

**Title:** Debris Impact on CFRP-AL Honeycomb Sandwich Structure

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**Abstract**

In order to do risk assessments of debris impacts on unmanned spacecraft, it is necessary to investigate damage of honeycomb sandwich structures caused by debris impacts. However, the study of the honeycomb sandwich panel with CFRP face sheets has not been sufficiently performed. The purpose of this study is to investigate hypervelocity impact phenomena of CFRP-AL honeycomb sandwich structure. Hypervelocity impact tests were performed with a two-stage light gas gun at University of Padova. Three kinds of CFRP-AL honeycomb sandwich panels which are frequently used as a material of a spacecraft structure were tested. The cell size and the core thickness were varied. Aluminum spheres, 0.8 mm in diameter, were used as projectiles. The tests were performed at a velocity range between 2 and 5 km/sec. After the tests, the projectiles perforated all targets. The perforation holes on the panels were measured, and ultrasonic inspection was performed. The area of the perforation holes of the panel were increased with the impact velocity. The core size of the honeycomb core did not influence the relationship between the hole and the impact velocity. Impacts of the projectile on the foil of honeycomb cell caused heavy damage to a face sheet of the opposite side of the impact surface.

**Keywords:** Space Debris, Hypervelocity Impact, Honeycomb Sandwich Panel