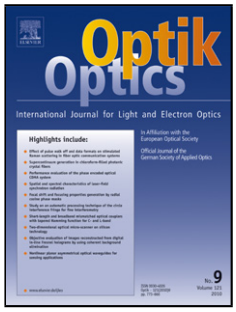

Title: The control of a class of uncertain fractional-order chaotic systems via reduced-order method

Author: Haipeng Su Runzi Luo Yanhui Zeng

PII: S0030-4026(16)31111-1
DOI: http://dx.doi.org/doi:10.1016/j.ijleo.2016.09.092
Reference: IJLEO 58235

To appear in:

Received date: 25-7-2016
Accepted date: 21-9-2016

Please cite this article as: Haipeng Su, Runzi Luo, Yanhui Zeng, The control of a class of uncertain fractional-order chaotic systems via reduced-order method, *<![CDATA[Optik - International Journal for Light and Electron Optics]]>* (2016), http://dx.doi.org/10.1016/j.ijleo.2016.09.092

The control of a class of uncertain fractional-order chaotic systems via reduced-order method

Haipeng Su Runzi Luo Yanhui Zeng
Department of Mathematics, Nanchang University, 330031, P. R. China

Abstract

In this paper we mainly discuss the control of a class of 3,4-dimensional fractional-order chaotic systems with unknown parameter, model uncertainties and external disturbances. Based on the fractional-order extension of Lyapunov stability theorem some novel criteria for the control of a class of 3,4-dimensional fractional-order chaotic systems are proposed via reduced-order method. Moreover, by using our results the control and synchronization of the fractional-order Rössler system is also investigated. Numerical simulations are shown to further verify the feasibility of the presented control schemes.
Keywords: Fractional-order chaotic system; Chaos control; Reduced-order method

1. Introduction

Chaos control and synchronization is a hot topic in the field of nonlinear science since Pecora and Carroll introduced a method to synchronize two identical chaotic systems with different initial conditions. In the literature there are some kinds of synchronization phenomena have been proposed, such as complete synchronization [1], lag-synchronization [2], anti-synchronization [3], phase synchronization [4], generalized synchronization [5], combination synchronization [6], equal combination synchronization [7], etc. In order to control or synchronize chaotic system many different approaches have been developed, such as active control technique [8], adaptive control approach [9], impulsive control method [10], back-stepping technique [11], passive control scheme [12], sliding control method [13], and so on.

Generally, there are two kinds of chaotic systems. One is the integer-order chaotic system and the other is the fractional-order chaotic system. The control and synchronization of integer-order chaotic system have been intensively investigated due to its theoretical challenge and potential applications in secure communications, information science, chemical reactions, biological systems, social science, and many other fields [1-13]. In recent years, the control and synchronization of fractional-order chaotic systems have gained wide attention owing to its application in physics and engineering [14-18]. In order to prove the stability of fractional order nonlinear systems one of techniques that can be applied is the