

激光技术

不确定单模激光Lorenz系统函数投影同步控制研究

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摘要:

基于Lyapunov稳定性理论, 以不确定单模激光Lorenz系统作为驱动系统, 不确定Chen系统作为响应系统, 利用自适应控制方法, 设计了非线性反馈控制器及参数识别器, 使响应系统的所有状态变量严格地按函数比例跟踪驱动系统的混沌轨迹, 并辨识出包括非线性项在内的驱动系统和响应系统的所有不确定参数。利用四阶龙格-库塔仿真模拟, 结果表明了该方法的有效性, 设计的函数投影同步控制的方法能更有效地提高保密通信的性能。

关键词: 自适应混沌同步 跟踪控制 参数辨识 Chen系统 单模激光Lorenz系统

Function projection synchronization control of uncertain single-mode laser Lorenz system

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Abstract:

Based on the Lyapunov stability theory, the nonlinear feedback controller and parameter recognizer were designed with the adaptive control method. The uncertain single-mode laser Lorenz system is taken as the drive system and the uncertain Chen system as the response system in the design, which makes all the status variable of the response system to follow the chaotic path of the drive system strictly in function proportion, and recognizes all the uncertain parameters including unknown coefficients of nonlinear terms of the drive and response systems. The result obtained by the four-order Runge Kutta simulation indicates the effectiveness and feasibility of the method, and proves that the function projection synchronization control can improve the performance of the secure communication.

Keywords: adaptive chaotic synchronization tracking control parameter identification Chen system single-mode laser Lorenz system

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