Enhanced Performance of an Asynchronous Motor Drive with a New Modified Adaptive Neuro-Fuzzy Inference System-Based MPPT Controller in Interfacing with dSPACE DS-1104

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Aims and scope

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Abstract

This paper presents a photovoltaic system with maximum power point tracking facility. Maximum power point trackers are so important in photovoltaic systems to increase their efficiency. The system consists of a photovoltaic solar module connected to a DC–DC buck–boost converter and load. The adaptive neuro-fuzzy inference system (ANFIS)-based maximum power point tracking (MPPT) controller is used to track the maximum power. DC–DC boost converter and space vector modulation-based inverter are used to provide the required supply to the load. The proposed ANFIS-based MPPT improves the system efficiency even at abnormal weather conditions. Here a lot of reduction in torque

and current ripple contents is obtained with the help of ANFIS-based MPPT for an asynchronous motor drive. Also, the better performance of an asynchronous motor drive is analyzed with the comparison of conventional and proposed MPPT controller using MATLAB simulation along with experimental implementation. The experimental implementation of MPPT with hardware setup is done using dSPACE real-time controller. Data acquisition and codes of the successfully simulated model can be linked and loaded directly to the dSPACE DS-1104 controller for real-time hardware operation. The simulation and the practical results represent that the proposed system tracked the maximum power accurately and successfully under different working conditions. Practical validations are also carried out and are represented.

References

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