Title:	Direct Torque Control Based on Discrete-Time PI Controller of an SVPWM Inverter Fed Induction Motor Using Energy Model
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Abstract:
A direct torque control (DTC) of an induction motor (IM) with constant switching frequency has been presented in this work which is performed using space-vector modulation (SVM). The developed DTC scheme is based on the discrete-time PI controller strategy and this has been used to achieve direct control of torque of IM. To design the discrete-time PI (DTPI) controller the energy model of induction motor is simplified at the beginning by means of indirect field-oriented control (IFOC) strategy. The overshoot of conventional continuous PI controller and DTPI controller cannot be eliminated. A little modification is done in a conventional DTPI controller to overcome the problem of overshoot. In order to achieve the stable operation of proposed controller, the gains of controller are chosen by using the pole placement technique. The main advantages of the proposed control, compared to the works published in this subject, are constant switching frequency, no need to use predeï¬ned switching table and voltage vector, and no necessity of inner current control loops. It is found that the proposed DTPI controller can provide excellent performance to track the desired torque and speed. In the control of speed, the DTPI controller is able to reject the disturbance of load. The proposed controller was tested in simulations using MATLAB/Simulink. Results have proved excellent performance and verify the validity of the proposed DTC scheme.

Keywords: Direct torque control, speed control, energy model, induction motor, discrete-time PI controller