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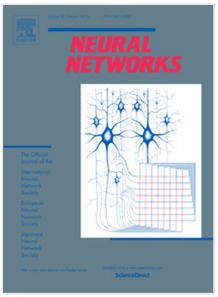


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ACCEPTED MANUSCRIPT

# Robust Fixed-time Synchronization for uncertain Complex-valued Neural Networks with Discontinuous Activation Functions

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**Abstract**

This paper is concerned with the fixed-time synchronization for a class of complex-valued neural networks in presence of discontinuous activation functions and parameter uncertainties. Fixed-time synchronization not only claims that the considered master-slave system realize synchronization within a finite time segment, but also requires a uniform upper bound for such time intervals for all initial synchronization errors. To accomplish the target of fixed-time synchronization, a novel feedback control procedure is designed for the slave neural networks. By means of the Filippov discontinuity theories and Lyapunov stability theories, some sufficient conditions are established for the selection of control parameters to guarantee synchronization within a fixed time, while an upper bound of the settling time is acquire as well, which allows to be modulated to predefined values independently on initial conditions. Additionally, criteria of modified controller for assurance of fixed-time anti-synchronization are also derived for the same system. An example is included to illustrate the proposed methodologies.

*Keywords:* Complex-valued neural networks; robust fixed-time synchronization; anti-synchronization; uncertainties; discontinuous activation function; Filippov solution.

## 1. Introduction

Recently, the complex-valued neural networks(CVNNs) have aroused enormous interest of many scholars owing to their broad application prospects in filtering, optoelectronics, computer vision, remote sensing and speech synthesis [8], [39], [27], [23], [10], etc. Unlike the real valued

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