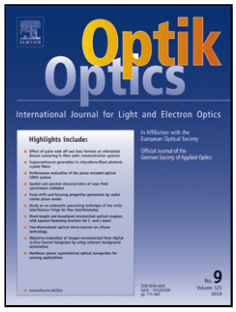

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Yet another four-dimensional chaotic system with multiple coexisting attractors

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Abstract

The study of nonlinear system with coexisting chaotic attractors is of recent interest. In this letter, we introduce a new four-dimensional chaotic system with coexisting attractors. The system has three quadratic nonlinearities and only one unstable fixed point. Basic dynamics of the system are analyzed, including dissipativity, equilibria, etc. The coexisting attractors in the system is investigated by numerical simulation. The control problem of the system is also considered. By using an ordinary feedback controller and a speed feedback controller, the chaotic behavior of the system can be well suppressed.

Keywords: Chaotic system, Coexisting attractors, Feedback control, Simulation

1. Introduction

Chaos has been studied for many years since the discovery of the famous Lorenz attractor in 1963 [1]. It has an extremely important research status in the field of natural science. Many researchers attempted to detect chaos from the low-dimensional, continuous, autonomous ordinary differential system. In 1976, Rössler presented a simple chaotic system with one cross-product term [2]. In 1994, Sprott constructed 19 chaotic attractors from three-dimensional continuous system with either five terms and two quadratic nonlinearities or six terms and one quadratic nonlinearity [3]. Later, Chen proposed a special chaotic attractor with similar butterfly shape but not equivalent to Lorenz attractor [4]. With the development of chaos theory, more chaotic systems have been put forward, such as no-equilibria chaotic system, homoclinic-orbit and heteroclinic-orbit chaotic system, multi-wing and multi-scroll chaotic system, hyper-chaotic system, fractional-order chaotic system, etc [5, 6, 7, 8, 9, 10, 11].

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