

通讯受限不确定网络化控制系统鲁棒H ∞ 滤波

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摘要 针对一类通讯受限的不确定网络控制系统, 结合切换Lyapunov函数和参数依赖Lyapunov函数方法, 提出了一种基于模态切换构造的鲁棒H ∞ 滤波器设计方法。通过引入两个附加的松弛矩阵使Lyapunov矩阵和系统矩阵分离, 得到了一个新的具有更低保守性的鲁棒H ∞ 性能判据, 并基于该判据给出了系统的鲁棒H ∞ 滤波器的设计方法。设计的滤波器不但保证闭环系统的二次稳定性, 同时使误差系统的H ∞ 范数小于一个给定的衰减水平 γ 。当将其应用于具有凸多面体不确定性的网络控制系统时可以得到与系统不确定性相关联的Lyapunov函数, 有效降低了设计的保守性。数值算例验证了本文所提出的算法的有效性。

关键词 [自动控制技术](#), [网络控制系统](#), [鲁棒滤波](#), [切换系统](#)

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Robust H ∞ filtering for a class of uncertain networked control systems with limited communication

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Abstract Based on combining switched Lyapunov function and parameter dependent Lyapunov function, a robust H ∞ filter with structure switched according to the system model changes was designed for networked control systems with limited bandwidth and polytopic uncertainties. A new improved performance criterion for the existence of robust H ∞ filter was presented by introducing two slack matrices which made a kind separation between the system matrices and the positive definite Lyapunov matrices. A filter was directly derived from this criterion which can guarantee not only quadratic stability of the closed loop systems but also the H ∞ norm bound within a predefined level. As a result, the vertex dependent Lyapunov function can be adopted to deliver a less conservative result. A numerical example was used to illustrate the effect of the proposed approach.

Key words [automatic control technology](#) [networked control system](#) [robust filtering](#) [switch system](#)

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