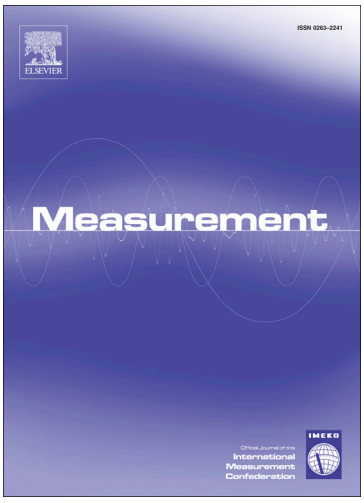

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Rotor resistance estimation using Extended Kalman filter and spectral analysis for rotor bar fault diagnosis of sensorless vector control induction motor

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Abstract: The aim of this paper is the broken rotor bars fault detection for a sensorless vector controlled induction motor drive. The technique of control used is based on the field-oriented control (FOC), where the fault effect in the mechanical speed is compensated in order to ensure the operation continuity of the machine. The broken rotor fault is detected through the rotor resistance estimation using extended kalman filter observer and the fast Fourier transforms for analyzing a several electrical and mechanical quantities (i.e., rotor speed, quadratic current components of control and stator phase current). The spectral analysis is effectuated only if the variation of the rotor resistance estimation is significant. An EKF observer has proven to be an excellent mathematical tool for the fault indicator in the variable speed drive. Moreover, the spectral analysis using FFT transforms can be a useful solution to ensure that the resistance variation indicates to broken rotor bars fault. The effectiveness of the sensorless control and the fault detection techniques are presented in simulation and validated in a real-time implementation using Matlab/Simulink with the real-time interface (RTI) based on dSpace 1104 board.

Keywords*: Induction Motor, Sensorless vector control, fault diagnosis, broken rotor bars, Extender Kalman Filter, Rotor resistance estimation, Fast Fourier Transforms, dSpace 1104*

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