

16th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Interactive Presentations - 16th IAA SYMPOSIUM ON SPACE DEBRIS (IP)

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STUDY ON PERFORMANCE OF SHIELDING CONFIGURATION STUFFED WITH AL-MESH AND
BASALT FABRIC

Abstract

In order to probe the shielding configuration with good performance, and with no the fixing and sustaining structure of stuffed layer, structure optimum on the stuffed layer comprised by Al-mesh and basalt fabric was proposed. The performance of Al-mesh / basalt fabric cracking and intercepting debris cloud was validated by hypervelocity impact test on shielding configuration. There were three kinds of stuffed layers with equivalent areal density. Along the impact direction of debris cloud, the first structure was one layer Al-mesh and four layers basalt fabric, the second structure four layers basalt fabric and one layer Al-mesh, the third structure was 8 layers configuration comprised by basalt fabric and Aramid-III fabric alternating in turn. For the improvements of the first and second stuffed layer configurations, the Al-mesh and basalt fabric were sewed by the aramid thread for degrading the influence of poor evenness of Al-mesh on stuffed layer structure, and reducing the fixing and sustaining structure of stuffed layer. Therefore, the additional weight of shielding configuration was reduced. For the shielding configuration, the bumper and the rear plate were aluminum plate with thickness of 1 mm, their distance was 121 mm. The configurations were impacted by the 5mm-diameter aluminum projectile with the velocities ranged from 4 km/s to 5 km/s. The hypervelocity impact test results showed that Al-mesh played better performance of cracking debris cloud when it was placed before the basalt fabric, however, the debris with high velocity produced by Al-mesh cracking may cause caters and bulges on the rear plate. The shielding performance of the second stuffed layer structure was better than the third one, the Al-mesh played the role of sustaining basalt fabric and benefiting its performance of cracking debris cloud, the effect of Al-mesh intercepting debris cloud was evident, however, the effect of Al-mesh cracking debris cloud was reduced compared with the first stuffed layer structure. The shielding performance of stuffed layer was degraded when Al-mesh and basalt fabric were sewed by the aramid thread for better adhesion.