



航空学报 » 2013, Vol. 34 » Issue (9) :2212-2218 DOI: 10.7527/S1000-6893.2013.0054

电子与控制

[最新目录](#) | [下期目录](#) | [过刊浏览](#) | [高级检索](#)

[<<](#) [<](#) [<< 前一篇](#) | [后一篇 >>](#) [>>](#)

导弹鲁棒高阶滑模制导控制一体化研究

董飞焱, 雷虎民, 周池军, 李炯, 邵雷

空军工程大学 防空反导学院, 陕西 西安 710051

Research of Integrated Robust High Order Sliding Mode Guidance and Control for Missiles

DONG Feiyao, LEI Humin, ZHOU Chijun, LI Jiong, SHAO Lei

School of Air and Missile Defense, Air Force Engineering University, Xi'an 710051, China

摘要

参考文献

相关文章

Download: [PDF \(2413KB\)](#) [HTML 0KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要

针对传统制导与控制系统分开设计在拦截高速机动目标时的缺陷,提出一种高阶滑模制导控制一体化方法。综合考虑弹目拦截几何与导弹动态,根据零化视线(LOS)角速率的准则,将导弹制导控制问题转化为一个三阶积分链系统的镇定问题。基于几何齐次理论设计了标称系统的全局有限时间镇定控制律,同时针对目标机动和导弹气动参数扰动等带来的不确定性,利用超扭曲算法(STA)设计了补偿控制律。仿真结果表明,与传统制导与控制系统分开设计相比,本文所提出的鲁棒高阶滑模制导控制一体化方法具有更小的脱靶量,且导弹姿态和控制舵偏角的变化更加平缓。

关键词: 导弹 制导控制一体化 高阶滑模 几何齐次理论 超扭曲算法

Abstract:

Aiming at the disadvantages of traditional two-loop guidance and control system against high speed and maneuverable targets, an integrated sliding mode guidance and control is derived in this paper. Through combining the intercept geometry with missile dynamics and basing on the principle of zeroing the line of sight (LOS) rate, a guidance and control problem is transformed to that of stabilization of a third integral chain system. Based on geometric homogeneity, a global finite-time stabilization control law for nominal systems is proposed. For the uncertainty of the system caused by target maneuverability and missile aerodynamic parameter perturbation, a compensating control law is provided using the super twisting algorithm (STA). Simulation results show that the proposed integrated guidance and control algorithm possesses the advantages of smaller miss distance and smoother variations in missile attitude and elevators over the conventional two-loop design.

Keywords: missiles integrated guidance and control high order sliding mode geometric homogeneity theory super twisting algorithm

Received 2012-11-28; published 2013-01-15

Fund:

航空科学基金(20110196005)

Corresponding Authors: 邵雷, Tel.: 029-84789198 E-mail: weiwei_19850922@163.com Email: weiwei_19850922@163.com

About author: 董飞焱 男, 博士研究生。主要研究方向: 非线性控制及其在航空航天中的应用。Tel: 029-84789435 E-mail: dongfeiyao.live@aliyun.com; 雷虎民 男, 博士, 教授, 博士生导师。主要研究方向: 飞行器制导控制技术。Tel: 029-84789196 E-mail: hmleinet@21cn.com; 周池军 男, 博士研究生。主要研究方向: 飞行器制导控制技术。Tel: 029-84789435 E-mail: 1470615968@qq.com; 李炯 男, 博士, 讲师。主要研究方向: 飞行器制导控制技术。Tel: 029-84789198 E-mail: graceful001@126.com; 邵雷 男, 博士, 讲师。主要研究方向: 基于数据的飞行控制技术。Tel: 029-84789198 E-mail:

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

- ▶ 董飞焱
- ▶ 雷虎民
- ▶ 周池军
- ▶ 李炯
- ▶ 邵雷

引用本文:

董飞垚, 雷虎民, 周池军, 李炯, 邵雷. 导弹鲁棒高阶滑模制导控制一体化研究[J]. 航空学报, 2013, 34(9): 2212-2218. DOI: 10.7527/S1000-6893.2013.0054

DONG Feiyao, LEI Humin, ZHOU Chijun, LI Jiong, SHAO Lei. Research of Integrated Robust High Order Sliding Mode Guidance and Control for Missiles[J]. Acta Aeronautica et Astronautica Sinica, 2013, 34(9): 2212-2218. DOI: 10.7527/S1000-6893.2013.0054