短文

基于异步观测器的离散分段仿射系统控制: LMI方法

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摘要

基于分段二次Lyapunov函数为离散分段仿射系统提出了一种基于观测器的控制律. 考虑的主要问题是原系统当前所在作用域未知, 且无法根据测量输出推断. 通过将凸多面体作用域用椭球体外逼近, 并将矩阵等式约束用奇异值分解技术予以处理, 所提控制方法能够被转化为线性矩阵不等式(LMI)描述, 比现有的只能转化为双线性矩阵不等式的方法更容易求解. 最后, 将所提方法应用到混沌系统控制.

关键词　　分段仿射系统　分段Lyapunov函数　控制器设计　观测器　线性矩阵不等式(LMI)

分类号

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Non-synchronized Observer-based Control of Discrete-time Piecewise Affine Systems: an LMI Approach

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Abstract

This paper presents a novel observer-based control scheme for discrete-time piecewise affine systems based on a piecewise-quadratic Lyapunov function. The key issue addressed in this paper is that the currently active region of the system is unknown, and can not be inferred from the measured outputs. By approximating polytopic operating regions by ellipsoids and using the singular value decomposition technique to treat the constraint of matrix equality, the suggested control method can be formulated as linear matrix inequalities (LMIs), and solved much more efficiently than existing methods which could be only cast as bilinear matrix inequalities. A numerical example is also given to verify the proposed approach.

Key words　　Piecewise affine system　piecewise Lyapunov function　controller design　observer　linear matrix inequality (LMI)

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