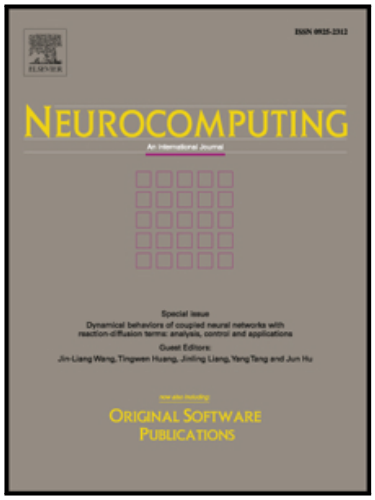
Communicated by Dr Bin xu

Accepted Manuscript



Constrained Adaptive Neural Control for a Class of Nonstrict-Feedback Nonlinear Systems with Disturbances

Kenan Yong, Mou Chen, Qingxian Wu

PII: S0925-2312(17)31252-3
DOI: 10.1016/j.neucom.2017.07.015
Reference: NEUCOM 18703

To appear in: *Neurocomputing*

Received date: 26 March 2017
Revised date: 20 June 2017
Accepted date: 5 July 2017

Please cite this article as: Kenan Yong, Mou Chen, Qingxian Wu, Constrained Adaptive Neural Control for a Class of Nonstrict-Feedback Nonlinear Systems with Disturbances, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.07.015

Constrained Adaptive Neural Control for a Class of Nonstrict-Feedback Nonlinear Systems with Disturbances

Kenan Yong[a], Mou Chen[a,*], Qingxian Wu[a]

[a] *College of Automation Engineering, Nanjing University of Aeronautics and Astronautics, 211106 Nanjing, China*

Abstract

This paper focuses on the tracking problem for a class of nonstrict-feedback nonlinear systems with mismatched unknown nonlinear functions and external disturbances. First, a disturbance observer is developed to estimate the disturbance generated by an exogenous system. Then, based on the output of the disturbance observer, a constrained adaptive neural controller is developed for the nonstrict-feedback nonlinear system. In the control scheme design, the modified variable separation approach is applied to establish the relationship between the bounded function of nonstrict-feedback nonlinear function and the error variable. Furthermore, the barrier Lyapunov function is applied to guarantee that full state constraints are not violated. As a result, all the signals of the closed-loop system are semi-global uniformly ultimately bounded. Finally, two simulation examples are used to demonstrate the effectiveness of the developed constrained adaptive neural control law.

Keywords: Nonstrict-Feedback System, Barrier Lyapunov Function, Disturbance Observer, Adaptive Neural Control.

*Corresponding author
Email address: chenmou@nuaa.edu.cn (Mou Chen)