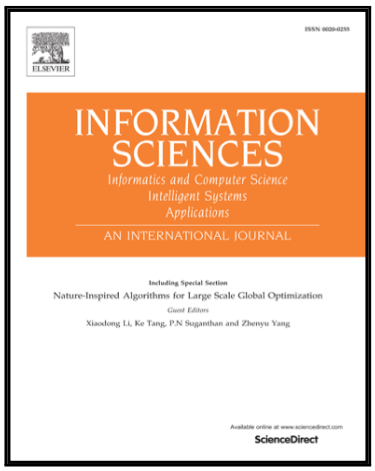

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Fuzzy-model-based admissibility analysis and output feedback control for nonlinear discrete-time systems with time-varying delay

Jian Chen, Chong Lin, Bing Chen, and Qing-Guo Wang

Abstract

This paper is concerned with the admissibility analysis and stabilization problems for singular fuzzy discrete-time systems with time-varying delay. The novelty of this paper comes from the consideration of a new summation inequality which is less conservative than the usual Jensen inequality, the Abel-Lemma based inequality and the Seuret inequality. Based on the inequality, sufficient conditions are established to ensure the systems to be admissible. Moreover, the corresponding conditions for the existence of desired static output feedback controller gains are derived to guarantee that the closed-loop system is admissible. The conditions can be solved by a modified cone complementarity linearization (CCL) algorithm. Examples are given to show the effectiveness of the proposed method.

Keywords: time-delay, T-S fuzzy model, discrete-time system, admissibility, static output feedback.

I. Introduction

The phenomenon of delays is very common in many practical situations like industry process, internet environment, economic and biological systems. Many results on stability analysis and control issues related to time-delay systems have been proposed in [7], [8], [10], [13], [16], [20], [22]–[24], [26], [27], [29]–[31], [41], [48]–[50]. There have been many methods based on various tools. A substantial part of results is based on Lyapunov-Krasovskii functional (LKF) method [18]. The derivative/forward difference of V

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