

## 采用可变增益观测器的红外导引头导气管扰动补偿

吴海龙<sup>1,2</sup>, 贾宏光<sup>1</sup>, 魏群<sup>1</sup>, 姜湖海<sup>3</sup>

1. 中国科学院 长春光学精密机械与物理研究所, 吉林 长春 130033;
2. 中国科学院大学, 北京 100039;
3. 西南技术物理研究所, 四川 成都 610041

## Compensation for gas tube disturbance of infrared seeker based on variable gain disturbance observer

WU Hai-long<sup>1,2</sup>, JIA Hong-guang<sup>1</sup>, WEI Qun<sup>1</sup>, JIANG Hu-hai<sup>3</sup>

1. Changchun Institute of Optics, Fine Mechanics and Physics, Chinese Academy of Sciences, Changchun 130033, China;
2. University of Chinese Academy of Sciences, Beijing 100039, China;
3. Southwest Institute of Technical Physics, Chengdu 610041, China

摘要

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**摘要** 为了提高红外导引头的跟踪精度,降低导气管对导引头控制系统的影响,提出一种新型可变增益扰动观测器。首先,利用搭建的导引头实验系统研究了导气管干扰的扰动特性。然后,在分析导气管扰动的系统特性基础上,结合经典扰动观测器理论,设计了新型可变增益扰动观测器,并分析了其鲁棒稳定性。最后,针对某实际红外导引头系统,设计了可变增益扰动观测器,并进行了导气管扰动抑制实验。结果表明:经典扰动观测器无法对导气管的扰动进行有效的抑制,而采用可变增益扰动观测器后,系统速度阶跃响应稳定精度提高71.1%;位置阶跃响应稳定精度提高42.8%。研究表明可变增益扰动观测器可以有效地抑制红外导引头中的导气管扰动。

**关键词** : 红外导引头, 导气管扰动, 扰动观测器, 变增益, 扰动补偿

**Abstract** : In order to improve the tracing accuracy of infrared seeker and to reduce the influence imposed by the gas tube disturbances, a variable gain disturbance observer (VGDOB) is put up forward. First, based on the control system design platform of infrared seeker, disturbance characteristics is analyzed. Second, according to the characteristics of the gas tube disturbances and traditional disturbance observer theory, VGDOB is designed and its robust stabilization is also researched. Finally, experiment is implemented to restrain the gas tube disturbances by using the VGDOB. Experimental results indicate that with VGDOB, the velocity step response accuracy of the system is improved by 71.1%, and the position step response accuracy of the system is increased by 42.8%, while the traditional disturbance observer cannot compensate the gas tube disturbances. It can be concluded that the VGDOB can suppress the gas tube disturbances that exist in the infrared seeker effectively.

**Key words** : IR seeker gas tube disturbance disturbance observer variable gain disturbance compensation

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**作者简介**: 吴海龙(1988-),男,山东济南人,博士研究生,2011年于中国石油大学(华东)获得学士学位,主要从事稳定平台控制系统设计研究。E-mail:wuhailong.2001@163.com

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