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Abstract:

The sliding mode control system is able to have a high gain, robust to external and parameter disturbances, and capable to ensure the desired motion dynamics. Since the dynamics of an induction motor can be represented by multi-input and multi-output state space energy model, a multi-input and multi-output sliding mode controller is designed to obtain high-performance speed and torque control of an induction motor based on the energy model. The stability of designed controller is confirmed by satisfying the Lyapunov stability criteria. Since all state variables are not accessible, a full-order observer, whose gains are obtained by using the Lyapunov stability criteria, is also designed to estimate the unmeasured state variables. The effectiveness of the designed controller and observer system are verified by simulation using Matlab/Simulink.

Keywords: Sliding Mode Controller, Speed Control, Torque Control, Energy Model, Full Order Observer, Induction Motor