



航空学报 » 2011, Vol. 32 » Issue (12) :2303-2309 DOI: CNKI:11-1929/V.20110526.1757.023

电子与自动控制

最新目录 | 下期目录 | 过刊浏览 | 高级检索

<< Previous Articles | Next Articles >>

飞行模拟器操纵负荷系统的无源性设计

刘彦文¹, 王广雄², 李佳¹

1. 哈尔滨工程大学 自动化学院, 黑龙江 哈尔滨 150001;

2. 哈尔滨工业大学 航天学院, 黑龙江 哈尔滨 150001

Passivity Design for the Control Loading System of a Flight Simulator

LIU Yanwen¹, WANG Guangxiong², LI Jia¹

1. College of Automation, Harbin Engineering University, Harbin 150001, China;

2. School of Astronautics, Harbin Institute of Technology, Harbin 150001, China

摘要

参考文献

相关文章

Download: PDF (0KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 操纵负荷系统是飞行员与飞行模拟器之间的接口装置。提出了这种人在回路的实时控制系统的一种新的设计思想,这种设计将无源性与阻抗的概念结合,并将系统阻抗的频率特性作为定量设计的手段。基于频率分析,控制器设计中应增加一个阻尼项,使传递到操作员手上的阻抗与飞行环境的阻抗相匹配。并指出,系统中的力伺服系统的阻尼比应在0.5~0.8范围内以满足这个虚拟环境的无源性要求。操纵负荷系统的无源性可保证整个仿真系统的稳定性。所提出的设计思想还可推广应用于其他各种虚拟环境的设计。

关键词: 飞行模拟器 操纵负荷系统 实时控制 虚拟环境 无源性 阻抗匹配

Abstract: The control loading system of a flight simulator is an interface between the human operator and the flight simulator. A novel design idea is proposed for such a man-in-loop real time control system. It is pointed out that the design must be based on the combination of passivity with the concept of impedance, and the frequency response of the impedance of the system is used as a quantified design tool in the design. Based on the frequency analysis, an additional damping term is included in the controller design so that the resulting impedance transmitted to the operator's hand is matched closely to the flight environment impedance. It is also pointed out that the damping ratio of the force servo of the control loading system must be in the range of 0.5-0.8 to meet the passivity requirement of the virtual environment. The passivity of the control loading system can ensure the stability of the whole system. The proposed design methodology can also be used to design various virtual environments.

Keywords: flight simulators control loading system real time control virtual environment passivity impedance matching

Received 2011-03-26;

Fund:

国家自然科学基金(61073181);黑龙江省博士后科研启动金(LBH-Q09126);中央高校基本科研业务费专项资金(HEUCF110412)

Corresponding Authors: 刘彦文 Email: zhwlw@163.com

About author: 刘彦文(1976-) 女,博士,副教授。主要研究方向:采样系统和鲁棒控制系统设计。 Tel: 0451-82519404 E-mail: zhwlw@163.com

王广雄(1933-) 男,教授,博士生导师。主要研究方向: H_∞ 控制,控制系统的鲁棒设计。 E-mail: gxwang@hit.edu.cn

李佳(1981-) 男,硕士研究生。主要研究方向:采样系统的鲁棒控制。 E-mail: zhwlw@sina.com.cn

引用本文:

刘彦文, 王广雄, 李佳. 飞行模拟器操纵负荷系统的无源性设计[J]. 航空学报, 2011, 32(12): 2303-2309.

LIU Yanwen, WANG Guangxiong, LI Jia. Passivity Design for the Control Loading System of a Flight Simulator[J]. Acta Aeronautica et Astronautica Sinica,

Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

作者相关文章

