CRUSH CURVE MESSUREMENTS OF POROUS MATERIALS USED FOR LABORATORY IMPACT EXPERIMENTS

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@As the impact process is common in the solar system, it is important to understand the impact process of small bodies in order to study the origin and evolution of these bodies and the solar system. The scale of the impact process in the solar system is far larger than we can address in the laboratory directly. Therefore, numerical simulations offer an effective way to study the impact process of small bodies. However, numerical simulations require knowledge of the physical properties of the target material, and should reproduce the results of laboratory experiments. Therefore, laboratory studies of the physical properties of the target materials, and destruction experiments, are important for numerical simulations.

@In numerical simulations of the collisional disruption of asteroids, a fracture model, the Grady-Kipp model, has been used (Benz and Asphaug, 1994). The Grady-Kipp model represents cracks statistically using the nucleation and propagation of flows determined from an initial distribution. Increasing numbers of small porous bodies have been found in the solar system (Britt et al., 2002). Since the pores in a porous material stop crack growth, it is not clear how applicable the Grady-Kipp model is to the simulation of porous materials.

@In this study, we measured the crush curves of samples, i.e., stress-strain curves during static loading, and compared them with the static compressive strength of the samples. The porosity of sintered glass beads, gypsum, and pumice specimens is about 40, 50, and 72%, respectively. These samples were used as targets for laboratory impact experiments. The shapes of the crush curves differ from one other, probably due to the sample porosity and microscopic structure. We will discuss further how porous samples are destroyed.

References

Benz and Asphaug, 1994; *Icarus*, 107, 98-116.

Britt et al., 2002; *Asteroids III*, 485-500.