

Construction and Verification of a Simple Smooth Chaotic System

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Abstract: This article introduces a new chaotic system of three-dimensional quadratic autonomous ordinary differential equations, which can display different attractors with two unstable equilibrium points and four unstable equilibrium points respectively. Dynamical properties of this system are then studied. Furthermore, by applying the undetermined coefficient method, heteroclinic orbit of Shil'nikov's type in this system is found and the convergence of the series expansions of this heteroclinic orbit are proved in this article. The Shil'nikov's theorem guarantees that this system has Smale horseshoes and the horseshoe chaos.

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Key words: chaotic attractors, three-dimensional quadratic autonomous dynamical system, equilibrium point

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