Reduced Order Function Projective Combination Synchronization of Three Josephson Junctions Using Backstepping Technique

K.S. Ojo [1*], A.N. Njah [1], S.T. Ogunjo [2] and O.I. Olusola [1]

[1] *Department of Physics, Faculty of Science, University of Lagos, Lagos, Nigeria*
[2] *Condensed Matter Research Group, Department of Physics, Federal University of Technology, Akure, Ondo State, Nigeria*

Abstract: In this paper, a new synchronization scheme, combination synchronization, is used to realize reduced order function projective synchronization among three chaotic Josephson junction systems using backstepping technique. In the first case, function projective synchronization of two (2) third order drive systems with a single second order Josephson junction is considered while in the second case, a single third order system is synchronized with two (2) second order system using backstepping. Controllers are designed and simulated to show the efficacy of combination synchronization scheme.

Keywords: *function projective; reduced order synchronization; Josephson junction; combination synchronization.*

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

1 Introduction

Synchronization between two chaotic systems has evolved greatly since its proposition by Pecora and Caroll [1]. Many types of synchronization schemes have been proposed and implemented including complete synchronization (CS) [1], projective synchronization (PS) [2, 3], lag synchronization (LS) [4], modified projective synchronization [5] while techniques such as adaptive control method [6], active control [7], active backstepping [2] and feedback control [8] have been used for design of controllers. Backstepping scheme has been efficient in the design technique for stabilization, tracking and synchronization

---

* Corresponding author: mailto:kaystephe@yahoo.com