

Adaptive tuning wavelet neural controller design with a smooth compensator

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Abstract

In this paper, an adaptive tuning wavelet neural control (ATWNC) is proposed. The proposed ATWNC system is composed of a wavelet neural controller and a smooth compensator. The wavelet neural control is utilized to approximate an ideal controller and the smooth compensator is used to remove the chattering phenomena of conventional sliding-mode control completely. In the ATWNC, the learning algorithm is derived based on the Lyapunov function, thus the closed-loop system's stability can be guaranteed. Then, the proposed ATWNC approach is applied to a second-order chaotic nonlinear system to investigate the effectiveness. Through the simulation results, the proposed ATWNC scheme can achieve favorable tracking performance and the convergence of the tracking error and control parameters can be accelerated by the developed PI adaptation learning algorithm.

Keyword : Adaptive control, neural control, chaotic system, wavelet neural network