



Passive Delayed Static Output Feedback Control for a Class of T-S Fuzzy Systems

X. Song^{1,3}, J. Lu², S. Xu^{1*} and H. Shen¹

¹ School of Automation, Nanjing University of Science and Technology, Nanjing 210094, China

² School of Electrical and Automation Engineering, Nanjing Normal University,
Nanjing 210042, China

³ Electronic and Information Engineering College,
Henan University of Science and Technology, Luoyang 471003, China

Received: April 2, 2010; Revised: March 31, 2011

Abstract: This paper investigates the problem of passive delayed static output feedback control for a class of fuzzy systems. The system is described by a state-space Takagi–Sugeno (T-S) fuzzy model with additive delays and interval parameter uncertainties. The aim is to design a fuzzy delayed static output feedback controller which ensures the closed-loop system is passive for all admissible uncertainties. In terms of linear matrix inequalities, a delay-dependent condition for the solvability of the above passive control problem is presented. A simulation example is provided to illustrate the effectiveness of the proposed design approach.

Keywords: *passive control; static output feedback; additive delays; T-S fuzzy models; interval parameter uncertainties.*

Mathematics Subject Classification (2000): 93C42, 93D09, 93D15.

1 Introduction

It is known that Takagi–Sugeno (T-S) fuzzy model, which is described by IF–THEN rules, provides an effective way to represent complex nonlinear systems in terms of fuzzy sets linear sub-systems [1, 13]. Time delays are commonly encountered in various engineering systems. Considerable attention has been paid to the stability analysis and synthesis for T-S fuzzy systems with time delays [12, 16], these results can be classified into two categories, namely, delay independent and delay dependent results. In most of these works, the state vector has a single delay. In this paper, we consider a class of T-S

* Corresponding author: <mailto:syXu02@yahoo.com.cn>