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论文与报告

一类不确定非线性系统的自适应输出反馈镇定

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摘要
研究了一类不确定非线性系统的全局自适应输出反馈镇定问题. 由于不确定控制系数和未知线性增长率的存在, 这个问题比较复杂且很难解决. 本文引入一个新的在线调节的动态增益, 并基于此设计了高增益K-滤波器用于重构系统的状态. 然后, 受广义控制方法的启发, 发展了反推法并设计了自适应输出反馈镇定控制器. 结果表明, 通过选择恰当的设计参数可以保证闭环系统的全局稳定性. 给出的仿真算例验证了本文理论结果的正确性.

关键词 非线性系统 不确定控制系数 未知线性增长率 高增益K-滤波器 输出反馈 自适应控制 反推法

分类号

Adaptive Output-feedback Stabilization for a Class of Uncertain Nonlinear Systems

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Abstract
This paper investigates the problem of global adaptive stabilization by output-feedback for a class of uncertain nonlinear systems. Due to the uncertain control coefficients and unknown linear growth rate, this problem is much complicated and quite difficult to solve. In this paper, a novel dynamic gain updated on-line is introduced, and based on this, high-gain K-filters are proposed to reconstruct the system states. Then, motivated by the universal control method, the backstepping design approach is developed for the adaptive output-feedback stabilizing controller. It is shown that the global stability of the closed-loop system can be guaranteed by the appropriate choice of the design parameters. A simulation example is also provided to illustrate the correctness of the theoretical results.

Key words Nonlinear systems uncertain control coefficient unknown linear growth rate high-gain K-filters output-feedback adaptive control backstepping

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