Fuzzy Stator Resistance Estimator for a Direct Torque Controlled Interior Permanent Magnet Synchronous Motor

Yanping Xu, Yanru Zhong, Jie Li

Department of Electrical Engineering, Xi’an University of Technology, Xi’an 710048, China

Abstract—Direct torque control (DTC) of Interior Permanent Magnet Synchronous Motor (IPMSM) uses the motor stator resistance to estimate the stator flux. The variation of stator resistance due to changes in temperature or frequency deteriorates the performance of DTC controller by introducing errors in the estimated flux linkage and the electromagnetic torque. A novel stator resistance estimator during the operation of the motor is proposed. By means of comparing the actual current and the reference current, the change of stator resistance can be estimated. The estimation method is implemented using fuzzy logic control schemes. Simulation results obtained clearly demonstrate the effectiveness of the estimator in estimating the stator resistance and improving performance of DTC.