



# Global Stability and Synchronization Criteria of Linearly Coupled Gyroscope

O.I. Olusola<sup>1,2\*</sup>, U.E. Vincent<sup>3,4</sup>, A.N. Njah<sup>2</sup> and B.A. Idowu<sup>5</sup>

<sup>1</sup> CSIR - Indian Institute of Chemical Biology, 4, Raja S.C. Mullick Road, Kolkata 700032, India.

<sup>2</sup> Nonlinear Dynamics Research Group, Department of Physics, Federal University of Agriculture, P.M.B. 2240, Abeokuta, Nigeria.

<sup>3</sup> Department of Physical Sciences, Redeemer's University, Km 46, Lagos - Ibadan Expressway P.M.B 3005, Redemption City, Nigeria.

<sup>4</sup> Department of Physics, Lancaster University, Lancaster LA1 4YB, United Kingdom.

<sup>5</sup> Department of Physics, Lagos state University, Ojo, Lagos State, Nigeria.

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**Abstract:** We examine the synchronization transition of a pair of unidirectionally coupled gyroscope. Based on Lyapunov stability theory and linear matrix inequalities (LMI), some necessary and sufficient criteria for stable synchronous behaviour are obtained and an exact analytic estimate of the threshold for complete chaos synchronization is derived. Finally, numerical simulation results are presented to validate the feasibility of the theoretical analysis.

**Keywords:** *chaos synchronization; nonlinear gyroscope; linear matrix inequality; Lyapunov stability theory.*

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## 1 Introduction

In the last two decades, an intensive research activity has been devoted to the study of dynamics of coupled and driven chaotic systems. Despite the considerable body of knowledge that has already been gained and established, research on coupled nonlinear systems still remains an active field. In view of the importance of the classical results from the dynamics of driven or coupled harmonic oscillators in science and technology, the question of which phenomena emerge when chaotic oscillators are coupled or somehow

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\* Corresponding author: <mailto:olasunkanmi2000@gmail.com>