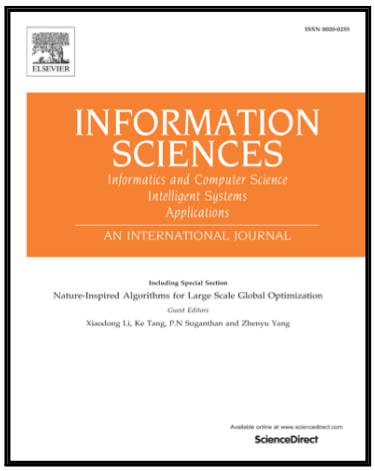

Robust adaptive fuzzy fault-tolerant control for a class of non-lower-triangular nonlinear systems with actuator failures

Huanqing Wang, Xiaoping Liu, Peter Xiaoping Liu, Shuai Li

PII: S0020-0255(15)00897-X
DOI: 10.1016/j.ins.2015.12.008
Reference: INS 11916

To appear in: *Information Sciences*

Received date: 25 March 2015
Revised date: 22 November 2015
Accepted date: 4 December 2015

Please cite this article as: Huanqing Wang, Xiaoping Liu, Peter Xiaoping Liu, Shuai Li, Robust adaptive fuzzy fault-tolerant control for a class of non-lower-triangular nonlinear systems with actuator failures, *Information Sciences* (2015), doi: 10.1016/j.ins.2015.12.008

Robust adaptive fuzzy fault-tolerant control for a class of non-lower-triangular nonlinear systems with actuator failures *

Huanqing Wang[1,3†], Xiaoping Liu[2], Peter Xiaoping Liu[3] and Shuai Li[4]

[1] School of Mathematics and Physics, Bohai University, Jinzhou 121000, Liaoning, P. R. China,

[2] Faculty of Engineering, Lakehead University, Thunder Bay, ON P7B 5E1, Canada,

[3]Department of Systems and Computer Engineering, Carleton University, Ottawa, ON K1S 5B6, Canada,

[4] Department of Computing, Hong Kong Polytechnic University, Hung Hom, Kowloon, Hong Kong.

Abstract: In this paper, the problem of adaptive fuzzy fault-tolerant tracking control is studied for a class of non-lower-triangular nonlinear systems with actuator failures. According to the same structure of virtual control inputs and the monotonously increasing property of the bounding functions, a variable separation approach is proposed. By applying the backstepping technique, an adaptive fuzzy control approach is presented which can guarantee the semi-global boundedness of all signals within the closed-loop system. The tracking error using the proposed control scheme eventually converges to a small neighborhood of the origin.

KEY WORDS: Non-lower-triangular nonlinear systems, Adaptive fuzzy control, Actuator failures, Backstepping.

*This work is partially supported by the Natural Science Foundation of China (61304002, 61304003 and 61175072) and National 863 Project 2013AA013804.

†Corresponding author. E-mail address: ndwhq@163.com (H. Wang)