# An Artificial Neural Network For Online Tuning Of Genetic Algorithm-Based PI Controller For Interior Permanent Magnet Synchronous Motor Drive

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## Summary

An artificial neural network for online tuning of a genetic algorithm-based proportional-integral (PI) controller for an interior permanent magnet synchronous motor (IPMSM) drive is presented in this paper. The proposed controller is designed to achieve accurate speed control of the IPMSM drive under system disturbances. Initially, different operating conditions are obtained, based on motor dynamics incorporating various uncertainties. For each operating condition a generic algorithm is used to optimize the PI controller parameters in a closed-loop vector control scheme. In the optimization procedure a performance index is developed to reflect the minimum speed deviation, minimum settling time, and zero steady-state error. A radial basis function network is utilized for online tuning of the PI controller parameters to ensure optimum drive performance under different disturbances. The proposed controller is successfully implemented in real time using a digital signal processor board (DS-1102) for a laboratory 1 hp IPMSM. The efficacy of the proposed controller is verified by simulation as well as experimental results under different dynamic operating conditions. The proposed approach is found to be quite robust for application in the controller for IPMSM drives.

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