Title:	Efficiency Optimized Speed Control of SVPWM Inverter-Fed IPMSM
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Abstract:

This paper presents a speed control strategy with efficiency optimization of space-vector pulse-width modulated (SVPWM) inverter-fed interior permanent magnet synchronous motor (IPMSM). The efficiency optimization algorithm is derived by minimizing the total controllable losses in terms of d-axis magnetizing current component. A discrete time state space multi-input and multi-output (MIMO) model from linear continuous time state space model is first developed and an augmented system for implementing the efficiency optimized algorithm with speed control is designed based on optimal regulator. Since SVPWM is the best among all the carrier based PWM techniques, SVPWM-fed inverter is used to implement the designed speed control strategy with efficiency optimization of IPMSM. The complete control system of IPMSM including the SVPWM inverter has been simulated to verify the performance of the proposed speed controller with efficiency optimization. The simulation has also been done for vector control to compare with the efficiency optimization technique. The simulation results are found to have excellent performance of speed control without any overshoot and steady state error.

Keywords: Efficiency Optimization, Speed Control, Interior Permanent Magnet Synchronous Motor, Multi-input and Multi-output Optimal Regulator.