

Fuzzy logic based DSP controlled servo position control for ultrasonic motor

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Abstract

In this paper, position control of an ultrasonic motor was implemented on the basis of fuzzy reasoning. A digitally controllable two phase serial resonant inverter was developed to drive the ultrasonic motor by using a TMS320F243 digital signal processor. The driving frequency was used as a control input in the position control loop. The position characteristics obtained from the proposed drive and control system were demonstrated and evaluated by experiments. The experimental results verify that the developed position control scheme is highly effective, reliable and applicable for the ultrasonic motor.

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1. Introduction

The ultrasonic motor (USM) is a new type of motor that has different construction, characteristics and operating principles than the commonly used conventional electromagnetic motors. In recent years, a variety of novel types of USMs featuring high holding torque, high torque at low speed, no electromagnetic noise, silent operation, compactness and flexible design possibilities in their configuration have attracted special interest as servo actuators in direct drive motion control applications [1,2]. The USM is particularly superior in high holding torque and high response characteristics. As a result, it was expected to be used as a precise and accurate positioning actuator [3].

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