Abstract

This paper presents the dynamic performances of an indirect vector controlled induction motor (IVCIM) using a fuzzy logic (FL) based model reference adaptive control (MRAC) slip gain tuner for speed regulation in the drive. In high performance AC drives the motor speed should closely match with the specified reference speed irrespective of the variations in the
load, motor parameters and model uncertainties. Two fuzzy controllers combined with MRAC reactive power and stator direct axis (d-axis) voltage estimator have been used to tune the slip gain of the IVCIM drive against parameter variations and model uncertainties. An integrated mathematical model of the control scheme has been developed and simulated in MATLAB for Indirect vector control of an Induction motor. The simulated performances of the FL-MRAC slip gain tuner based IVCIM drive is compared to fuzzy PI controller. The simulated results in different dynamic operating conditions such as sudden change in command speed, step change in load, etc are demonstrated through necessary waveforms. The comparison of simulated results show that the fuzzy logic MRAC slip gain tuner based IVCIM drive is more robust and effective in minimizing the detuning effect in the drive due to parameter variations and model uncertainties.

Reference

- B.K. Bose, power electronics and AC Drive. Englewood Cliffs, NJ. Prentice hall, 1986
- M. Masiala, B. Vafakhah, A. Knight and J. Salmon, “Performances of PI and Fuzzy-Logic
Performance Analysis of Field Oriented Induction Motor using Fuzzy PI and Fuzzy Logic based Model Reference Adaptive Control


Index Terms
Computer Science  Power Systems

Key words
Fuzzy logic  PI controller  field oriented induction motor
model reference adaptive control