Performance Analysis of Permanent Magnet Synchronous Motor Using Direct Torque Control Based ANFIS Controller for Electric Vehicle

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Abstract : Day by day, the uses of internal combustion engines (ICE) are deteriorating because of pollution and less fuel availability. In the present scenario, the electric vehicle (EV) plays a major role in the place of an ICE vehicle. The performance of EVs can be improved by the proper selection of electric motors. Initially, EV preferred induction motors for traction purposes, but due to complexity in controlling induction motor, permanent magnet synchronous motor (PMSM) is replacing induction motor in EV due to its advantages. Direct torque control (DTC) is one of the known techniques for PMSM drive in EV to control the torque and speed. However, the presence of torque ripple is the main drawback of this technique. Many control strategies are followed to reduce the torque ripples in PMSM. In this paper, the adaptive neuro-fuzzy inference system (ANFIS) controller technique is proposed to reduce torque ripples and settling time. Here the performance parameters like torque, speed and settling time are compared between conventional proportional-integral (PI) controller with ANFIS controller.

Keywords : direct torque control, electric vehicle, torque ripple, PMSM
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