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A RADIAL BASIS FUNCTION NEURAL NETWORK CONTROLLER FOR UPFC

P.K. Dash, S. Mishra, G. Panda
Regional Engineering College,
Rourkela, INDIA

Abstract: This paper presents the design of radial basis function neural network controllers (RBFNN) for UPFC to improve the transient stability performance of a power system. The RBFNN uses either single neuron or multi-neuron architecture and the parameters are dynamically adjusted using an error surface derived from active or reactive power/voltage deviations at the UPFC injection bus. The performance of the new single neuron controller is evaluated using both single-machine infinite-bus and three-machine power systems subjected to various transient disturbances. In the case of three-machine 8-bus power system, the performance of the single neuron RBF controller is compared with BP (back-propagation) algorithm based multi-layered ANN controller. Further it is seen that by using a multi-input multi-neuron RBF controller, instead of a single neuron one the critical clearing time and damping performance are improved. The new RBFNN controller for UPFC exhibits a superior damping performance in comparison to the existing PI controllers. Its simple architecture reduces the computational burden thereby making it attractive for real-time implementation.

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