

基于模型依赖平均驻留时间的线性切换系统有限时间 l_2 控制王通^{1a}, 王青^{1a}, 李玮², 董朝阳^{1b}1. 北京航空航天大学, a. 自动化科学与电气工程学院, b. 航空科学与工程学院, 北京100191;
2. 中国舰船研究院, 北京100192.Finite-time l_2 control for switched linear systems based on mode-dependent average dwell timeWANG Tong^{1a}, WANG Qing^{1a}, LI Wei², DONG Chao-yang^{1b}1a. School of Automation Science and Electrical Engineering, 1b. School of Aeronautic Science and Engineering, Beihang University, Beijing 100191 China;
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摘要

图/表

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摘要

针对一类具有有界干扰的线性切换系统研究其有限时间鲁棒控制问题。基于模型依赖平均驻留时间,提出了系统有限时间有界且具有 l_2 性能指标的充分条件,与传统方法中系统具有单一平均驻留时间不同,各切换子系统具有各自的平均驻留时间,因而降低了设计的保守性。进一步,将切换系统的有限时间状态反馈控制器设计转化为具有线性矩阵不等式约束的优化问题。数值算例和仿真对比表明,所提出的方法增加了切换律设计的自由度。

关键词: 鲁棒控制, 线性切换系统, 有限时间有界, 模型依赖平均驻留时间

Abstract:

Considering switched linear systems with norm-bounded disturbances, the finite-time robust control problem is studied. Based on mode-dependent average dwell time, the sufficient condition is provided to guarantee the finite-time boundedness and l_2 performance of the switched system. Compared with the single average dwell time scheme, the presented condition reduces the conservatism as each subsystem has its own average dwell time. The design algorithm of finite-time robust state feedback controllers is proposed in the form of an optimal problem involving linear matrix inequalities. A numerical example and contrastive simulations show that the freedom degree of switching signal design is increased by using the proposed method.

Key words: robust control switched linear system finite-time boundedness mode-dependent average dwell time

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