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HYPERCHAOTIC CHEN'S SYSTEM AND ITS GENERATION

Yuxia Li[1,2], Kit-sang Tang[3] and Guanrong Chen[3] and and Xuecheng Su[1]

[1]College of Information and Electrical Engineering
Shandong University of Science and Technology, Qingdao, 266510, P.R. China
[2]Electromechanical Engineering College
Guangdong University of Technology, Guangzhou, 510090, P.R. China
[3]Department of Electronic Engineering
City University of Hong Kong, Tat Chee Avenue, Kowloon

Abstract. This letter presents the finding of a new hyperchaotic generator, obtained by controlling a three-dimensional autonomous chaotic system – Chen's system – with a periodic driving signal, $\gamma cos(\omega t)$. The existence of the hyperchaotic system is confirmed with bifurcation analysis.

Keywords. Chaos, Chen's system, Hyperchaos.
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1 Introduction

Interest in studying hyperchaos generator has seen significant increase recently. A hyperchaotic attractor is usually characterized as a chaotic attractor with more than one positive Lyapunov exponent [1], implying that the dynamics expand in more than one direction, giving rise to "thicker" and "more complex" chaotic dynamics. Due to its increased degree of randomness and higher unpredictability [2], it is found to be useful for some nontraditional engineering and technological applications.

Hyperchaos was first reported by Rossler in 1979 [1]. Since then, some other hyperchaos generators have also been coined [3-8]. This letter presents a new hyperchaotic system, which is generated by driving a three-dimensional autonomous chaotic system – Chen's system [9,10] – with a simple periodic forcing signal, $\gamma cos(\omega t)$, where γ and ω are constant parameters. The existence of the hyperchaotic system is verified with bifurcation analysis.

2 Hyperchaotic Chen's System

The chaotic Chen's system was reported in [9], which can be described as follows: