

Adaptive TSK-type Self-evolving Neural Control for Unknown Nonlinear Systems

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Abstract

In this paper, a real-time approximator using a TSK-type self-evolving neural network (TSNN) is studied. The learning algorithm of the proposed TSNN not only automatically online generates and prunes the hidden neurons but also online adjusts the network parameters. Then, an adaptive TSK-type self-evolving neural control (ATSNC) system which is composed of a neural controller and a smooth compensator is proposed. The neural controller uses a TSNN to approximate an ideal controller and the smooth compensator is designed to eliminate the effect of the approximation error introduced by the neural controller upon the system stability in the Lyapunov sense. Finally, the proposed ATSNC system is applied to a chaotic system to illustrate its effectiveness. It shows by the simulation results that a favorable control performance can be achieved by the proposed ATSNC scheme.

Keyword : adaptive control, neural control, TSK-type neural network