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Improved Multimachine Multiphase Electric Vehicle Drive System Based on New SVPWM Strategy and Sliding Mode — Direct Torque Control

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Abstract: This paper presents a Sliding Mode Direct Torque Control (SM-DTC) of a multiphase Induction Machine (IM) supplied with multiphase voltage source inverter (VSI) controlled by a new algorithm of Space Vector Pulse Width Modulation (SVPWM) for a high-performance multi-machine electric vehicle (EV) drive system. The SM-DTC is one of the effective nonlinear robust control approaches; it provides better dynamic performances of considered system. The new SVPWM algorithm develops a new analysis of voltage vectors to synthesize required phase voltages for driving multiphase IM with a minimum switch stress. Theoretical developments are verified for EV with two-separate-wheel-drives based on two pentaphase induction motors. The obtained results illustrate the effectiveness of the proposed drive system. Moreover, this system can be easily extended to an n-phase multi-machine drive system.

Keywords: *multiphase multimachine drive system; multiphase SVPWM; multiphase VSI; sliding mode; direct torque control.*

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