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# Tracking control for a ten-ring chaotic system with an exponential nonlinear term

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**Abstract:** A new system with an exponential nonlinear term, which can exhibit ten-ring attractors, is introduced in this paper. The proposed chaotic system is totally different from the existing systems in previous works. Some basic dynamical properties of the system are analyzed theoretically and numerically. Existence and uniqueness of the solution of the presented system are proved. Next, the tracking control for the proposed system with exponential convergence rate is addressed. Finally, numerical simulations are also performed to verify the effectiveness of presented schemes.

Keywords: ten-ring; chaos; tracking control

## 1. Introduction

Since the first classical chaotic system was discovered by Lorenz in 1963 [1], chaos phenomenon has received more and more attention from scientific community, meanwhile, many more three-dimensional (3D) chaotic systems were found in literatures [2-10]. By now, chaotic systems have great potential in various fields such as cryptosystems, physics, engineering, finance and mechanics. It is meaningful to construct new chaotic systems and study their dynamical behaviors and dynamical properties.

Recently, there has been more interested in generating new chaotic systems with notable features by using exponential nonlinearity. Several chaotic systems with exponential term were obtained [11-15]. Motivated by the preceding discussion, in this paper, we introduce an eight-term 3D chaotic system with a quadratic nonlinearity and an exponential nonlinear term.

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