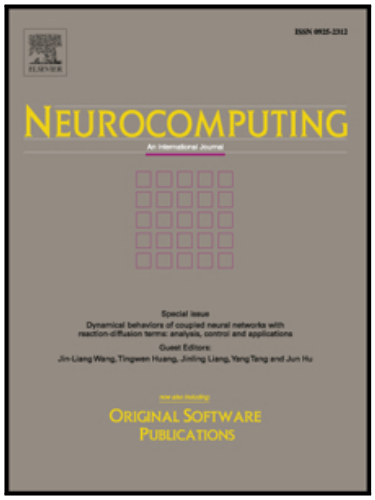
communicated by Dr. Jin-Liang Wang

# Accepted Manuscript

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PII: S0925-2312(17)30834-2
DOI: 10.1016/j.neucom.2017.04.063
Reference: NEUCOM 18431

To appear in: *Neurocomputing*

Received date: 10 November 2016
Revised date: 23 March 2017
Accepted date: 24 April 2017

Please cite this article as: R. Sasirekha, R. Rakkiyappan, Extended Dissipativity State Estimation for Switched Discrete-time Complex Dynamical Networks with Multiple Communication Channels: A Sojourn Probability Dependent Approach, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.04.063

# Extended Dissipativity State Estimation for Switched Discrete-time Complex Dynamical Networks with Multiple Communication Channels: A Sojourn Probability Dependent Approach

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**Abstract:** In this paper the problem of extended dissipative state estimation for discrete-time switched complex dynamical networks (CDNs) with mixed time delays is investigated. The switching approach is based on sojourn probabilities and it is assumed that these probabilities are known aprior. One primary channel and multiredundant channels which constitute multiple communication channels are considered to coexist for the state estimation of underlying switched CDNs. To solve for the $H_\infty$, $l_2-l_\infty$, passive and dissipative state estimation, the concept of the extended dissipativity is used by adjusting the weighting matrices in a new performance index. Suitable Lyapunov-Krasovskii functional is constructed in terms of Kronecker product and based on the Lyapunov stability theory, new delay-dependent sufficient stability conditions are derived in terms of linear matrix inequalities (LMIs). The effectiveness of the developed theoretical results is demonstrated via a numerical example.

**Keywords:** State estimation, switched CDNs, extended dissipativity, multiple communication channels, sojourn probability.

## 1 Introduction

There has been increasing an research interest in the dynamics analysis of complex dynamical networks (CDNs), right from the pioneering work of Watts and Strogatz [1]. CDNs constitutes a major class of practical systems which are ever-present in the real world, and representative cases of CDNs range from neural networks, social networks, ecological prey-predator networks, to gene expression and protein networks. The investigation of complex networks tackles with the network whose structure is irregular, complex and networks with highly interconnected nodes, which progress dynamically with respect to time [2]. Complicated dynamics which are exhibited by these systems are represented by a set of interconnected nodes, edges and coupling strength. The techniques of synchronization and state estimation for CDNs can be found in [3], [4], [5], [6], [7], [8].

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