

论文与报告

具有状态和控制约束的受扰离散线性切换系统的反馈控制

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摘要

本文的主要贡献是针对一类具有重置函数及由外部不能控事件决定动态的离散时间线性切换系统, 给出一些稳定性综合结论. 当系统受到外部有界扰动, 及状态和控制量约束时, 在输入到状态稳定性理论框架下, 研究使得系统镇定的线性状态反馈控制器设计方法. 针对这类混杂系统, 本文引入了受控D不变性的概念, 并给出检测某一混杂区域具有受控D不变性的充要条件. 进而, 提出一种能够使得受扰的线性切换系统镇定, 同时保证状态和控制量满足其约束的反馈矩阵的计算方法. 最后, 通过一个由两个子系统构成的数值例子来说明本文技术的应用性.

关键词 [切换系统](#) [扰动](#) [限制](#) [镇定问题](#) [输入到状态稳定性](#)

分类号

Feedback Control of Discrete Linear Switching Systems with Bounded State and Control Input in the Presence of Disturbances

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Abstract

The main contribution of this paper is to present some stability synthesis results for a subclass of hybrid systems, which is the discrete-time linear switching systems whose dynamics contain reset functions and are determined by exogenous and uncontrollable events. In the presence of additive bounded disturbances, with state and control input constraints, the linear state feedback controller design that can stabilize the system is investigated in the sense of input-to-state stability (ISS). The concept of controlled D-invariance is introduced for this class of hybrid systems, and a necessary and sufficient condition to test the controlled D-invariance of a hybrid region is given. After this, a procedure for the computation of the feedback matrices, which can stabilize the disturbed linear switching systems and also satisfy the state and control input constraints, is proposed. Finally, a numerical example made up of two subsystems is given to show the applicability of the technique.

Key words [Switching systems](#) [disturbances](#) [constraints](#) [stabilization problem](#) [input-to-state stability \(ISS\)](#)

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