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ANFIS based Coordination of Multiple UPFC Control Functions for Damping Low Frequency Oscillations in Power Systems

M. Sobha, R.S. Kumar, S. George

Abstract

Multiple controllers perform the control functions of unified power flow controller (UPFC) to exploit its various functional capabilities. Due to dynamic interactions among different UPFC controllers, performance is deteriorated when separately designed and individually implemented stable UPFC controllers are in joint operation. An adaptive neuro-fuzzy inference system (ANFIS) based supplementary unified power flow controller (UPFC) in co-ordination with other controllers of the UPFC to damp the low frequency oscillations is proposed in this paper. A hybrid learning procedure was adopted for the proposed ANFIS to adapt the gains of the damping controller over wide range of operating conditions, various control signals and in presence of different UPFC controllers. The input to the fuzzy controller was the deviation in the generator angular speed and output, the control signal to be superimposed on the selected UPFC signal. The performance of the proposed adaptive damping controller was validated by time domain simulation under varying operating conditions, system parameters and in presence of other UPFC controllers.

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