Speed Tracking Control for Micro Stepping Driver Systems

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ABSTRACT

This thesis proposes a neural fuzzy network controller (NFNC) for the speed tracking control of linear micro-stepping motors. Linear micro-stepping deriver system has to suffer from nonlinear friction, unknown payload, parameter variation, and high-frequency dynamics in their dynamics. These effects will induce mechanical instability and vibration under low speed motion. In this thesis, an intelligent controller which combines the neural network with the fuzzy logic is developed to overcome these external disturbances. Back-propagation training algorithms are derived to on-line adjust all network parameters. In the hardware, the linear micro-stepping driver system includes a personal computer, a DMC-18x2 driver card, an E-DC driver and a linear hybrid stepping motor. Moreover, a control program is developed for the linear micro-stepping driver system to complete a high-precision speed control using Borland C++ software. Finally, Experiments on a practical linear micro-stepping driver system via the proposed control scheme and a PID controller to compare and verify the excellence of the proposed NFNC methodology.

Keywords : Linear stepping motor Driver Neural fuzzy network

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