An Experimental Study of A Permanent Magnet DC Brushless Motor Servo Driver Basing On DSP

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ABSTRACT

DC brushless motor possesses some characters, such as high torque, high power density, and so on. Through appropriate electronic commutator, it can perform as well performing character as common DC brush motor, it is attracting more and more attention from the application of servo system. This thesis focuses on the control of TMS320F240 Digital signal processor chip which produced by Texas Instrument corporation, undertaking the research and development for three phase driving circuit and controller of DC brushless motor, developing a digital servo driving system. In driving circuit, for the purpose of producing an actuator which is simple structure, inexpensive cost and excellent performance, we done it completely independent rather than adapted the actuating model which produced by arbitrary corporation. In driving style, utilizing the match of Hall element, encoder and the output signal of back EMF, achieving the electronic commutator of both six step square wave PWM and sinusoidal wave PWM. In controller, determining the transfer function of system by utilizing system identification, in order to provide reference information for designing the parameters of PID controller, achieving the velocity and position control of brushless motor. Finally, assisting with Simulink ’ s software, simulating the dynamic response of system and comparing it with measured waveform, so as to verify the correctness of context which this thesis describes.

Keywords : DC brushless motor ; TMS320F240 digital signal processor ; Hall element ; Back EMF(electromotive force) ; encorder ; six step square wave PWM(pulse width modulation) ; sinusoidal wave PWM ; PID controller

Table of Contents

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