**Correlation of Particle Volume and Velocity of Fragments of Different Types of Meteorites During Disruption Events**

by Alexis R. Rolling

Samples of meteorites have been studied to further understand how they break apart during disruption events. Through small-scale impact experiments, models have become increasingly more realistic, yet the current results on meteorite fragmentation are still relatively speculative. This study includes analysis of different types of meteorites through examining the volume-velocity relationship of disrupted particles. This is done in order to gain a systematic understanding of how different meteorites may behave after impact. Cameras at the NASA Ames Vertical Gun Range are used to obtain videos of numerous meteorites being disrupted, and later these images are converted into TIFF virtual stacks to be analyzed in ImageJ®. The ImageJ distance tool allows for the distance the particle traveled to be found. This is done by measuring the distance between the place of impact and the place where the particle has traveled in space. Three different types of meteorites were examined in this preliminary study: ordinary chondrite (Saratov), carbonaceous chondrite analog (hydrated Northwest Africa 869), and CI carbonaceous chondrite analog (hydrated Northwest Africa 4502). For each meteorite type, videos from two separate shots were analyzed. From the data currently collected, there seems to be a trend. In all three types of meteorites, velocity seems to be a consequence of the disrupted particles volume. Besides a few outliers, small particles tend to travel at higher velocities than large particles, as expected. The particle with the maximum velocity of 2,105.36 cm/sec was the smallest particle tracked. Generally, particles with the largest volumes were the particles with the lowest velocities. In all the shots, there is a noticeable correlation between volume and velocity. Small particles of all the meteorites, which were less than $1.64 \times 10^{-2}$ $cm^3$, had velocities 1.6X to 2.6X the velocities of the larger particles, which were greater than $1.64 \times 10^{-2}$ $cm^3$. When looking at velocity of particles alone, the three types of meteorites all disrupt in a similar pattern.