

论文与报告

## 借助Lyapunov方法的量子系统平衡态的布居控制

匡森, 丛爽

1. Department of Automation, University of Science and Technology of China, Hefei 230027, P.R. China

2. Hefei National Laboratory for Physical Sciences at the Microscale, Hefei 230026, P.R. China

收稿日期 2009-11-23 修回日期 2010-3-17 网络版发布日期 接受日期

摘要

This paper studies the population control problem associated with the equilibrium states of mixed-state quantum systems by using a Lyapunov function with degrees of freedom. The control laws are designed by ensuring the monotonicity of the Lyapunov function; main results on the largest invariant set in the sense of LaSalle are given; and the strict expression of any state in the largest invariant set is normally deduced in the framework of Bloch vectors. By analyzing the obtained largest invariant set and the Lyapunov function itself, this paper also discusses the determination problem of the degrees of freedom. Numerical simulation experiments on a three-level system show the validity of research results.

关键词 [Quantum system](#) [population control](#) [Bloch vector](#) [Lyapunov function](#) [invariant set](#)

分类号

## Population Control of Equilibrium States of Quantum Systems via Lyapunov Method

KUANG Sen, CONG Shuang

1. Department of Automation, University of Science and Technology of China, Hefei 230027, P.R. China

2. Hefei National Laboratory for Physical Sciences at the Microscale, Hefei 230026, P.R. China

Abstract

This paper studies the population control problem associated with the equilibrium states of mixed-state quantum systems by using a Lyapunov function with degrees of freedom. The control laws are designed by ensuring the monotonicity of the Lyapunov function; main results on the largest invariant set in the sense of LaSalle are given; and the strict expression of any state in the largest invariant set is normally deduced in the framework of Bloch vectors. By analyzing the obtained largest invariant set and the Lyapunov function itself, this paper also discusses the determination problem of the degrees of freedom. Numerical simulation experiments on a three-level system show the validity of research results.

Key words [Quantum system](#) [population control](#) [Bloch vector](#) [Lyapunov function](#) [invariant set](#)

DOI: 10.3724/SP.J.1004.2010.01257

通讯作者 匡森 [skuang@ustc.edu.cn](mailto:skuang@ustc.edu.cn)

作者个人主页 匡森; 丛爽

### 扩展功能

本文信息

▶ [Supporting info](#)

▶ [PDF \(554KB\)](#)

▶ [\[HTML全文\]\(OKB\)](#)

▶ [参考文献\[PDF\]](#)

▶ [参考文献](#)

服务与反馈

▶ [把本文推荐给朋友](#)

▶ [加入我的书架](#)

▶ [加入引用管理器](#)

▶ [复制索引](#)

▶ [Email Alert](#)

相关信息

▶ [本刊中 包含“Quantum system”的 相关文章](#)

▶ 本文作者相关文章

· [匡森](#)

· [丛爽](#)