

Regolith induced wear and dust mitigation

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Abstract. Harsh lunar environment, solar radiation, high temperature fluctuation and vacuum will challenge our future manned/unmanned missions. One of the most aggravating, restricting facets of lunar surface exploration is the lunar dust which is electrostatically charged and adheres to everything that it comes into contact with. It is very fine and also highly abrasive. In this study we looked into regolith induced wear on mechanisms and using electrostatic and dielectrophoretic forces to remove dust from surfaces. Material degradation at presence of dust is investigated by designing a new abrasive wear test device and also standard Steel Wheel Abrasion Test. Employment of electrostatic forces to remove and transport lunar dust are also addressed by manufacturing different patterns of electrodes both experimentally and numerically. Moreover an extreme example of using lunar dust as a solid lubricant will be discussed.