



On Multi-Switching Synchronization of Non-Identical Chaotic Systems via Active Backstepping Technique

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Received: August 14, 2017; Revised: March 18, 2018

Abstract: An active backstepping scheme is proposed to attain three different types of synchronization between the chaotic Cai system and the Chen system. Complete synchronization, anti-synchronization and hybrid synchronization are accomplished by using the active backstepping method between different switches of the Cai and Chen systems, where the Cai system is considered as a master system and the Chen system is considered as a slave system. The goal is to design appropriate controllers by using the Lyapunov stability criteria and active backstepping method so that asymptotically stable synchronized state for different switches of the master and slave systems can be obtained. The results obtained by theoretical and graphical analysis are in agreement.

Keywords: *active backstepping method; multi-switching synchronization; chaotic systems; Lyapunov stability theory.*

Mathematics Subject Classification (2010): 34D06, 34H10, 93C10.

1 Introduction

In the area of applied sciences “chaos” is an important field as one of its beautiful features is its applications in several areas such as ecology, secure communication, medicine, biology etc. So many integer order chaotic and hyperchaotic systems have been obtained after the invention of the classical “Lorenz system” in 1963, and so many chaotic and hyperchaotic systems have also been developed in the field of fractional calculus. In the field of chaos, synchronization has been a fascinating branch for the last three decades and researchers have shown their interest to this branch.

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