing stability following a disturbance. Flexible AC Transmission System (FACTS) devices are found to be very effective in a transmission network for better utilization of its existing facilities without sacrificing the desired stability margin. The Static Synchronous Compensator (STATCOM) is a shunt device which employs one of the latest technologies of FACTS and power electronic switching devices in electric power transmission systems to control the voltage and power flow. The STATCOM regulates the voltage at its terminal by controlling the amount of reactive power injected into or absorbed from the power system. Whilst the Iraqi National (400 kV) Super High Voltage Grid System suffers from voltage stability problems because of the high variation in the reactive power conditions all over the year seasons. Therefore, this thesis proposed an application of the STATCOM devices to maintain the voltages within the specified limits and enhancing voltage stability for all seasons in the year, as well as reducing the apparent power losses. And in order to reduce the required installation cost of the STATCOM devices, this performance has been done by using minimum possible size of the reactive power injected or absorbed by the STATCOM devices, while satisfying the stability limits. The benefit of the STATCOM devices depends greatly on how these devices can be placed in the system. The general problem focused in this thesis was how to optimally determine the locations and the sizes of the STATCOM devices that to be installed. For that reason, it was decided to follow an optimization approach such

	as a Genetic Algorithm (GA), which is one of the heuristic methods to find the optimum location and the value of installed STATCOM devices. The Newton-Raphson load flow method, with the proposed approach has been examined and tested first on the 5-bus IEEE test system; the results obtained encouraged us to implement the same approach on the 27-bus Iraqi National (400kV) SHV Grid System. The real data for Iraqi network have been taken from Iraqi National Control Center (INCC), in the Ministry of Electricity. A computer program, written in MatLab environment, was developed to represent the proposed method.