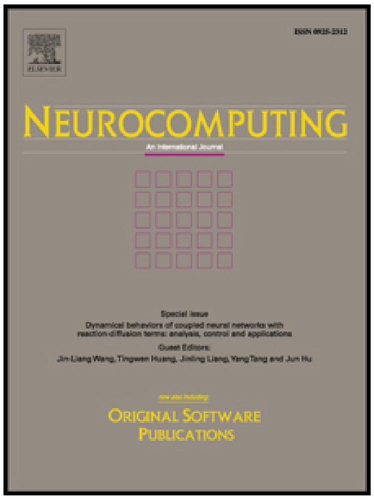
Communicated by Dr Hu Jun

Accepted Manuscript



Improved quasi-synchronization criteria for delayed fractional-order memristor-based neural networks via linear feedback control

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PII: S0925-2312(18)30459-4
DOI: 10.1016/j.neucom.2018.03.060
Reference: NEUCOM 19492

To appear in: *Neurocomputing*

Received date: 20 November 2017
Revised date: 8 March 2018
Accepted date: 26 March 2018

Please cite this article as: Yingjie Fan, Xia Huang, Zhen Wang, Yuxia Li, Improved quasi-synchronization criteria for delayed fractional-order memristor-based neural networks via linear feedback control, *Neurocomputing* (2018), doi: 10.1016/j.neucom.2018.03.060

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Improved quasi-synchronization criteria for delayed fractional-order memristor-based neural networks via linear feedback control *

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Abstract: This paper is concerned with the quasi-synchronization of two delayed fractional-order memristor-based neural networks (FMNNs) with mismatched switching jumps via linear feedback control. The concept of asynchronous switching time interval (ASTI) is introduced first to describe when the drive-response FMNNs update their connection weights asynchronously. Under the framework of fractional-order differential inclusions, two improved quasi-synchronization criteria, expressed by algebraic conditions and LMIs conditions respectively, are established by constructing appropriate Lyapunov functionals in combination with some fractional-order differential inequalities. Different from most previously published works, the synchronization error bound can be estimated without requiring the bound of chaotic trajectories. In addition, it has been shown that the degree of mismatch between the switching jumps has an important influence on the distribution of ASTI as well as the practical synchronization error. Finally, two numerical examples are given to verify the validity and feasibility of the obtained results.

Keywords: Quasi-synchronization; Fractional-order; Memristor-based neural networks; Linear feedback control; Switching jumps; Asynchronous switching time interval.

1 Introduction

In recent years, considerable attention has been attracted to fractional-order dynamical systems due to their widespread applications in many fields such as neural systems [1], financial systems [2], and viscoelastic systems [3]. As a generalization of integration and differentiation from integer-order to arbitrary non-integer order, a distinguished feature of fractional-order systems is that they have long-term memory effects, which makes it suitable for describing various materials and processes more precisely [4]. In the field of electronics, the model of fractional capacitor, formally called the fractance, has been presented, which describes the fractional differentiation constitutive relationship $I(t) = C\frac{d^{\alpha}V(t)}{dt^{\alpha}} \equiv C\, D_t^{\alpha}V(t)$ between the voltage $V(t)$ and the current $I(t)$ passing through it [5]-[6]. Neural networks (NNs) have found a wide scope of applications in signal processing, image processing, combinatorial optimization, pattern recognition, and associative memories. In recent years, as an important application area of fractional-order

*This work was supported by the National Natural Science Foundation of China under Grants 61473178, 61573008 61473177.

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