Neural Network Predictive Control Based Power System Stabilizer

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Abstract:

The present study investigates the power system stabilizer based on neural predictive control for improving power system dynamic performance over a wide range of operating conditions. In this study a design and application of the Neural Network Model Predictive Controller (NN-MPC) on a simple power system composed of a synchronous generator connected to an infinite bus through a transmission line is proposed. The synchronous machine is represented in detail, taking into account the effect of the machine saliency and the damper winding. Neural network model predictive control combines reliable prediction of neural network model with excellent performance of model predictive control using nonlinear Levenberg-Marquardt optimization. This control system is used the rotor speed deviation as a feedback signal. Furthermore, the using performance system of the proposed controller is compared with the system performance using conventional one (PID controller) through simulation studies. Digital simulation has been carried out in order to validate the effectiveness proposed NN-MPC power system stabilizer for achieving excellent performance. The results demonstrate that the effectiveness and superiority of the proposed controller in terms of fast response and small settling time.

Keywords:

NN_MPC control, power system stabilizer, single synchronous machine infinite bus systems

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