



Synchronization Between a Fractional Order Chaotic System and an Integer Order Chaotic System

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Abstract: This paper deals with synchronization between a fractional order Coulet chaotic system and an integer order Rabinovich-Fabrikant chaotic system by using tracking control and stability theory of fractional order system. An effective controller is designed to synchronize these two systems. Numerical simulations have been done by using Mathematica and Matlab both. Numerical solutions via Grünwald-Letnikov method have been used in Matlab. Numerical results show that method is effective and feasible.

Keywords: *synchronization; fractional order derivatives; fractional order coulet system, integer order Rabinovich-Fabrikant chaotic system, tracking control method, Grünwald-Letnikov method.*

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1 Introduction

Synchronization is the dynamical process by which two or more oscillators adjust their rhythms due to a weak interaction [38]. This problem has received the great attention in the literature due to its importance in engineering and physical sciences, as well as in the challenging biological and social entities [38, 39, 44]. Chaotic synchronization did not attract much attention until Pecora and Carroll [34] introduced a method to synchronize two identical chaotic systems with different initial conditions in 1990 and they demonstrated that chaotic synchronization could be achieved by driving or replacing one of the variables of a chaotic system with a variable of another similar chaotic device. From then

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