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SPEED SENSORLESS TORQUE CONTROL OF INDUCTION MOTOR FOR ELECTRICAL VEHICLES

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ABSTRACT

Novel induction motor speed sensorless torque control optimizing both torque response and efficiency is proposed. The control is quite different than the conventional field-oriented or direct torque control. First, the produced torque is explicitly continuous output variable of control. Second, a new rotor flux observer, which allows speed sensorless operation of IM by low and zero speed, was developed. A new stator and rotor flux controller/observer based on continuous sliding mode and Lyapunov theory are developed. The proposed robust control scheme allows a smooth transition into the field weakening region and the full utilization of the inverter current and voltage capability during acceleration or regenerative braking of EV. The drive system including a 18 kW, 4 pole, 6000 rpm, 120 V battery-powered IM and a 30 kW IGBT inverter has been applied to a pick up truck (EV).