A Novel Modulated Model Predictive Control Applied to Six-Phase Induction Motor Drives

Magno Ayala; Jesus Doval-Gandoy; Jorge Rodas; Osvaldo Gonzalez; Raúl Gregor; Marco Rivera

Abstract

Model-based predictive control techniques, with finite set control, are considered an interesting option to control multiphase drives due to their control flexibility and fast dynamic response. However, those techniques have some drawbacks such as a high computational cost, poor (x-y) currents reduction, and steady-state error, especially at high speeds. To improve some of these drawbacks, modulation stages have been presented as an alternative. However, some of those drawbacks have not been improved. This article proposes a novel approach to the classic predictive current control (PCC) applied to an asymmetrical six-phase induction machine, where a space vector modulation with specific vectors is used in order to improve the (x-y) currents, the steady-state error and total harmonic distortion (THD) at high operation speeds. Experimental results are presented to demonstrate the characteristics of the proposed control technique in terms of current tracking, (x-y) currents reduction and THD of stator currents compared to the classic PCC.