Abstract

This research shows that when connecting a generator and steam turbines to a transmission line that has series capacitive compensation, this may cause many problems, including the emergence of a sub-synchronous resonance state. The Flexible Ac Transmission System (FACTS) controller of the devices wide use which has been used to reduce and suppress the phenomenon of sub-synchronous resonance the Thyristor Control Series Compensation (TCSC) is one type of FACTS controller that has been used to put down the SSR. The first standard model of IEEE was adopted to study this phenomenon. Linear Quadratic Gaussian (LQG) was used to design TCSC strong to dampen this phenomenon in the energy system. Reduce-Order version of this controller is also obtained. Non-linear systems simulations are used to achieve a better control unit to dampen all oscillations in a very short time. In this paper, we also examine the process of controlling the parameters of TCSC and AVR through the use of PID controller To achieve a process of suppression of this phenomenon. In this research, the method of Eigenvalue was used to analyze the sub-synchronous resonance phenomenon and the result was verified using DYMOLA simulation.
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**Index Terms**

Computer Science  Applied Sciences

**Keywords**

Flexible AC Transmission Systems (FACTS), Linear Quadratic Gaussian (LQG), TCSC (Thyristor Control Series Compensation), SSR (Sub-Synchronous Resonance), Kalman filter, power system oscillation damping.