短文

具有扇区有界非线性离散系统的可靠H_∞滤波器设计: 一种LMI优化方法

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摘要

针对一类具有非线性不确定离散非线性系统设计了可靠H_∞滤波器. 设计的结果使得滤波误差系统在标称状态及具有传感器失效状态时不仅是渐进稳定的, 而且满足给定的H_∞范数约束. 采用Lyapunov稳定性理论和线性矩阵不等式技术给出了滤波器存在的充分条件. 而且, 为了减少设计的保守性及得到更好的性能, 我们利用松弛变量来解耦Lyapunov矩阵及系统动态矩阵. 数值仿真例子说明设计方法的有效性.

关键词　H_∞滤波　可靠滤波　Lyapunov函数　传感器失效　线性矩阵不等式(LMI)

分类号

Reliable H_∞ Filter Design for Discrete-time Systems with Sector-bounded Nonlinearities: an LMI Optimization Approach

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Abstract

This paper is concerned with the reliable H_∞ filtering problem against sensor failures for a class of discrete-time systems with sector-bounded nonlinearities. The resulting design is that the filtering error system is asymptotically stable and meets the prescribed H_∞ norm constraint in normal case as well as in sensor failure case.

Sufficient conditions for the existence of the filter are obtained by using appropriate Lyapunov functional and linear matrix inequality (LMI) techniques. Moreover, in order to reduce the design conservativeness and get better performance, we adopt the slack variable method to realize the decoupling between the Lyapunov matrices and the system dynamic matrices. A numerical example is provided to demonstrate the effectiveness of the proposed designs.

Key words　H_∞ filtering　reliable filtering　Lyapunov function　sensor failure　linear matrix inequality (LMI)

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