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Author: <ce:author id="aut0005"
author-id="S0030402617300281-
ff15502f26d2a5982db4f3ec0e6042ca"> Ajit K.
Singh<ce:author id="aut0010"
author-id="S0030402617300281-
58182fca2886f72a4b122454cd8350ed"> Vijay K.
Yadav<ce:author id="aut0015"
author-id="S0030402617300281-
e49c00cb76d5001b4d8ee096e5798bac"> S.
Das



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Synchronization between fractional order complex chaotic systems with uncertainty

Ajit K. Singh, Vijay K. Yadav and S. Das*

Department of Mathematical Sciences, Indian Institute of Technology (BHU), Varanasi - 221005, India.

* *Corresponding author: S. Das;*
e-mail address: sdas.apm@iitbhu.ac.in

Abstract

In this article, the synchronization between fractional order complex chaotic systems with uncertainty is considered using Active control method. Synchronization of the fractional order chaotic systems with uncertainty have already been studied in real variable, but for the case of complex variable it is first of its kind. Due to complexity and the presence of additional variables, it is more interesting and important for the researchers working on the real life problem. The fractional order complex Lorenz system and complex T-system are chosen to address the theoretical result in the presence of uncertain parameters. Numerical simulation is carried out using Adams-Bashforth-Moulton method for different particular cases, which reveals that the method is reliable and effective, even for fractional order complex chaotic systems, and in the presence of uncertain terms.

Keywords: Chaotic system, Synchronization, Fractional derivative, Complex T-system, Complex Lorenz system, Active control method.

1 Introduction

Synchronization of chaotic systems of coupled oscillators is one of the important issues in the frontier of nonlinear dynamics and complex systems. This study provides the understanding of the collective behaviours in many fields, such as the power grids, the flashing of fireflies, the rhythm of pacemaker cells of the heart, and even some social phenomena. Theoretically, the chaotic systems with uncertainty turn out to be paradigms for synchronization problem, which have inspired a wealth of works because of both their simplicity for mathematical treatment and their relevance to practice [1]. The idea of synchronization of two identical or non-identical chaotic systems with different initial conditions was first introduced by Pecora

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