Optimal thyristor control series capacitor neuro-controller for damping oscillations

Abstract

This study applies a neural-network-based optimal TCSC controller for damping oscillations. Optimal neural network controller is related to model-reference adaptive control, the network controller is developed based on the recursive "pseudo-linear regression. **Problem statement:** The optimal NN controller is designed to damp out the low frequency local and inter-area oscillations of the large power system. **Approach:** Two multilayer-perceptron neural networks are used in the design-the identifier/model network to identify the dynamics of the power system and the controller network to provide optimal damping. By applying this controller to the TCSC devices the damping of inter-area modes of oscillations in a multi-machine power system will be handled properly. **Results:** The effectiveness of the proposed optimal controller is demonstrated on two power system problems. The first case involves TCSC supplementary damping control, which is used to provide a comprehensive evaluation of the learning control performance. The second case aims at addressing a complex system to provide a very good solution to oscillation damping control problem in the Southern Malaysian Peninsular Power Grid. **Conclusion:** Finally, several fault and load disturbance simulation results are presented to stress the effectiveness of the proposed TCSC controller in a multi-machine power system and show that the proposed intelligent controls improve the dynamic performance of the TCSC devices and the associated power network.