

Design and Simulation of an Efficient STATCOM Controller to Improve Electric Power System Dynamics

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Abstract

This paper presents the design and simulation of a static synchronous compensator (STATCOM) controller which is one of the key shunt controllers in flexible alternating current transmission system (FACTS) to control the transmission line voltage and can be used in power systems to enhance the power transmission capacity and extend the transient stability margin. In this paper, the STATCOM based on the voltage source converter (VSC) topology is proposed as it is conventionally realized by a VSC that can generate a controllable current directly at its output terminals. The performance and behavior of the STATCOM is simulated at different cases which result in excellent current and voltage waveforms as well as short response time while operating at a low switching frequency. The transmission system is divided into two portions; one is consisted of two sets of three phase transmission lines in parallel and another is consisted of a three phase transmission line. When the STATCOM is not installed, interruption of either three phase line due to a fault decreases the transmission line voltage as the line impedance increases to double before the interruption. Different bus voltages at different cases are simulated and it is observed that installing the STATCOM makes it possible to control the transmission line voltage. The proposed STATCOM has been simulated using the MATLAB/Simulink package.

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