

工程与应用

## 自适应模糊全局快速Terminal滑模控制方法

张伟<sup>1</sup>, 孙秀霞<sup>1</sup>, 秦硕<sup>1</sup>, 王鹏翔<sup>2</sup>

1.空军工程大学 工程学院 自动控制工程系, 西安 710038

2.空军第四飞行学院, 石家庄 301612

收稿日期 2008-5-26 修回日期 2008-9-1 网络版发布日期 2009-9-28 接受日期

**摘要** 提出了一种自适应模糊全局快速Terminal滑模控制方法, 在参数不确定性和外干扰情况下, 为解决系统的非线性不确定性提供了一种新途径。与传统模糊Terminal滑模控制相比, 通过采用模糊逻辑系统来逼近未知系统函数和开关项; 鲁棒自适应律用来减小逼近误差, 从而有效降低抖振; 证明了该控制方案的稳定性, 并将该方案应用在倒立摆系统中。仿真结果验证了该方案的有效性。

**关键词** [自适应模糊控制](#) [全局快速Terminal滑模控制](#) [非线性系统](#) [逼近](#)

**分类号** [TP39](#)

## Novel adaptive fuzzy global fast terminal sliding mode control method

ZHANG Wei<sup>1</sup>, SUN Xiu-xia<sup>1</sup>, QIN Shuo<sup>1</sup>, WANG Peng-xiang<sup>2</sup>

1. Automatic Control Engineering Department, Institute of Engineering, Air Force Engineering University, Xi'an 710038, China

2. The Fourth Air Force Flight Academy, PLA, Shijiazhuang 301612, China

### Abstract

A novel adaptive fuzzy global fast terminal sliding mode control scheme is proposed. On the condition of parametric uncertainties and disturbance, it provides a new method to resolve the nonlinear uncertainty of system. Compared to the conventional fuzzy terminal sliding mode control, in the proposed scheme, fuzzy logic systems are used to approximate the unknown system functions and switch item. Robust adaptive law is used to reduce the approximation errors, thus the chattering phenomenon is alleviated effectively. Stability of the proposed control scheme is proved and the scheme is applied to an inverted pendulum system. Simulation studies show the effectiveness of the proposed method.

**Key words** [adaptive fuzzy control](#) [global fast terminal sliding mode control](#) [nonlinear system approximation](#)

DOI: 10.3778/j.issn.1002-8331.2009.27.069

通讯作者 张伟

### 扩展功能

#### 本文信息

▶ [Supporting info](#)

▶ [PDF\(446KB\)](#)

▶ [\[HTML全文\]\(0KB\)](#)

▶ [参考文献](#)

#### 服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

▶ [文章反馈](#)

▶ [浏览反馈信息](#)

#### 相关信息

▶ [本刊中包含“自适应模糊控制”的相关文章](#)

▶ [本文作者相关文章](#)

- [张伟](#)
- [孙秀霞](#)
- [秦硕](#)
- [王鹏翔](#)