

SESSION 2A. SPACEPORT MATERIALS

Electrodynamic Shield to Remove Dust from Solar Panels on Mars

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Abstract

The Materials Adherence Experiment on the Mars Pathfinder mission measured an obscuration of the solar arrays due to dust deposition at a rate of 0.28% per day. Dust deposition is the prime mission constraint of the duration for the current Mars Exploration Rovers which are expected to last around 90 sols. Here we have developed a prototype Electrodynamic Shield to be used to remove dust from solar panels on Mars. This technology, developed in the 1970's, has been shown to lift and transport charged and uncharged particles using electrostatic and dielectrophoretic forces. This technology has never been applied for space applications on Mars nor the moon due to electrostatic breakdown concerns. However, we show that using an appropriate design not only can the electrostatic breakdown be prevented, we are also able to show that uncharged dust can be lifted and removed from surfaces under simulated Martian environmental conditions. This technology has many potential benefits for removing dust from visors, viewports and many other surfaces as well as solar arrays.