[1]王明昊,刘 刚,何志昆,等.基于LFT-LPV结构的导弹自动驾驶仪降保守性设计[J].弹箭与制导学报,2013,2:1-3.

WANG Minghao,LIU Gang,HE Zhikun,et al.Reduction of Conservatism in Missile Autopilot Based on LFT-LPV[J].,2013,2:1-3.

基于LFT-LPV结构的导弹自动驾驶仪降保守性设计

《弹箭与制导学报》[ISSN:1673-9728/CN:61-1234/TJ] 期数: 2013年第2期 页码: 1-3 栏目: 导弹与制导技术 出版日期: 2013-04-25

Title: Reduction of Conservatism in Missile Autopilot Based on LFT-LPV

作者: 王明昊[1]; 刘 刚[1]; 何志昆[1]; 杨述华[2]

1 第二炮兵工程大学,西安 710025;

2 第二炮兵驻211厂军事代表室,北京 100076

Author(s): WANG Minghao[1]; LIU Gang[1]; HE Zhikun[1]; YANG Shuhua[2]

1 The Second Artillery Engineering University, Xi'an 710025, China;

2 The Second Artillery Military Representative Office in No.211 Factory, Beijing 100076, China

关键词: 线性变参数; 线性分式变换; 全块比例矩阵; 输出反馈; 线性矩阵不等式

Keywords: linear parameter system; linear fractional transformation; full block scaling matrix; output feedback; LMI

分类号: TJ765.23

DOI: -

文献标识码: A

摘要: 针对一类导弹纵向运动模型,提出了一种基于全块比例矩阵的LFT-LPV系统降保守性输出反馈控制器的设计方法。首先在感兴趣的飞行区域内通过数据拟合得到系统模型的LFT-LPV表示,利用S-过程,通过选择具有特定结构的全块比例矩阵避免需要在所有可能的变参数轨迹上求解无穷个LMIs的问题,同时推导出满足LFT-LPV系统性能指标的输出反馈控制器的设计方法。最后的仿真结果验证了方法的有效性。

Abstract: According to a class of longitudinal model of missile, an output feedback controller design methodology of LFT-LPV system based on full block scaling matrix is proposed which reduce the conservatism effectively. Firstly, the system nonlinear model is transformed into a LFT-LPV form by data fitting in the interested working region. Then, using S-Procdure, full block scaling matrix with a specific configuration is chosen to satisfy the inequality, avoid solving a infinite numbers of LMIs on the trajectory of all possible varying parameters, and then give the method of the output feedback controller design which can satisfy the given performance target based on LFT-LPV system. Finally, the digital simulation results prove the availability of the proposed method.

导航/NAVIGATE

本期目录/Table of Contents

下一篇/Next Article

上一篇/Previous Article

工具/TOOLS

引用本文的文章/References

下载 PDF/Download PDF(531KB)

立即打印本文/Print Now

参考文献/REFERENCES

[1] Apkarian P, Gahinet P, Becker G. Self-Scheduled H_∞ control of linear parameter-varying systems:A design example [J]. Automatica, 1995, 31(9): 1251-1261.

[2] Packard A. Gain scheduling via linear fractional transformations[J]. System and Control Letters, 1994, 22(2): 79-92.

[3] Apkarian P, Gahinet P. A convex characterization of gain-scheduled H_∞ controllers[J]. IEEE Transactions on Automatic Control, 1995, 40(2): 853-864.
[4] 虞忠伟, 陈辉堂. 机器人LFT变增益H_∞控制[J]. 控制理论与应用, 2002, 19(5): 713-719.
[5] 钱杏芳, 林瑞雄, 赵亚男. 导弹飞行力学[M]. 北京: 北京理工大学出版社, 1999: 175-230.
[6] Wu F, Dong K. Robust and gain-scheduling H_2 synthesis for LFT parameter-dependent system[C]//American Control Conference, 2005: 2851-2856.
[7] Scherer C W. Robust mixed control and LPV control with full block scalings[J]. Recent Advance of LMI Methods in Control, 2000, 12(4): 187-207.
[8] 李文强, 苏涛, 杨林,等. 基于LFT的鲁棒变增益控制的降保守性设计[J]. 海军航空工程学院学报, 2011, 26(5): 533-538.
[9] 于剑桥, 刘莉, 靳东亚,等. 导弹线性分式变换模型及其在H_∞增益调度自动驾驶仪设计中的应用[J]. 兵工学报, 2007, 28(7): 844-848.
[10] 贾晓洪, 凡永华, 杨军. 气动力/直接力复合控制导弹自动驾驶仪的鲁棒稳定性分析[J]. 弹箭与制导学报, 2005, 25(4): 1-2.
[11] Yu J Q, Luo G C, Yin W T. Missile robust gain scheduling autopilot design using full block multipliers[J].Journal of Systems Engineering and Electronics, 2010, 21(5): 883-891.

备注/Memo: 收稿日期:2012-09-26 基金项目:国家自然科学基金(61132008)资助作者简介:王明昊(1984-),男,山东滕州人,博士研究生,研究方向:LPV系统控制。

更新日期/Last Update: 2013-04-25