Chattering-free adaptive wavelet neural network control for a BLDC motor via dynamic sliding-mode approach

許駿飛,王志湖
Electrical Engineering
Engineering
fei@chu.edu.tw

Abstract

In this paper, a chattering-free adaptive wavelet neural network controller (CAWNNC) is proposed using the dynamic sliding-mode approach. The proposed CAWNNC system is composed of a neural controller and a switching compensator. The neural controller uses a wavelet neural network to online approximate an ideal controller, and the switching compensator is designed to eliminate the approximation error introduced by neural controller. Finally, the proposed CAWNNC 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 to show its effectiveness. The experimental results demonstrate the proposed CAWNNC scheme can achieve favorable control performance without occurring chattering phenomena.

Keyword：Adaptive control, Wavelet neural network, Brushless DC motor