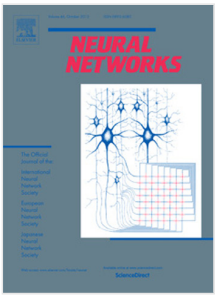
Accepted Manuscript



New results on exponential synchronization of memristor-based neural networks with discontinuous neuron activations

Abdujelil Abdurahman, Haijun Jiang

PII: S0893-6080(16)30121-6
DOI: http://dx.doi.org/10.1016/j.neunet.2016.09.003
Reference: NN 3665

To appear in: *Neural Networks*

Received date: 12 May 2016
Revised date: 9 August 2016
Accepted date: 5 September 2016

Please cite this article as: Abdurahman, A., & Jiang, H. New results on exponential synchronization of memristor-based neural networks with discontinuous neuron activations. *Neural Networks* (2016), http://dx.doi.org/10.1016/j.neunet.2016.09.003

New results on exponential synchronization of memristor-based neural networks with discontinuous neuron activations

Abdujelil Abdurahman, Haijun Jiang*

College of Mathematics and System Sciences, Xinjiang University,

Urumqi, 830046, Xinjiang, P.R. China

Abstract. This paper investigates the exponential synchronization of delayed memristor-based neural networks (MNNs) with discontinuous activation functions. Based on the framework of Filippov solution and differential inclusion theory, using new analytical techniques and introducing suitable Lyapunov functionals, some novel sufficient conditions ensuring the exponential synchronization of considered networks are established via two types of discontinuous controls: linear feedback control and adaptive control. In particular, we extend the discontinuous control strategies for neural networks with continuous dynamics to MNNs with discontinuous activations. Numerical simulations are given to show the effectiveness of the theoretical results. Our approach and theoretical results have a leading significance in the design of synchronized MNN circuits involving discontinuous activations and time-varying delays.

Key words: Memristor; Neural network; Exponential synchronization; Discontinuous activation; Time-varying delay

1 Introduction

In conventional neural network models, the strengths of synapses among the neurons are modeled by the connection weights, and in circuit implementation, the connection weights among the neurons are modeled by the conductances of resistors [1, 2]. Though,

*Corresponding author. E-mail: jianghaijunxj@sina.com.