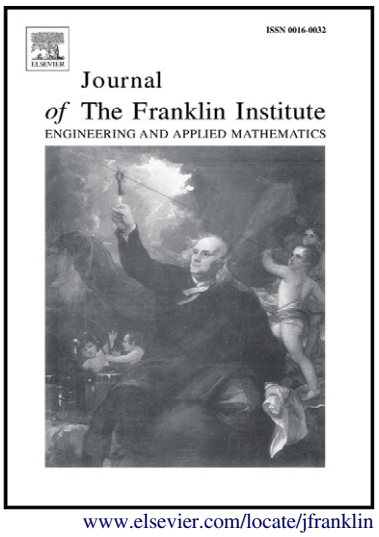
Author's Accepted Manuscript



www.elsevier.com/locate/jfranklin

An improved robust stabilization method for discrete-time fuzzy systems with time-varying delays

A. Gonzalez, T.M. Guerra

PII: S0016-0032(14)00218-X
DOI: http://dx.doi.org/10.1016/j.jfranklin.2014.08.001
Reference: FI2085

To appear in: *Journal of the Franklin Institute*

Received date: 5 January 2014
Revised date: 25 June 2014
Accepted date: 1 August 2014

Cite this article as: A. Gonzalez, T.M. Guerra, An improved robust stabilization method for discrete-time fuzzy systems with time-varying delays, *Journal of the Franklin Institute,* http://dx.doi.org/10.1016/j.jfranklin.2014.08.001

An improved robust stabilization method for discrete-time fuzzy systems with time-varying delays

A. Gonzalez[a,*], T. M. Guerra[a]

[a] *University of Valenciennes and Hainaut-Cambresis, LAMIH (UMR CNRS 8201), Le Mont Houy, 59313 Valenciennes Cedex 9, France.*
e-mail: angonsor@gmail.com

Abstract

This note focuses on the robust stabilization of discrete-time fuzzy uncertain systems with time-varying delays under a delayed nonparallel distributed compensation scheme. The key idea is twofold: first, the linear matrix inequalities (LMI) proposed here are shown to generalize some previous similar results available in recent literature, and second, the design of control parameters are decoupled from the proposed fuzzy-basis dependent Lyapunov-Krasovskii functional (FBDLKF) by means of Finsler's lemma. Finally, a numerical example is provided to illustrate the effectiveness of this method.

Keywords: Robust stabilization; Fuzzy time-varying delay systems; I/O Approach; Linear matrix inequality (LMI).

1. Introduction

Over the past decades, Takagi-Sugeno (T-S) fuzzy models [1] have been extensively accepted by the control community, since they represent a powerful tool to deal with the robust stability analysis and stabilization of nonlinear systems [2]. In fact, a large number of complex nonlinear systems (i.e, the internal combustion engine system [3], the quadrotor helicopter [4], etc) can be represented by a weighted sum of linear subsystems, blended together with some nonlinear scalar functions satisfying the convex sum property. Thus, the advantages of T-S models are twofold: 1) T-S fuzzy models provide a

*Corresponding author
[1]Email address: angonsor@gmail.com (A. Gonzalez)