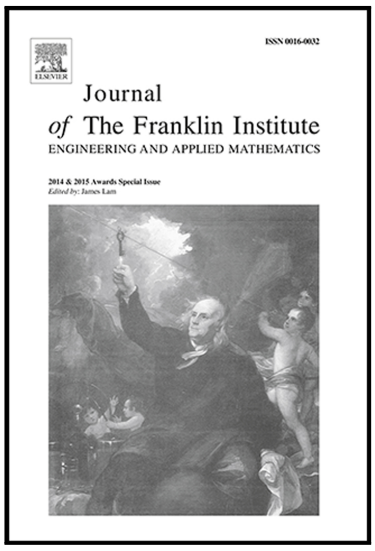

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Asynchronous Output Feedback Control of Time-Varying Markovian Jump Systems Within A Finite-Time Interval

Jun Song, Yugang Niu†, and Yuanyuan Zou

Abstract

This work addresses the asynchronous output feedback control for time-varying Markovian jump systems. The parameter uncertainties enter the system in random ways according to a determined mode-dependent Bernoulli distributed white sequence. The non-synchronization phenomenon between the system modes and controller modes is modeled as a hidden Markov model. By means of intensive stochastic analysis and recursive matrix inequality techniques, sufficient conditions are attained to ensure the finite-time stochastic boundedness of the closed-loop system with a satisfied H_∞ disturbance rejection level. Moreover, an iterative algorithm is established for designing asynchronous output feedback controller. Finally, simulation results are given to illustrate the proposed design scheme.

Keywords: Asynchronous Control, Hidden Markov Model, Output Feedback, Finite-Time Stability

I. Introduction

Dynamic systems with Markovian jump parameters have received considered attention since they may effectively model physical plants with abrupt variations in their structures, such as random failures or repair of components, sudden environmental disturbances, executor faults, etc. A variety of results on the analysis and synthesis of Markovian jump systems have been obtained, for example, system filtering in [1], [2], [3], [4], H_∞ control [5], [6], [7], sliding mode control in [8], [9], [10], the fault detection in [11], [12], and so on.

Notice that in real applications, it is rather difficult for the mode information of plant to be completely accessible to the controller due to various causes, such as communication delays and observation errors, which occur the non-synchronous (i.e., *asynchronous*) nature inevitably. Hence, asynchronous control/filtering problems have recently begun to receive more attentions for Markovian jump systems. The resilient asynchronous H_∞ filtering problem for a class of discrete-time Markov jump neural networks with time-delays was concerned in [13]. By introducing a hidden Markov model approach, the issue of asynchronous passive controller design problem was addressed in [14]. More recently, the problem of finite-time asynchronous H_∞ control for Markov jump systems with input constraints has been studied in [15]. It is worth pointing out that, although some initial efforts have been made on the asynchronous filtering/control problems, all of them have been concerned with *time-invariant* Markovian jump systems

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