

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

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AN INVESTIGATION ON CAPABILITY OF METAL MESH/PLATE MULTI-SHOCK SHIELD TO
RESIST HYPERVELOCITY IMPACT**Abstract**

Metal mesh/plate multi-shock shield was designed by improving on aluminum Whipple shield, and a series of high-velocity impact tests were practiced with a two-stage light gas gun facility. The material of metal mesh is stainless steel 304. Meshes of stainless steel mesh chosen are 20, 40, 80 and 160 respectively, and areal densities are 0.0488, 0.0464, 0.0298 and 0.0245g/cm² respectively. Impact velocity of aluminum sphere is approximately 4km/s. The diameter of projectile is 6.35mm. For the different shield configurations with the same stainless steel mesh, the same shield configurations with different stainless steel mesh and the filmed stainless steel mesh shield configurations, the structure and material factors affecting on performance of shield were analyzed. The results indicated when the stainless steel mesh wall was located in the last wall site of the bumper it could help dispersing debris clouds, reducing the damage of the rear wall. At the same time, when the stainless steel mesh wall was located in the first wall site of the bumper, it did not help comminuting and decelerating projectile. The mesh opening size, wire diameter and separation distance arrangement were the important factors for enhancing the protection performance of shields. The filmed stainless steel mesh helped in weakening the kinetic energy of debris cloud.