

Velocity Distributions of Fragments in Oblique Impact Cratering on Gypsum

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Introduction: In order to understand the behavior of the impact-induced fragments on the small asteroid, oblique impact cratering experiments were produced using gypsum targets, which were used as one of porous and low density materials. The fragment size and velocity were measured for fragments larger than 1mm in diameter, and slower than 200m/sec. A high speed CCD video camera was used to see the fragments in flight, and secondary collisions with a window of the target chamber were also employed to measure fragment velocity. Especially, we focused to measure the behaviors of very low velocity fragments, which have special meaning for the ejecta on very small asteroids.

Experimental Procedure: We used almost the same experimental procedure as our other paper pre-sented in this meeting, Velocity Distributions of Fragments and its Time Dependence. Since in this series of oblique impact, we shot the target surface inclined downward, the extremely slow fragments could come out from the crater cavity.

Results: In the paper cited above, it is shown that the impact ejection is divided into 4 stages according to the ejection pattern. In the second stage (0-3msec), the elevation angle of ejection decreases slightly, and the data are more scattered compared with the case of vertical impact, in the impact at 45degree. In the impact at 70 degree, the secondary collision on the window only was identified in the down range direction, and that was also consistent with the result of the run using witness papers.

Figure 1 indicates the ejected time and the elevation angle of ejection of the each tracked fragments also mentioned in the other paper for the vertical impact one. In the impact at 0degree, and 45degree, a target box with a slit was installed to get the 3D velocity of the fragments, and there is few fragments were ejected target surface normal in the second stage. The large number of small and slow fragments ejected later, consists the last stage (3msec-). The average direction of the flow composed by a cluster of small and slow fragments slightly deviate from the surface normal in the oblique impact.

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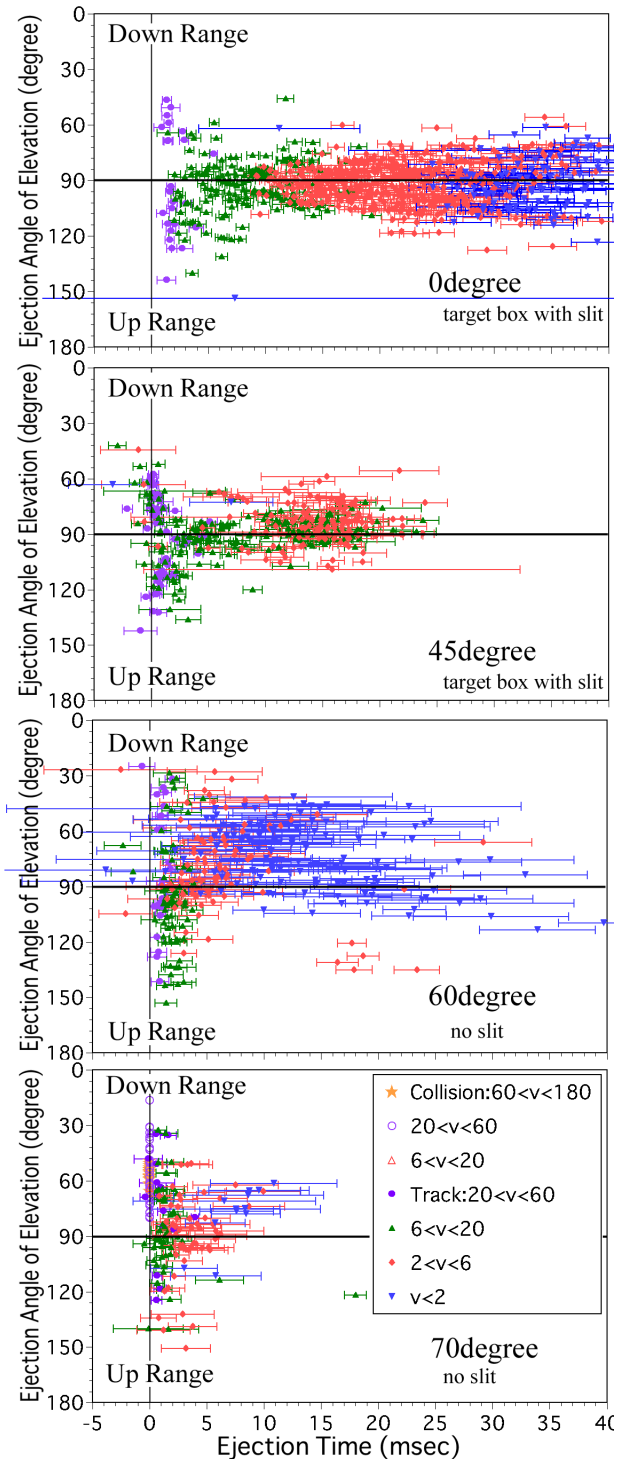


Figure 1 Ejected time and the elevation angle of ejection in the oblique impacts: the later half of the film in the impact at 70degree was lost by an accident.