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CHAOS COMBINATION ANTI-SYNCHRONIZATION OF SOME FRACTIONAL-ORDER UNCERTAIN CHAOTIC SYSTEMS PERTURBED BY SOME RANDOM NOISE

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Abstract. Based on some important concepts of fractional calculus and the theorem related to the fractional Lyapunov direct method, chaos combination anti-synchronization (CCAS) of some fractional-order uncertain chaotic systems is studied in this paper. These systems are perturbed by some random noise. To ensure the asymptotic stability of synchronization error system, a new simple adaptive control scheme is introduced. The CCAS technique is designed for a class of some fractional-order chaotic systems. The proposed technique is global and theoretically rigorous. A numerical example is given to illustrate effectiveness of the general scheme, in which the synchronizations between two fractional-order chaotic financial systems and one fractional-order modified coupled dynamos system can be achieved. Numerical simulation results further demonstrate that the proposed methods are effective and robust.

Keywords. Combination anti- synchronization, Chaotic system, Caputo fractional derivative, Lyapunov function, Adaptive control.

AMS (MOS) subject classification: 34A34, 35B35, 37C25, 37N30

1 Introduction

Over the last decades, fractional calculus has attracted importance attention in different fields of science and technology, such as: viscoelasticity, diffusion modeling, control processing, signal transmission and so forth [1, 2, 3, 4, 5, 6]. Many powerful control techniques have been reported to control or synchronize fractional-order chaotic systems [7, 8, 9, 10, 11].

On the other hand, chaos synchronization of fractional-order chaotic systems is one of the most important researchs, due to its real applications in numerous research fields, such as: secure communication, images encryption and control processing [12, 13, 14]. Several synchronization techniques to ensure the asymptotic stability of error synchronization between some types