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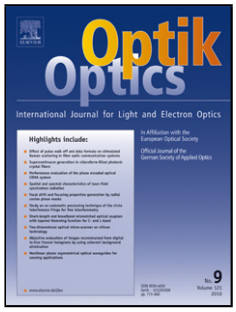

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Stabilization and synchronization of Bose-Einstein condensate systems by single input linear controllers

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Abstract

This paper investigates the control problems of the Bose-Einstein condensate (BEC) system. Firstly, a new linear feedback control method for the control problems of a class of chaotic systems in any dimension based on triangle system structure. Then, based on the obtained method, the stabilization, synchronization, and anti-synchronization of BEC system are investigated extensively, and the corresponding controllers are designed. It should be pointed out that the obtained controllers are single input linear controllers, which are simpler than the existing results. Finally, numerical simulations are given to show the effectiveness and validity of the proposed results.

Key words: Bose-Einstein condensate; stabilization; synchronization; anti-synchronization

1. Introduction

Chaos reveals the general complexity of nature and humanity. Chaotic system has high sensibility to initial condition and tiny distribution, which is called the butterfly effect. The pioneering work about chaos synchronization was finished by Pecora and Carroll in 1990 [1]. They introduced a method of a simple coupling to synchronize two identical chaotic systems. From then on, chaos synchronization has caused increasing attention due to its applications in physics, secure communications, information storage, chemical

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