论文与报告

一种自适应鲁棒控制方法及其闭环稳定性分析

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摘要
研究了含有未建模动态的慢时变系统的自适应镇定问题.考虑的对象具有非最小相位、含未建模动态和大范围时变参数等不良特性,且存在未知但有界外部扰动.这类对象很难用时不变鲁棒控制器或传统自适应控制器进行镇定.利用l1优化设计结合参数估计的投影算法,提出了一种自适应鲁棒控制策略.基于l1优化设计的连续性和投影算法的收敛性,证明了这种控制策略能够持续适应慢时变对象并且保持闭环系统一致稳定性.鲁棒性分析表明这种控制策略具有良好的鲁棒镇定性.

关键词　自适应控制　l1优化设计　未建模动态　未知但有界扰动

分类号

扩展功能
本文信息
▸ Supporting info
▸ PDF(617KB)
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▸ 本刊中 包含"自适应控制"的 相关文章
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An Adaoptive Robust Control Algorithm and Analysis of its Closed Loop Stability

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Abstract
In this paper, the problem of adaptive stabilization of slowly time-varying systems with unmodeled dynamics is investigated in the presence of unknown but bounded disturbances. The plants under consideration are non-minimum phase and time-varying and contain norm-bounded unmodeled dynamics, and cannot be stabilized by time-invariant robust controller or adaptive controller. A new adaptive robust scheme is proposed based on integration of l1 optimization design methodology and projection algorithm of parameter estimation. Using the continuity properties of l1 optimal control and convergent properties of projection algorithm, the adaptive scheme proposed in this paper can persistently adapt to the time-varying plant to maintain uniform stability. Robustness analysis demonstrates that this scheme has good robust stability.

Key words　Adaptive control　l1optimization design　unmodelled dynamics　unknown but bounded disturbances

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