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PARAMETER TUNING FOR IMPROVED DYNAMIC RESPONSE OF INDIRECT STATOR FLUX ORIENTED INDUCTION MOTOR DRIVES

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Abstract

Sensorless vector control of an induction motor drive essentially means vector control without any speed sensors. An incremental shaft mounted speed encoder (usually an optical type) is required for the closed loop or position control in both vector and scalar controlled drives. A speed signal is also required in indirect vector control in the whole speed range, and in direct vector control for the low speed range, including the zero speed start-up operation. A speed encoder is undesirable in a drive because it adds cost and reliability problems, besides the need for shaft extension and mounting arrangement. It is possible to estimate the speed signal from machine terminal voltages and current. In order to eliminate the speed sensor, an adaption algorithm for tuning the rotor speed is proposed in this paper. Based on model referencing adaptive system scheme, the rotor speed is tuned to obtain an indirect stator flux oriented control. The machine parameters are tuned in such a way to reduce the transient time of the drive. Experimental results obtained for a 1.5HP, three phase induction machine are presented in this paper showing the effectiveness of the proposed method in terms of dynamic response.

Keywords: Induction motor drives, Vector Control, Sensorless Control, Model Referencing Adaptive System, Indirect stator field orientation, Rotor speed estimation.