

Adaptive fuzzy-neuro-wavelet dynamic sliding-mode control for a BLDC motor

許駿飛, 彭凱霖

Electrical Engineering

Engineering

fei@chu.edu.tw

Abstract

In this paper, an adaptive fuzzy-neuro-wavelet dynamic sliding-mode control (AFDSC) system which is composed of a neural controller and a switching compensator is proposed. The neural controller using a fuzzy wavelet neural network is the main controller, and the switching compensator is designed to eliminate the approximation error introduced by neural controller. The adaptation laws of the AFDSC system are derived in the sense of Lyapunov function, thus the system can be guaranteed to be stable. Finally, the proposed AFDSC system is implemented based on a field programmable gate array (FPGA) chip for low-cost and high-performance industrial applications and it is applied to control a brushless DC (BLDC) motor. The experimental results demonstrate the proposed AFDSC scheme can achieve favorable control performance without occurring chattering phenomena.

Keyword : adaptive control, neural control