

SPACE DEBRIS SYMPOSIUM (A6)
Hypervelocity Impacts and Protection (3)

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VERIFICATION ON HYPERVELOCITY IMPACT TESTS OF EJECTA AND DATA ANALYSIS OF
WITNESS PLATES AFTER THE IMPACT TESTS**Abstract**

When small space debris or a meteoroid impacts a surface of a satellite, a lot of secondary debris is generated from the impact point. This secondary debris is called "ejecta". The amount of ejecta is deeply dependent on the surface material, the surface structure, the impact velocity, the impact angle and so on. So then it is significant to understand how much mass is ejected from the real space surface materials. However the hypervelocity impact test procedures are not perfectly equal one another among different impact test facilities in the world. As a result, the impact results cannot be compared directly among them. Under such situation the draft CDV11227 on a test procedure of hypervelocity impact upon ejecta was proposed by Dr.Mandeville to Working Group 6, Sub-Committee 14, Technical Committee 20, International Organization for Standardization (ISO/TC20/SC14/WG6) about four years ago, in which hypervelocity impact test conditions including projectile size, projectile material, impact velocity are specified as well as measurement method of crater size distribution on witness plates. The crater size distribution could be converted to the fragment size distribution in the ejecta under some assumptions on relationship between fragment size and crater size. In FY2009 calibration tests were done according to the chapter 5 of the draft in which a thick fused silica is used as a target. And in FY2010 hypervelocity impact tests were carried out according to the chapter 6 of the draft in which the real space materials such as solar array coupon, CFRP honeycomb and aluminum honeycomb are used as targets. In this talk, we will show the crater size distribution induced by ejecta impacts on their witness plates. We found that the total ejecta mass for the solar array coupon, CFRP honeycomb and aluminum honeycomb are 45, 25 and 7 times larger than that of the projectile. Finally we confirmed that hypervelocity impact tests and data analysis of witness plates after the impact can be performed based on the CDV11227 draft using Japanese test facilities.