

复杂卫星抖动下的星敏感器姿态测量数据处理技术

王炯琦^① 矫媛媛^① 周海银^{①②} 武云丽^{②*}

^①(国防科技大学数学与系统科学系 长沙 410073)

^②(空间智能控制技术国防科技重点实验室 北京 100190)

Star Sensor Attitude Measuring Data Processing Technique in Condition of Complex Satellite Dithering

Wang Jiong-qi^① Jiao Yuan-yuan^① Zhou Hai-yin^{①②} Wu Yun-li^{②*}

(Department of Math., Science College, National University of Defense Technology, Changsha 410073, China)

(Space Intelligent Control Key Laboratory of Science and Technology for National Defense, Beijing 100190, China)

摘要

参考文献

相关文章

Download: PDF (327KB) HTML 1KB Export: BibTeX or EndNote (RIS) Supporting Info

摘要 由于复杂卫星在轨运行中不可避免地存在着抖动振动, 从而导致星敏感器数据不稳和精度降低, 这给低信噪比条件下的敏感器姿态测量数据处理带来了很大困难。该文针对复杂卫星抖动情况下数据的处理进行了讨论, 分析了星敏感器测量原理及各类误差源产生机理, 并在此基础上, 重点研究了抖动条件下的星敏感器姿态测量数据处理技术, 结合抖动幅频特性, 通过寻找用于处理抖动引起误差的幅频分界点, 分析了抖动对星敏感器姿态测量精度的影响, 并结合卫星姿态确定过程, 给出了抖动情况下星敏感器姿态测量数据的处理方法, 可有效地提高星敏感器数据处理精度, 使不经稳态控制就可对抖动测量数据进行处理成为可能, 大大降低了系统的设计成本, 缩短了设计周期。

关键词: 复杂卫星 星敏感器 姿态测量 抖动 幅频特性 数据处理

Abstract: Because dithering and vibrating exist inevitably while complex satellite running, this will lead to nonsteady and lower precision for star-sensor measurement data and difficult in data processing at low SNR. Therefore, in this paper, the data processing method in the condition of complex satellite dithering is discussed. Firstly, the measure principle and error mechanism of star sensor in satellite attitude determination are analyzed, and then on the basis of these analysis, the attitude measurement data processing technique in condition of satellite dithering is researched detailedly. Combined with the amplitude and frequency character of dithering signal, the influence of dithering to the measurement precision of star sensor is analyzed by using of searching the boundary point of amplitude and frequency for treating dithering error. In addition, integrating with the process of satellite attitude determination, the measurement data processing method of star sensor in the dithering condition is presented, which can effectively enhance the data precision for star sensor observation and make it possible to utilize dithering measurement data without steady state control. The method has the advantages of decreasing design cost and shortening design period.

Keywords: Complex satellite Star sensor Attitude measuring Dithering Amplitude and frequency character Data process

Received 2009-08-13;

本文基金:

国家自然科学基金(60974124)资助课题

通讯作者: 王炯琦 Email: wangjq1979@163.com

引用本文:

王炯琦, 矫媛媛, 周海银, 武云丽. 复杂卫星抖动下的星敏感器姿态测量数据处理技术[J] 电子与信息学报, 2010, V32(8): 1885-1891

Wang Jiong-Qi, Jiao Yuan-Yuan, Zhou Hai-Yin, Wu Yun-Li. Star Sensor Attitude Measuring Data Processing Technique in Condition of Complex Satellite Dithering[J], 2010, V32(8): 1885-1891

链接本文:

http://jeit.ie.ac.cn/CN/10.3724/SP.J.1146.2009.01079 或 http://jeit.ie.ac.cn/CN/Y2010/V32/I8/1885

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

- ▶ 王炯琦
- ▶ 矫媛媛
- ▶ 周海银
- ▶ 武云丽