URN etd-0407109-183712-923
Author Fu-Kai Tu
Author's Email Address No Public.
Statistics This thesis had been viewed 43 times. Download 0 times.
Department
Year 2002
Semester 2
Degree Master
Type of Document Master's Thesis
Language zh-TW.Big5 Chinese
Title Design and implementation of an adaptive fuzzy controller for PMSM using floating-point DSP

Date of Defense 0000-00-00
Page Count 101

Keyword
Permanent magnet sychronous moter
FPGA
DSP
Adaptive fuzzy control

Abstract
The main purpose of this thesis is focus on combining a floating-point DSP and a FPGA chip to develop a high performance drives for permanent magnet synchronous motors (PMSM). First, a FPGA chip of Altera FLEX EPF10K100A which possesses the characteristics of fast response is used to design the current vector control structure of PMSM, or the detection of the quadrature encoder pulse and magnetic poles, field oriental control, SVPWM calculation and current loop PI controller are all implemented in a FPGA chip. Second, a floating-point DSP chip of TI TMS320C6711 with the fast computation is adopted to develop an adaptive fuzzy controller in the velocity loop of the motor drives. Therefore, the combinations of DSP_based software intelligent speed control techniques and FPGA_based IC realization techniques for current vector control will make drives of PMSM more programmable, robust and easy implementation. In this thesis, except the derivation of the adaptive fuzzy controller for a PMSM, an experimental system which includes a PMSM, DSP control board, FPGA experimental board, inverters, rectifier and a set of PC has been set up and verified the effectiveness of the proposed architecture.
Advisory Committee Ying-Shieh Kung - advisor

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Date of Submission 2003-07-23