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Author: Dr. Siyuan Ren

Beijing Institute of Spacecraft Environment Engineering, China Academy of Space Technology (CAST),
China, yuandermail@yeah.net

Prof. Zizheng Gong

Beijing Institute of Spacecraft Environment Engineering, China Academy of Space Technology (CAST),
China, gongzz@263.net

Dr. Qiang Wu

Beijing Institute of Spacecraft Environment Engineering, China Academy of Space Technology (CAST),
China, wuqiang12525@126.com

Dr. Pinliang Zhang

Beijing Institute of Spacecraft Environment Engineering, China, zhangpinliang620@126.com

Dr. Guangming Song

China Academy of Space Technology (CAST), China, guangming.012@163.com

Dr. Chuan Chen

China Academy of Space Technology (CAST), China, chenchuan0611@163.com

Ms. Yan Cao

China, caoyan1983@163.com

HYPERVELOCITY IMPACT CHARACTERISTICS OF MULTILAYER REACTIVE MATERIAL
BUMPER SHIELD AGAINST LARGE SIZE PROJECTILES

Abstract

The need to improve the protection capability of spacecraft shield structure is urgent, owing to the deterioration of space environment caused by orbital debris. Reactive material is a kind of impact-induced energetic composites, and using reactive material to protect spacecraft against hypervelocity impact of orbital debris is a new way. In this paper, the experiments of large size projectiles with hypervelocity impact on multilayer reactive material bumper shield with PTFE/Al and Al2024 as bumper respectively were carried out by using two-stage light-gas gun, and the protective capability of these two materials against hypervelocity impact are compared. The experimental results show that the protective capability of PTFE/Al reactive materials is better than that of Al2024. Through theoretical calculation and numerical simulation, the reasons for the difference of protective capability of different reactive materials are analyzed, and the ballistic limit curves of multilayer bumper shield structures are compared.