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制导、导航与控制

具有受限转移率的跳变系统L2-L∞模糊控制

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摘要：

讨论了一类含不确定转移率的非线性Markov跳变系统的L2-L∞模糊控制问题。系统模态间转移概率所包含的不确定性是未知且有界的。通过Takagi Sugeno模型模糊建模，获取了整个闭环模糊动态方程。基于L2-L∞模糊控制理论，提出了使得系统随机稳定且满足一定输入输出L2-L∞特性的模态依赖的模糊控制器存在条件。利用构造的Lyapunov Krasovskii函数，结合线性矩阵不等式技术，给出了鲁棒L2-L∞模糊控制器的设计方法，并将其设计转化为一个优化问题。仿真示例说明了设计方法的有效性。

关键词： Markov跳变系统 Takagi Sugeno模型 不确定转移率 L2-L∞模糊控制器 线性矩阵不等式

L2-L∞ fuzzy control of jump systems with bounded transition probabilities

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Abstract:

The L2-L∞ fuzzy control problem of a class of nonlinear Markov jump systems (MJSs) with uncertain transition jump rates is studied. The uncertain transition jump rates are assumed unknown but bounded. By means of Takagi Sugeno fuzzy models, the overall closed loop fuzzy dynamic equalities are constructed through selected membership functions. Based on the L2-L∞ fuzzy control theory, the sufficient condition for the existence of mode dependent fuzzy controller is given so that the fuzzy MJSs are stochastically stable for all admissible uncertainties and satisfy the given L2-L∞ control index. By using the constructed Lyapunov Krasovskii function and applying linear matrix inequality techniques, the design scheme of the robust L2-L∞ fuzzy controller is derived and described as an optimization one. Simulation results demonstrate the validity of the proposed approach.

Keywords: Markov jump system Takagi Sugeno model uncertain transitions jump rate L2-L&infin fuzzy controller linear matrix inequality

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