

Introduction to Electrostatic Dust Motion on Small Planetary Bodies

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Abstract—The solar wind plasma directly impinges on the surface of airless planetary bodies such as asteroids and the Moon. Interaction with the solar wind plasma and UV radiation causes charging of the surface dust (called regolith) and the development of an electric field near the surface. It has been hypothesized that the resulting electrostatic force on grains can cause dust grains to detach from the surface of airless bodies. When grains are launched off the surface of an airless body with a small range of initial velocities and charges, the electrostatic force can also negate gravity, causing the grains to levitate above the body. We will describe the physics of electrostatic dust motion and demonstrate the significance of cohesion on electrostatic dust lofting. Additionally, we will present the altitudes and grain sizes at which grains are expected to electrostatically levitate above asteroids and the Moon. We will also discuss existing and planned observations at asteroids that support and will test our predictions of electrostatic dust motion.