

FPGA-base adaptive wavelet neurocontroller design for DC-DC converter

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Abstract

DC-DC converters are the devices which can convert a certain electrical voltage to another level of electrical voltage. They are very popular used because of the high efficiency and small size. This paper proposes an adaptive wavelet neurcontroller system for the DC-DC converters. The proposed adaptive wavelet neurcontroller system is composed of a neural controller and a robust controller. The neural controller uses a wavelet neural network (WNN) to online mimic an ideal controller, and the robust controller is designed to achieve tracking performance with desired attenuation level. Finally, a field-programmable gate array chip is adopted to implement the proposed adaptive wavelet neurcontroller scheme for possible low-cost and high-performance industrial applications. The experimental results are provided to demonstrate the proposed adaptive wavelet neurcontroller system can cope with the input voltage and load resistance variations to ensure the stability while providing fast transient response.

Keyword : Adaptive control; robust control; wavelet neural network; DC-DC converter