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MAD: AN EXPERIMENT FOR MATERIAL ADHESIVENESS DETERMINATION ON-BOARD THE EMIRATES LUNAR MISSION'S RASHID ROVER

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 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 the Rashid rover of the Emirates Lunar Mission is presented. MAD employee several wheels of the rover's mobility system, as platform to repeatedly expose different materials to the lunar surface regolith. The material samples will be mounted on neighbouring 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.

Among the materials, also Graphene based composites and structures developed in a collaborative effort of the University of Cambridge and the Free University of Brussels are foreseen to be integrated to MAD as part of novel materials investigated for lunar applications.

Another proposed component of the MAD experiment that is under study for potential inclusion in the Emirates Lunar Mission is a Passive Regolith Sampler, being developed by a team at the Massachusetts Institute of Technology. The PRS will be further introduced elsewhere in this conference (Stober).

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.