



Increased Order Generalized Combination Synchronization of Non-Identical Dimensional Fractional-Order Systems by Introducing Different Observable Variable Functions

S. Kaouache^{1*}, N. E. Hamri¹, A. S. Hacinliyan², E. Kandiran³,
B. Deruni⁴ and A. C. Keles⁵

¹ *Laboratory of Mathematics and Their Interactions, Abdelhafid Boussouf University Center, Mila 43000, Algeria*

² *Department of Physics and Department of Information Systems and Technologies, Yeditepe University, 26 Agustos Yerlesimi, Kayisdagi Caddesi, 34755 Atasehir Istanbul, Turkey*

³ *Department of Software Development, Yeditepe University, 26 Agustos Yerlesimi, Kayisdagi Caddesi, 34755 Atasehir Istanbul, Turkey*

⁴ *7, Harmanlik Street, Yakacik, Kartal 34876, Turkey*

⁵ *Department of Information Systems and Technologies, Yeditepe University, 26 Agustos Yerlesimi, Kayisdagi Caddesi, 34755 Atasehir Istanbul, Turkey*

Received: April 9, 2020; Revised: July 13, 2020

Abstract: An increased order generalized combination synchronization (IOGCS) of non-identical dimensional fractional-order systems with suitable different observable variable functions is proposed and analyzed in this paper. This synchronization scheme is applied for the combination of two fractional-order unified drive systems and the fractional-order Liu response system. In view of the stability property of linear fractional-order systems, an effective nonlinear control scheme is designed to achieve the desired synchronization. Theoretical analysis and numerical simulations are shown to demonstrate the effectiveness of the proposed method.

Keywords: *increased order generalized combination synchronization; chaotic system; fractional-order system; stability property of fractional-order system.*

Mathematics Subject Classification (2010): 34A34, 37B55, 93C55, 93D05.

* Corresponding author: <mailto:s.kaouache@centre-univ-mila.dz>