

不确定切换时滞非线性系统状态切换的指数稳定性

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Exponential stability of uncertain switched nonlinear time-delay systems with state-dependent switching

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摘要

利用状态依赖控制策略对切换信号进行设计, 使得一类参数不确定时滞非线性切换系统指数稳定且具有一定的 H_∞ 抗干扰性能. 利用 Lyapunov-Krasovskii (LK) 函数方法, 以线性矩阵不等式组的方式, 给出了稳定切换律存在的充分条件, 并且该系统是指数稳定的. 通过引入自由矩阵并结合积分不等式技巧, 得到了保守性较低的稳定性条件. 仿真算例表明了所提出方法的有效性和较低的保守性.

关键词: 指数稳定, 非线性切换系统, 不确定, 时变时滞, 切换信号

Abstract:

By using the state-dependent switching control strategy, the switching rule design for global exponential stability with H_∞ performance of uncertain switched nonlinear systems with time-varying delay is considered. By using a Lyapunov-Krasovskii(LK) function technique, sufficient conditions for the existence of a class of stabilizing switching laws are derived in terms of linear matrix inequalities(LMIs) to guarantee the switched time delay system to be exponentially stable. The free weighting matrix and integral-inequality approaches are used to find the less conservative stability results. Numerical examples are provided to show the effectiveness and less conservativeness of the proposed methods.

Key words: exponential stability nonlinear switched system uncertain time-varying delay switching signal

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