

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

Author: Mr. Fa-wei Ke

China Aerodynamics Research and Development Center(CARDC), China, kefawei2@163.com

Ms. Jie Huang

China Aerodynamics Research and Development Center(CARDC), China, hai@cardc.cn

Mr. Xue-zhong Wen

China Aerodynamics Research and Development Center(CARDC), China, kefawei2@163.com

Mr. Qiang Song

China Aerodynamics Research and Development Center(CARDC), China, 10477222@qq.com

Mr. Qing Luo

China Aerodynamics Research and Development Center(CARDC), China, hai@cardc.cn

Dr. Sen Liu

China Aerodynamics Research and Development Center(CARDC), China, liusen@cardc.cn

STUDY ON THE SHIELDING PERFORMANCE OF CONFIGURATION STUFFED WITH ARAMID  
AND BASALT FABRIC COMPOSITE LAYER

**Abstract**

At present, the shielding configuration stuffed with ceramic and aramid-II fabric was used widely on spacecraft. Firstly, hypervelocity impact test on shielding configurations stuffed with three different aramid fabrics respectively. The aramid fabric included the Aramid-II made in America DuPont Company, Aramid-II and Aramid-III made in China. 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 in the text were impacted by the 5mm-diameter aluminum projectile with the velocities of about 4.8 km/s. Under the same areal density, the stuffed layer containing Aramid-III fabric had better performance of intercepting debris cloud compared with the two other stuffed layers containing Aramid-II fabric respectively, which showed the application foreground of Aramid-III in space debris shielding configuration. Secondly, the influence of compound mode of Basalt with Aramid-III fabric was studied for probing stuffed layer with higher performance based on the above test results. The hybrid Basalt / Aramid-III fabric, the fiber plate composed by compounding several layers of Aramid and Basalt fabric with the glue were designed. Their shielding performances were compared with the configuration of equivalent areal density comprised by Basalt and Aramid-III fabric piling up alternately. The hybrid Basalt / Aramid-III fabric had no advantage of cracking and intercepting the debris cloud. The evenness and rigidity of the fiber plate was improved effectively compared with the fabric layer, however, its performance of intercepting debris was reduced which also caused the shielding performance of stuffed layer to decline.