

制导、导航与控制

时变时滞不确定系统模糊自适应 H_∞ 控制

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摘要:

针对含非线性和干扰项的时变时滞系统鲁棒稳定问题, 提出一种模糊自适应 H_∞ 控制方法。采用T-S模糊系统对未知非线性函数向量进行逼近, 设计自适应全调节律, 即同时调整模糊参数矩阵和基函数参量。对于逼近产生的误差和外界干扰, 引入 H_∞ 控制。基于李亚普诺夫稳定性理论和线性矩阵不等式技术, 在保证系统稳定的前提下, 通过求解矩阵不等式得到满足设计要求的控制器。通过对已有算例和空天飞行器高超声速飞行控制系统的仿真验证了所提方案的有效性。

关键词: 时变时滞系统; H_∞ 控制; 模糊自适应控制; 线性矩阵不等式

Fuzzy adaptive H_∞ control for time-varying delayed uncertain systems

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Abstract:

A fuzzy adaptive H_∞ control method is proposed for the stability of time-varying delayed systems with nonlinear function and external disturbance parts. An adaptive fully tuned T-S fuzzy model is designed to estimate the nonlinear function vector. The H_∞ controller is used to attenuate the approximation error and external disturbance. Based on the Lyapunov functional theory and linear matrix inequality techniques, the proposed method could be obtained by solving the matrix inequality to guarantee the stability of the closed loop system and satisfy the requirement of design. A numerical example and flight control system simulation of the hypersonic aerospace vehicle are given to illustrate the effectiveness of the presented method.

Keywords: time varying delayed system H_∞ control fuzzy adaptive control linear matrix inequality

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