Three-dimensional imaging of impact induced cracks using X-ray CT

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In order to understand physical mechanism of impact fragmentation of the planetesimals in the early solar nebula, we measured crack distribution in impacted basalt sample. X-ray CT can take images of cracks with advantages in non-destructive measurement. The cross sections measured by X-ray CT scanner in GSJ were restructed into three-dimensional image. An aluminum projectile was fired into basalt sample to make a crater and many cracks in it. We will show the three-dimensional distribution of cracks. Also with comparing the X-ray CT image with microscopic image of the cross section, the lower limit of the detectable crack opening will be shown.

The planetesimals were made by repeating collisions with each other and accreted to grow into planetary bodies in the early solar nebula. The size distribution of impact fragments has large influence on growing of planetesimals. In order to understand physical mechanism of impact fragmentation, we measured crack distribution in impacted rock sample.

X-ray CT can take images of cracks with advantages in non-destructive measurement. The cross sections measured with 512 x 512 pixels image by X-ray CT scanner in GSJ (CT-W2000, Hitachi Medico) were restructed into three-dimensional image. The size resolution of the cross section image was 0.3 mm.

An aluminum projectile was fired into basalt sample with 1.3 km/sec in impact velocity to make a crater and many cracks in it. We will show the three-dimensional distribution of cracks in the sample. Also with comparing the X-ray CT images with microscopic images, the lower limit of the detectable crack opening will be shown.