

Abstract

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On-line Parameter Identification Scheme for Vector Controlled Drive of Synchronous Reluctance Motor without Shaft Encoder

The control characteristics of a SynRM are investigated on the basis of a simple parameter estimation system. To control synchronous reluctance motors (SynRMs), position and speed sensors are indispensable because the current should be controlled depending on the rotor position. Consequently, a sensorless control method based on extended electromotive force (EEMF) models considering magnetic saturation is proposed for SynRM. A decoupled vector control for SynRM drive has been presented. One of the most important advantages of the vector control is its ability to change the magnitude, frequency, and phase angle of the phase supply voltages, due to the independent control of flux and torque. Moreover, an effective and simple online parameter identification method for sensorless control is presented to estimate the armature resistance and the q-axis inductance of SynRMs. The identification method is developed based on the fact that, in practice the d-axis inductance is almost constant. The position sensorless control using identified motor parameters is realized, and simulation results are included to prove the effectiveness of the overall control system under different operating conditions. Therefore, the proposed on-line identification scheme gives fast and accurate transient performance over a wide range of speed and torque operation.