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ELECTRONICS BOX DESIGN OPTIMIZATION OF LUNAR MICRO ROVERS

Abstract

The role of micro robotic rovers is prevalent in the current century since the study of Moon and Mars are gaining the momentum. For a Lunar mission, the driving factors decide the structural design, size, and functioning of the micro-rover such as mass, stiffness, compactness, accommodation of science experiments as well as the duration of mission. The electronics box of the rover comprising the vital PCB cards is the heart of the extraterrestrial missions.

The electronics box design optimization discussed in this paper considered the factors, which constrain the mechanical, thermal and wire harnessing aspects of the micro rovers. The design considers a rover with a size of 500mm x 500mm x 800 mm and a limited mass allotted to electronics box. Moreover, the design of the electronics box assumes that the rover is designed for mid latitude operation of one lunar day. The proposed design also withstands the launch, cruise and landing loads of the mission.

One of the major design constrains is the stiffness requirement that need to meet the system level frequency. Therefore, the variation in thickness of electronics box cover, reinforcements, ability to withstand the vibration also investigated in the study to optimize the electronics box. The proposed box is a strut base design because of its feasibility in Integration and testing of the PCB cards. More details of the design aspects of the proposed electronics box from the system point of view will be discussed in the paper.