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月球巡视探测器自主定向算法研究

岳富占, 崔平远, 崔祐涛, 居鹤华

哈尔滨工业大学 深空探测基础研究中心, 黑龙江 哈尔滨 150001

Algorithm Research on Lunar Rover Autonomous Heading Detection

YUE Fu-zhan, CUI Ping-yuan, CUI Hu-tao, JU He-hua

Deep Space Exploration Research Center, Harbin Institute of Technology, Harbin 150001, China

摘要

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摘要 月球巡视探测器自主导航是其能在月面执行探测任务的关键,而定向又是月球巡视探测器自主导航的一个重要组成部分,其定向精度将直接影响到月球巡视探测器定位性能。将CCD(Charge Couple Device)太阳传感器应用到月球巡视探测器上,用太阳传感器测量太阳位置矢量,结合加速度计测量的重力矢量,利用QUEST算法推算了月球巡视探测器的姿态和航向,为月球巡视探测器构建了一套适用于长时间、长距离导航的绝对定向方案,通过理论分析和实际推算描述了该定向方案的具体实现过程,最后以仿真结果验证了该方案的可行性,为下一步月球巡视探测器定位研究提供了技术参考。

关键词: 月球探测 月球巡视探测器 太阳传感器 加速度计 航向角

Abstract: The lunar exploration mission requires a long-range autonomous navigation of lunar rover, heading information is an important part of lunar rover navigation, its precision will affects the localization precision and the performance of navigation directly, especially for long range, long duration traverse on the moon. A variety of technologies have contributed to the heading detection and localization of lunar rover, but there is no concretely defined heading detection architecture. In this paper, a feasible scenario is developed for absolute heading detection of lunar rover, which is based on the vector observation information coming from CCD(Charge Couple Device) sun sensor and accelerometer, and the process of heading detection is described in detail. Finally its validity is testified by simulation.

Keywords: lunar exploration lunar rover sun sensor accelerometer heading

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