

From Earth Missions to Deep Space Exploration (05)
Poster Session (P)

Author: Mr. Yue Ha
Harbin Institute of Technology, China, hayue@hit.edu.cn

Dr. Gongshun Guan
Harbin Institute of Technology, China, ggsh@hit.edu.cn
Prof. Baojun Pang
Harbin Institute of Technology, China, hit2009@163.com

INVESTIGATION OF PERFORMANCE ABOUT WOVEN OF BASALT CERAMIC FIBER TO
RESIST HYPERVELOCITY IMPACT BY AL-SPHERES

Abstract

In order to protect spacecraft against hypervelocity impacts of debris and meteoroids, several advanced shielding systems have been studied. The Stuffed Whipple Shield was one of the advanced shield composed of an external bumper (Whipple Shield) plus an intermediate wall made from Nextel fabric and Kevlar fabric, protecting the rear wall (i.e., the pressure shell of spacecraft). Woven of high strength fiber are the major materials filled in the stuffed Whipple shields. The analysis of resist capability of high strength fiber materials woven at hypervelocity impact is a key issue to develop the advance protects materials that will feed into deep space exploration. Basalt fiber is one of the high strength and modulus materials to be noticed in recent years. In the paper, the resist capabilities about woven of basalt fiber at hypervelocity impact by the aluminum projectiles were studied. It was show that woven of basalt fiber have the resist capabilities such as to absorb the impact energy, to break the body of projectiles and to make the mass loss of the aluminum projectiles by melting, softening and cutting aluminum projectile materials, also the capability of reduce the impact velocity and intercept projectiles with the tensile deformation of the yarns.