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Introduction: Porous structures are thought to be common among asteroids, comets and icy satellites of outer planets in our solar system [1]. It is very important to develop an understanding of the impact process which is one of key processes in the formation and evolution of these porous small bodies. Love et al. [2] conducted hypervelocity impacts of soda lime glass projectiles into four porous sintered glass beads targets with different porosity and compressive strength, and showed that the increase of target porosity leads to a greater localization of the impact damage. Such localization should occur with rapid decrease of stress wave with distance from the impact point due to the pores and result in different velocity fields of the ejecta from those of non-porous targets.

Yanagisawa and Itoi [3] conducted collision experiments with impact velocities from 3.7 to 7.3 km/s and studied the relation between the velocities of ejecta and the distance from the “equivalent center”, that is the depth of the center below the impact point defined as diameter of projectile multiplied by the root of the ratio of the densities of projectile and target. Their results showed that the stress attenuate with about –3 power of the distance from the equivalent center in the case of mortar, porous alumina and water. On the other hand, we found that the stress wave in sintered glass beads targets attenuate with about -2 power of the distance from the impact point [4]. Similar power (about -2) of attenuation was also found in flow velocity measured in impact cratering process onto glass beads [5]. However, the attenuation rate of the stress derived from antipodal velocity of sand target hold in a thin paper balloon was found to be steeper than -3 [3]. In order to understand the velocity field in porous aggregates, further study is required. However, aggregate targets are hardly prepared in laboratory. Ryan et al. [6] conducted catastrophic fragmentation of aggregate targets consisting of pebbles connected by weak glues. Yanagisawa and Itoi [3] prepared “rubble pile” by using sand in thin paper balloons. In this study, we prepared mountains of glass beads as “rubble pile” targets.

Experiments: Impact experiments are carried out using a light-gas gun at Kobe University. The projectiles are glass spheres of 3.2 mm in diameter. The impact velocity is about 260 m/s. Targets are piles of glass beads built up into a mountain shape in a plastic box. A hole for the projectile is open in the front wall of the box. The height of the pile at the front wall is lower than the hole, however, the peak of the mountain is higher than the hole. All the shots are recorded by a high-speed video camera. Ejecta velocity is measured on the images.

We will present the comparison between the previous results on sintered glass beads targets and the present ones and will discuss on the effect of the bonds between beads on the velocity field.

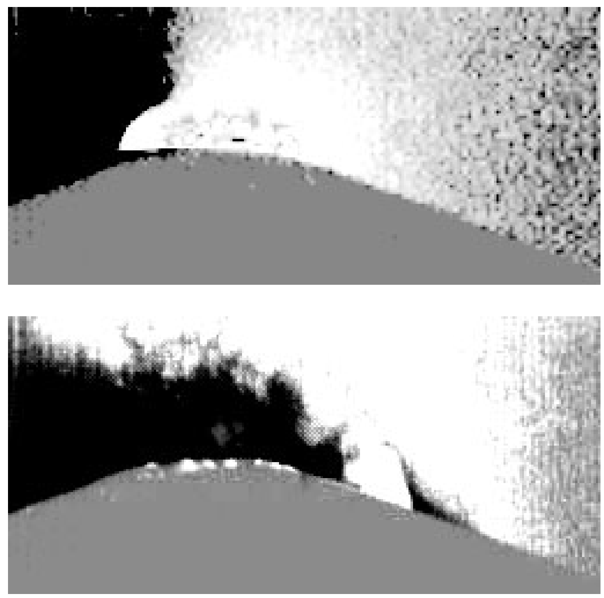

Figure 1: High-speed video images after impact on a mountain of glass beads of 50 μm in diameter. Frame rate was 2,000 fps. The projectile was shot from the left into center-left of the targets. The elapsed times are 36/2000 and 252/2000 sec. The pile of glass beads is shown in gray, whereas the ejecta cloud is black. The ejecta cloud develops from the left to right, however, in the lower image, ejection from antipodal point is also shown. The width of the images are about 10 cm.

References: [1] Britt, D. T. et al. (2002) In *Asteroids III* (Eds. Bottke Jr., W. F. et al.), pp. 485-500. [2] Love, S. et al. (1993) *Icarus*, 105, 216-224. [3] Yanagisawa, M. and Itoi, T. (1994) ASP conference Series, 63, 243-250. [4] Setoh, M. et al. (2008) *Lunar and Planetary Science* XXXIX, abstract No.1797. [5] Yamamoto, S. et al. (2008) *Lunar and Planetary Science* XXXIX, abstract No.1507. [6] Ryan, V. E. et al. (1991) *Icarus*, 94, 283-298.