Magnetic rotor flux observer of induction motors with fast convergence and less transient oscillation CHANG-WOO PARK, JUNG-HOON HWANG, Korea Electronics Technology Institute — This paper presents an observer design for the estimation of magnetic rotor flux of induction motors. We characterize the class of MIMO induction motor systems that consists of the linear observable and the nonlinear part with a block triangular structure. The similarity transformation that plays an important role in proving the convergence of the proposed observer is generalized to the systems. Since the gain of the proposed observer minimizes a nonlinear part of the system to suppress for the stability of the error dynamics, it improves the transient performance of the high gain observer. Moreover, by using the generalized similarity transformation, it is shown that under some observability and boundedness conditions, the proposed observer guarantees the global exponential convergence to zero of the estimation error. Since the proposed scheme minimizes the nonlinearity of an induction motor system, it improves the transient performance of the observer and guarantees the global exponential convergence to zero of the estimation error. The estimation results of magnetic rotor fluxes through experiments are shown and it is presented that the proposed magnetic flux observer exhibits less transient oscillation and faster convergence time than the general observer.

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