ABSTRACT

The objective of the thesis is to analyze and understand the transient stability of power system, with the main focus on stability theories and power system modeling. The thesis analyzed the effects that FACTS controllers have on electrical power generation system and transmission system. The thesis discusses the various stability problems and tuning techniques of FACTS controllers.

The thesis then performed an SVC modeling and simulation of a real time system. The performance of the real time system was simulated using MiPower with the proposed SVC. The operating points and system parameters were varied to test the robustness of the power system and the effectiveness of the proposed controller.

The thesis then performed a STATCOM modeling and simulation of a real time system. The performance of the real time system was simulated using MiPower with the proposed STATCOM. The operating points and system parameters were varied to test the robustness of the power system and the effectiveness of the proposed controller.

The thesis then performed an SVC and STATCOM modeling and simulation of a TNEB system. The performance of the TNEB system was simulated using MiPower with the proposed SVC and STATCOM. The fault clearing time was varied up to critical clearing time to test the robustness of the power system and the effectiveness of the proposed controllers.
The thesis then performed a TCSC and STATCOM modeling and simulation of an IEEE 14 bus system. The performance of the IEEE 14 bus system was simulated using MiPower with the proposed TCSC and STATCOM controllers. The operating points and system parameters were varied to test the robustness of the power system and the effectiveness of the proposed controllers.

The thesis then performed an SSSC and UPFC modeling and representation of an IEEE 14 bus system. The performance of the IEEE 14 bus system was implemented using MATLAB with the proposed SSSC and UPFC controller. By injecting the additional voltage and power angle, the transmission losses were reduced and system voltage was maintained in appreciable level. The amount of voltage and angle to be injected were calculated using

i) Fuzzy logic

ii) Neural network

iii) Fuzzy logic and neural network

At the end, the thesis was concluded with the overall effect of the controller on the transient stability of power system.