

# Abstract

This paper presents a robust and speed-sensorless stator flux estimation for induction motor direct torque control. The proposed observer is based on sliding mode approach. Stator electrical equations are used in the rotor orientation reference frame to eliminate the observer dependence on rotor speed. Lyapunov's concept for systems stability is adopted to confine the observer gain. Furthermore, the sensitivity of the observer to parameter mismatch is recovered with an adaptation technique. The nonlinearities of the pulse width modulation voltage source inverter are estimated and compensated to enhance stability at low speeds. Therefore, a new method based on the model reference adaptive system is proposed. Simulation and experimental results are shown to verify the feasibility and effectiveness of the proposed algorithms