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Author: Dr. Li Qunzhi
China Academy of Space Technology (CAST), China

Mr. yang jia
China Academy of Space Technology (CAST), China

A PRIORITY METHOD OF CRUISE DIRECTION FOR THE LUNAR ROVER

Abstract

Lunar Rover operation is a complex and incessant progress which contains multi-interactions between the rover and ground teleoperation center. This challengeable remote control working model is obviously different from China's previous spacecrafts. The control model of the lunar rover has following features: long distance, complex tasks of multi-model and multi-constrains, un-repeatable, non-structural and un-predictable lunar environment, high frequency and long duration mission supporting operations, requirements of synchronous simulation etc. Therefore, we developed a ground teleoperation system to meet the requirements. This control system has solved the difficult problems which can be expected in the future rover missions. During the exploration of the lunar rover on the moon, as one of the key elements of the teleoperation system, the rover cruise direction should be considered firstly. It is restricted by the rover's working conditions, the star-calendar among Sun-Earth-Moon, and the transitable ability on the moon. According to those states, a detailed analysis of the rover cruise direction is provided. Here, the essential factors of the rover's working conditions are analyzed, which including the power balance, the shelter of the communication, the limited moving range of the manipulator, the shadow of the solar array, the sun's ray's condition and the requirement of the scientific exploration. The results provide planning direction for the small scale global and local path planning of the lunar rover. This paper gives the synthesized analysis of the rover cruise direction on the moon firstly. Then the method of this synthesized analysis is introduced. Thirdly, the model of the analysis method is built and the judgment condition is determined. Finally, the feasibility of this method is approved by simulation test and validated by the rover exploration on the moon.