# Impact experiment of stress-applied target

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Fast rotating asteroids have been found and the centrifugal force in such fast spinning asteroids affects their collisional disruption process. In order to investigate this effect, we need to perform impact experiments of rotating targets. However this kind of experiment hardly has been performed because it is difficult to rotate the very porous samples rapidly. In this study we conducted impact experiments with stress-applied cylindrical targets in order to simulate the tensile stress in the target due to the centrifugal force.

Impact experiments were performed using one-stage light gas gun in Kobe University. Projectiles were spheres 3.2 mm in diameter and made of stainless, and impact velocity was up to about 260 m/s. Targets were made of cement mortar solidified from cement-water mixture, those mass ratio were 8 to 5 or 4 to 3. Targets were 20 mm or 16 mm in diameter and 15 mm in length. The target strength was measured by compression testing machine. Impact experiments were conducted with the targets applied stress up to 80 % of their own strength.

In previous study of impact experiments with rotating targets, $Q*$, the specific energy for fragmentation (ML/M=0.5) is nearly a factor of 4 smaller than for non-rotating targets when the rotational stress is as little as 5% of the target strength (Housen et al.,2004). However, there was no significant difference between stress-applied targets and normal targets in this study. This is because the stress distribution in the target of this study dose not correspond perfectly to that of the rotating target and also the rod applied to the targets for applying the stress prevents the growth of cracks induced by the impact. With taking account these effects, we will discuss on the effect of applied stress on collisional fragmentation.