

Impact velocity dependence of transient crater growth in granular targets

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In this study, we developed a new method for direct observations of transient crater growth in granular targets using a laser profiler. This method allows us to measure the excavation cavity in the transient crater growth at a temporal resolution of ~1 ms without using a high-speed video camera. Using a vertical two-stage light gas gun at JAXA, we conducted impact cratering experiments onto granular targets. Using the laser profiler, we successfully obtained the time expansion data of the excavation cavity for the impact velocities ranging from ~0.8 km/s to 6 km/s. Based on these new data for the transient crater growths, we discuss how the scaling law for impact cratering in the gravity regime depends on impact velocity.

Keywords: impact crater, impact experiment, scaling law, gravity regime