Comparative Study Between the Rotor Flux Oriented Control and Non-linear Backstepping Control of A Five-phase Induction Motor Drive-An Experimental Validation

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Highlights

- General Concept of modeling and control of the ensemble five-phase motor and inverter.
- Indirect Rotor flux oriented Control of a Five-phase Induction.
- Non-linear Backstepping Control of a Five-phase Induction Motor.
- Experimental validation of the proposed methods.

Abstract

Multiphase variable speed electric drives are employed in applications where the reduction in the total power per phase and the highest level of overall system reliability is required. Most of the literature on five-phase induction motor drive deals with field oriented control, direct torque control, and other non-linear control such as backstepping method. This paper deals with the theoretical concept and experimental implementation of Indirect Rotor Flux Oriented Control (IRFOC) and backstepping control (BSC) of a five-phase induction motor drive. A comprehensive comparison is done between the most popular IRFOC and non-linear BSC.

Backstepping control offers high performance in both steady state and transient operations even in the presence of parameters variations. However, this strategy (BSC) allow the synthesis of the speed and the flux control for a five-phase Induction motor, nevertheless this strategy is asymptotically stable in the context of Lyapunov. The comparison is done using experimental approach. The two control approaches are compared in different terms such as their stability