Title:	Fuzzy-Logic-Based Self-Tuning PI Controller for Speed Control of Indirect Field-Oriented Induction Motor Drive
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Abstract:

In this paper, a new self-tuning proportional and integral (PI) controller based on fuzzy logic is proposed to improve the performance of conventional PI speed control of induction motor (IM) taking core loss into account. A new parameterization technique to tune the proportional and integral gains of PI controller is adopted by using a single parameter (h) from the knowledge of pole placement technique. To tune the parameter h depending on the operating points, a simple fuzzy logic system is designed where only one input, one output variables, three membership functions for each input-output variable, and three fuzzy rules are used. Since the poles of PI speed controller are placed in negative real values by using the proposed parameterization technique, the speed controller always works in stable region. Moreover, the overshoot and steady state error problems are also overcome by changing of h based on the proposed fuzzy system under the variations of load torque and parameters. The performance of proposed fuzzy-logic-based self-tuning PI controller has been demonstrated through the simulations. The simulation results confirm that the excellent desired speed is achieved against the variations of load torque and parameters without any overshoot and steady state error by using the proposed system.