

Comparison of Fragments Created by Low- and Hyper-velocity Impacts

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This paper summarizes two new satellite impact tests conducted at the Kyushu University last December. The objective of the tests was to investigate the outcome of low- and hyper-velocity impacts on two identical target satellites. The first experiment was performed at a low velocity of 1.5 km/s using a 40-gram aluminum alloy sphere. The second experiment was performed at a hyper-velocity of 4.4 km/s using a 4-gram aluminum alloy sphere. The target satellites were 15 cm × 15 cm × 15 cm in size and 800 grams in mass. The ratios of impact energy to target mass for the two tests were approximately the same. The target satellites were completely fragmented in both tests, although there were some differences in the characteristics of the fragments. The projectile of the low-velocity impact experiment was partially fragmented while the projectile of the hypervelocity impact experiment was completely fragmented beyond recognition. Approximately 1,000 fragments from each experiment were collected. They are being measured and analyzed based on the analytic method used in the NASA Standard Breakup Model (2000 revision). Preliminary analysis results will be presented in this paper.