Paper ID: 29049
oral

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

Author: Prof.Dr. Zizheng GONG
China Academy of Space Technology (CAST), China, gongzz@263.net

Dr. Ming Li
China Academy of Space Technology (CAST), China, liming_cast@sina.cn
Dr. Jinchao Niu
China, kingyunue@sohu.com
Ms. Yan Cao
China, caoyan1983@163.com
Ms. Kunbo Xu
China, cat_xkb@sina.com
Dr. Yongqiang Mou
China Academy of Space Technology, China, mouyongqiang511@163.com

EXPERIMENTAL STUDY FOR LASER-DRIVEN FLYER PLATES UP TO 8 KM/S

Abstract

A laser-driven flyer technique (LDFT) system has been developed for the launch of flyer with 1mm in diameter and a few m in thickness to simulate space micro-debris hypervelocity impact. The influences of laser energy profiles and mechanical properties of flyer target on the velocity and integrity of flyer for Laser-driven flyer plate technique were experimentally investigated, by using single pulsed laser beams at 1064nm, of 15ns duration and up to 2J energy. The experimental results indicated that laser beams with "top hat" energy profile were key and important base to launch flyers with good qualities (velocity and integrity). There existed a good matching between foil adhesion to glass substrate, the shear strength of foil, and the tenacity of foil, for obtained a high velocity and good integrity flyer. By using the combined flyer target with a thin layer of chromium sandwiched between the aluminum foil and the glass substrate, the aluminum flyer approximately with 1mm in diameter and 3m in thick were launched over 8 km/s, and the experimental repeatability were very good. Though still developing, the Laser-driven flyer technique (LDFT) has been demonstrated promise in simulating micro M/OD hypervelocity impacting effects.