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探测器安全着陆风险评估与敏感性分析

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Risk assessment and sensitivity analysis of detector safety landing

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摘要 探测器安全着陆是行星探测的关键环节,而目前着陆成功率偏低,进行安全着陆风险研究有着非常现实的工程需求.为此,首先分析探测器结构与着陆方式,梳理行星表面影响安全着陆的主要因素,明确着陆安全判据,然后基于蒙特卡罗思想,模拟行星表面地貌和探测器着陆方式,给出了探测器在盲降下安全着陆概率估计的仿真方法.在此基础上,考虑探测器尺寸和着陆区域面积,对探测器安全着陆概率进行敏感性分析,结果表明探测器的尺寸对安全着陆概率有显著影响.

关键词: 探测器 着陆 风险评估 敏感性分析

Abstract: Safe landing of detector is the key of planetary exploration, but the success probability of landing is still low, and the study of landing risk is very important in practical engineering. The detector-s structure and landing way were analyzed, and the main influence factors of the safety landing were concluded, then the criterions of safe landing were given. Based on Monte Carlo theory, the planet surface landform and detector landing way were simulated, and the probability of safety landing under blind landing was given by simulation method.Furthermore, consider the detector size and landing area, the sensitivity analysis of the probability of safety landing was carried out, and the results show that the detector size has significant influence on the probability of safety landing.

Keywords: detector landing risk assessment sensitivity analysis

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