

Abstract Submitted
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Size Scaling Damage Saturation in Hypervelocity Cratering Experiments in Al 2024 JAMES WALKER, SIDNEY CHOCRON, DONALD GROSCH, Southwest Research Institute — Experiments were performed measuring mass liberated from an Al 2024-T351 target during impacts by a 3.0-cm-diameter aluminum sphere in the range of 4 to 5.77 km/s. The experiments were performed with a large two-stage light gas gun firing into targets mounted on a pendulum. The mass liberated from the targets, as measured by pre- and post-test weighing of the target, shows an interesting size-scale behavior when compared with historical data on Al 2024-T4 targets performed at smaller scale. Essentially, small spherical impactors (up to 1.27 cm in diameter) show a mass liberation that scales with impact speed times the square root of the diameter of the impactor. However, somewhere in the region of 1 cm diameter, the liberated mass transitions to scaling in terms of impact speed squared and there is no longer a size scale dependence on the liberated mass. This ejecta mass behavior is interpreted in the context of damage saturation. To support the analysis, computations were performed looking at damage model behavior that is required to support such a size scale transition in the region of 1 cm impactor diameter.

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