Title:	Design and Simulation of Discrete Time Optimal Speed Control for an Induction Motor Taking Core Loss and Stray Load Losses into Account
Author(s) Name:	Md. Rifat Hazari, Mohammad Abdul Mannan, Toshiaki Murata, Junji Tamura
Contact Email(s):	mdmannan@aiub.edu
Published Journal Name:	Journal of Power Electronics & Power Systems
Type of Publication:	Journal
Volume:	4 Issue 3
Publisher:	STM Journals
Publication Date:	2014
ISSN:	2321–4244
URL:	https://www.stmjournals.com/index.php?journal=JoPEPS&page=article&op=view&path%5B%5D=5139
Other Related Info.:	Pages 46-56

Power Electronics and Power Systems (STM Journals), Vol. 4, Issue 3, pp. 46-56, 2014.

Abstract:

Generally, the core loss and stray load loss are neglected in the mathematical model of induction motor (IM) to design the decoupling torque and flux control strategy. In order to precisely control the torque and flux, core loss and stray load loss, which are generally neglected, should be considered in the mathematical model of IM to design the controller. Some of literatures have shown how the detuning can be done in the rotor field oriented (RFO) control system to compensate the effects of core loss and stray load loss. But the mathematical modeling of detuning process is very complex which makes the complexity in the case of implementation. A state space model of IM taking core loss and stray load loss imto account is developed to design controller. In this paper, a discrete-time multi-input and multi-output (MIMO) optimal regulator based speed controller is proposed based on the developed state space model. The performances of the design control system has been verified by the simulation work which has been done by using Matlab/Simulink. The proposed controller is robust under the variation of load torue and parameters. The simulation results also show the good performance of speed control system to reduce the overshoot and steady-state error.

Keywords: Induction motor, core losses, stray-load loss, Matlab, simulink