



A Novel Chaotic Jerk System with Multistability and Its Circuit Implementation

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Abstract: In this research paper, a new chaotic jerk system is presented. The specialty of the new system is that it can produce coexisting multiple attractors for different initial conditions. This special behavior of the new system can be used to increase the security of the communication system. The bifurcation diagram, Lyapunov exponents, attractor diagrams, and basin of attraction are the important tools used to validate the multistability of the proposed system. The simulation results indicate that there are multiple coexisting attractors in the new system. Finally, an electronic circuit is designed for the proposed system to realize the coexisting attractors in practice.

Keywords: *jerk system; multistability; bifurcation analysis; circuit simulation.*

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1 Introduction

In recent years, chaotic jerk systems have been introduced with hidden attractors [1], multi-scroll attractors [2], multi-stability [3], mega-stability [4], hypogenetic system [5], memristor [6], and coexisting attractors [7]. The invention of the chaotic jerk system with coexisting multiple attractors is very important in recent days because of its many engineering applications such as secure communication systems [8], image processing [9], random number generation [10], etc. The coexisting attractors, which means multiple attractors, can be observed in any nonlinear dynamical system for different initial conditions and system parameters. This special behavior of the system increases its complexity

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