Paper ID: 59048
interactive

IAF SPACE EXPLORATION SYMPOSIUM (A3)
Virtual Presentations - IAF SPACE EXPLORATION SYMPOSIUM (VP)

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MAD: AN EXPERIMENT FOR MATERIAL ADHESIVENESS DETERMINATION ON THE LUNAR SURFACE

Abstract

Lunar dust is a major concern for any lunar surface mission. Due to its very abrasive nature, and its electrostatic charge, lunar dust has the tendency to stick to almost anything it gets in contact with. It is therefore necessary to develop materials and surface treatments (like coatings, paints, etc.) which are repellent to that type of contamination. To test such developments, it is ultimately needed to obtain in-situ data of the adhesiveness of different material samples to lunar dust. To do so, the experimental setup MAD - Material Adhesiveness Determination – as part of a small size lunar rover is presented. MAD employs one wheel of the rover's mobility system, as platform to repeatedly expose different materials to the lunar regolith. The material samples will be mounted on neighboring elements of the wheel surface. Hence, when the rover is moving, these different samples will be put in contact with the lunar surface in a controlled manner. Observing those samples during drive operations by means of an optical imager, the contamination of these samples can be inferred directly. Either determining the change in reflectivity of these samples, or change in color, will allow to estimate the surface density of the accumulated dust. Or, if the collected particles are larger than the optical resolution of the camera, a these grains can be spatially resolved. In this paper we present the measurement and operations concepts of the MAD platform for material testing in the lunar surface environment. Also, the potential impact on rover mobility and technical challenges are discussed.