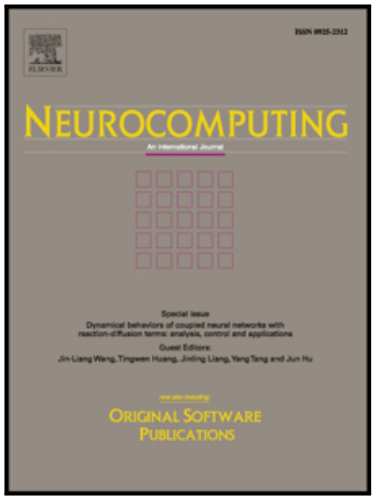
Communicated by Dr. Jin-Liang Wang

Accepted Manuscript



Synchronization of Memristive Delayed Neural Networks Via Hybrid Impulsive Control

Huamin Wang, Shukai Duan, Tingwen Huang, Jie Tan

PII: S0925-2312(17)31156-6
DOI: 10.1016/j.neucom.2017.06.028
Reference: NEUCOM 18627

To appear in: *Neurocomputing*

Received date: 14 February 2017
Revised date: 6 May 2017
Accepted date: 18 June 2017

Please cite this article as: Huamin Wang, Shukai Duan, Tingwen Huang, Jie Tan, Synchronization of Memristive Delayed Neural Networks Via Hybrid Impulsive Control, *Neurocomputing* (2017), doi: 10.1016/j.neucom.2017.06.028

Synchronization of Memristive Delayed Neural Networks Via Hybrid Impulsive Control

Huamin Wang[a], Shukai Duan[b], Tingwen Huang[c], Jie Tan[d]

[a] Department of Mathematics, Luoyang Normal University, Luoyang, Henan 471022, China

[b] College of Electronic and Information Engineering, Southwest University, Chongqing 400715, China

[c] Department of Science, Texas A&M University at Qatar, Doha 23874, Qatar

[d] College of Mathematics, Chongqing University of Science and Technology, Chongqing 401331, China

Abstract. Synchronization control problem is an important problem for the dynamical behaviors of neural networks. In this paper, by structuring hybrid impulsive and feedback controllers, synchronization problem of the memristive delayed neural networks is firstly promoted. Then, based on differential inclusions, several synchronization criteria for the memristive delayed neural networks are obtained by impulsive control theories, special inequalities and Lyapunov-type functional. In order to deduce synchronization conditions, the hybrid impulsive and feedback controllers are simultaneously used to control the memristive delayed neural networks, which promote and enrich the published results. Finally, the effectiveness of synchronization criteria is illustrated by two numerical examples.

Keywords: Synchronization; Memristive delayed neural networks; Hybrid impulsive control

1 Introduction

With the progress of technology, artificial neural networks (ANN) have been widely used in various fields such as pattern recognition, image analysis, signal processing, combinatorial optimization, etc. [1–7]. Over the past decades, Hopfield neural networks (HNNs), Cohen-Grossberg neural networks (CGNNs), bidirectional associative memories neural networks (BAMNN), cellular neural networks (CNNs) and memristive neural networks (MNNs) have been extensively studied on some relative problems of theory and application [7–17].

Since neural networks (NNs) can be implemented by very large scale integration(VLSI), when the fourth basic passive circuit element memristor, predicted by Prof. Chua in 1971 [18], was built in 2008 [19], it has deeply promoted the investigation of NNs. In recent years, a new NN model, named as MNN [20–27], has attracted much attention because it may be used to mimic the human brain [11]. Since the dynamic behaviors of MNN are very important for its application in the reality, they have been widely investigated. For instance, the authors in [20–22] formulated the MNNs and investigated their exponential stability by means of several differential methods. In [23–27], the authors studied synchronization of different MNNs by structuring various Lyapunov functionals.