

Accepted Manuscript

Adaptive fuzzy tracking control for a class of high-order switched uncertain nonlinear systems

Xinyong Wang, Hongmin Li, Guangdeng Zong, Xudong Zhao

PII: S0016-0032(17)30381-2
DOI: [10.1016/j.jfranklin.2017.08.008](https://doi.org/10.1016/j.jfranklin.2017.08.008)
Reference: FI 3091

To appear in: *Journal of the Franklin Institute*

Received date: 21 September 2016
Revised date: 27 March 2017
Accepted date: 5 August 2017

Please cite this article as: Xinyong Wang, Hongmin Li, Guangdeng Zong, Xudong Zhao, Adaptive fuzzy tracking control for a class of high-order switched uncertain nonlinear systems, *Journal of the Franklin Institute* (2017), doi: [10.1016/j.jfranklin.2017.08.008](https://doi.org/10.1016/j.jfranklin.2017.08.008)



This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Adaptive fuzzy tracking control for a class of high-order switched uncertain nonlinear systems

Xinyong Wang^a, Hongmin Li^a, Guangdeng Zong^b, Xudong Zhao^{c,a}

^aCollege of Engineering, Bohai University, Jinzhou 121013, Liaoning, China.

^bSchool of Engineering, Qufu Normal University, Rizhao 276826, China.

^cFaculty of Electronic Information and Electrical Engineering, Dalian University of Technology, Dalian 116024, Liaoning, China.

Abstract

In this paper, adaptive fuzzy tracking control is investigated for a class of high-order switched nonlinear systems. The considered systems possess the characteristic of completely unknown nonlinear functions and arbitrary switchings. An efficient fuzzy adaptive control method is established by combining the common Lyapunov function method with adding a power integrator approach. A common assumption that is widely used in high-order nonlinear systems with or without switching is removed. Because the unknown nonlinearities can be approximated by using fuzzy logic systems, our proposed method is more flexible and applicable. Furthermore, some effective parameters are introduced such that the obtained results can guarantee that the practical output tracking performance can be realized via easily tuning the controller design parameters. On the other hand, to solve the problem of over-parameterization, a result with only one adaptive law is given. Finally, simulation results are addressed to show the effectiveness of the theoretical approaches.

Keywords: High-order switched nonlinear systems, tracking control, fuzzy approximator.

1. Introduction

During the past decades, switched nonlinear systems have received a lot of attention. They are a special class of hybrid systems, see, e.g., [1, 2, 3, 4, 5, 6, 7, 8, 9] and the references therein. The switched system consists of a group of subsystems and a switching signal which assigns an active subsystem at each

^{*}This work was partially supported by the National Natural Science Foundation of China (61573069), the Liaoning Provincial Natural Science Foundation, China (2015020053), and the Fundamental Research Funds for the Central Universities (DUT16RC(3)033).

Email addresses: wangxinyong1993@gmail.com (Xinyong Wang), fslhongmin@gmail.com (Hongmin Li), lovelyletian@gmail.com (Guangdeng Zong), xdzhaohit@gmail.com (Xudong Zhao)

Download English Version:

<https://daneshyari.com/en/article/6953216>

Download Persian Version:

<https://daneshyari.com/article/6953216>

[Daneshyari.com](https://daneshyari.com)