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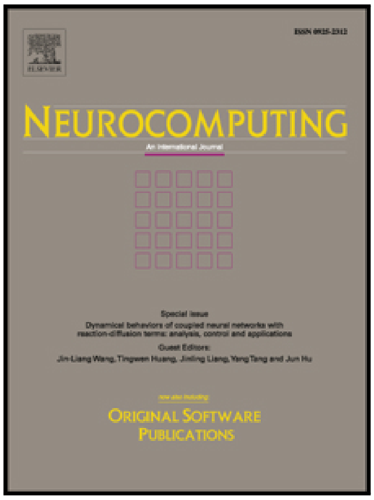

Further synchronization in finite time analysis for time-varying delayed fractional order memristive competitive neural networks with leakage delay

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Further synchronization in finite time analysis for time-varying delayed fractional order memristive competitive neural networks with leakage delay

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Abstract

This article mainly concerns the synchronization in finite-time to the time-varying delay fractional order memristive competitive neural networks (TMFCNNs) with leakage delay. By means of Fillipov's theory, Gronwall-Bellman integral inequality, Hölder's inequality, and the Caputo derivative properties, the novel algebraic sufficient conditions are proposed to guarantee the synchronization in finite time of addressing TMFCNNs with non-integer order: $0 < p < \frac{1}{2}$ and $\frac{1}{2} \leq p < 1$ via finite-time output feedback controller. Up to now, there are no relevant results in fractional order competitive-type neural networks, and this article makes filling up for this gap. The obtained results are improved to some existing results on integer-order memristive competitive neural networks. Finally, two numerical examples with simulations are also designed to confirm the merits of the proposed theoretical results, while we estimate the upper bound of the settling time for the synchronization errors.

Keywords. Synchronization in finite time; Competitive-type neural networks; Memristor; Fractional order; Time-varying delay; Leakage delay.

1 Introduction

Over the past few days, the fractional order dynamical system attracts many researchers in different branches, especially science and engineering. Comparing to the traditional integer order dynamical system, the main distinguished influence of fractional order is that infinite memory and more degrees of freedom because it has nonlocal and weakly singular kernels [7]. As a very suitable instrument, fractional order calculus acted as the description of memory and hereditary properties of various materials and processes [3], and it takes the main role in all manners in different areas such as fluid mechanics [7], system identification [12], viscoelasticity [30], robotics [31] and so on. Moreover, the fractional order dynamical system provides fundamental and general computational ability for one neuron, which can help to signal processing, frequency-independent phase shifts of oscillatory neuronal firing and simulates to human brain [20]. When a network model involves at least one fractional order derivative or fractional integral, it is called a fractional order network model. Recently, the incorporation of neural network models into its fractional derivative is the main area of research in the field concerned,

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