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Verification of Particle Image Velocimeter for Study of Martian and Lunar Regoliths

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Validation of PIV System for Regolith Study

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**Objective:**
Test operation of NASA’s Particle Image Velocimeter (PIV) to study dust motion. This will provide a better understanding of regolith behavior and will help verify the ability of the PIV to measure accurately the size and velocity of thousands of dust particles.

**Background:**
- Dust interaction with equipment is a major concern for long term space missions
- Human exploration of asteroids, the Moon, and Mars will require understanding and mitigating the dust contamination environment

**PIV:**
- NASA’s Goddard Space Flight Center developed PIV to measure velocity and size of particles
- Instrument detects particles as small as 5-8 \( \mu \text{m} \)

**Data Collection:**
- Martian regolith simulant is used**
- High speed camera records general flow trends
- NASA PIV algorithm processes the video image files

- Particle count and size distribution are collected for small sample sizes
- Particle size distribution is found from images of dropped particles using Matlab

• Particles under an electric field are tracked and the velocities are plotted to observe varying charging effects

- With the PIV algorithm, we can confirm plotted velocities and further study the deflection of charged particles from an electric field

**Future Tasks:**
- Determine particle’s charge-to-mass ratio
- Determine particle’s acceleration due to varying plate and charging configurations