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SPACE DEBRIS SYMPOSIUM (A6)
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Harbin Institute of Technology, China, Liao_Xiang_hit@163.comINVESTIGATION INTO DAMAGE OF WOVEN STUFFED SHIELD UNDER HIGH-SPEED
NON-METAL PROJECTILE IMPACT**Abstract**

Runing environment of spacecraft is very complex, mainly including space debris environment, vacuum environment, temperature environment, electron irradiation environment, etc., among them, the temperature alternating environment are the main factors influencing the spacecraft surface material performance. Space debris protective structure is usually located in the outermost layers of the spacecraft, temperature change of the protective material is very intense. At the same time, there are many non-metal particles in space debris environment, which material performance are influenced by ambient temperature. In this paper, experiment and numerical simulation have been done to analysis the damage of woven stuffed shield by non-metal projectiles high-speed impact. Damage of aluminum mesh and basalt fiber woven stuffed shield under different impact velocities were studied by a series of hypervelocity impact tests being practiced with different times of temperature alternating treatments of non-metal projectiles. The diameter of projectile was 3.2mm. The impact velocities were approximate 1.5km/s and 3.0km/s respectively. The impact angle was 0 for all the tests. The two selected projectile were ceramic sphere and nylon sphere, and the diameter of projectile were 4mm and 5.5mm respectively. The pressure of nitrogen gas in the first stage reservoir ranged from 3MPa to 8MPa. The pressure of hydrogen gas in pump tube was 0.1MPa. The pressure in test chamber was approximately 200Pa. The study focused on the influence of alternating temperature processing of non-metal projectiles on damage of woven stuffed shield. The results indicated that the different influence of alternating temperature processing on damage of woven stuffed shield was brought for the different impact velocities of non-metal projectile. For the ceramic sphere, the influence of alternating temperature processing of projectile was inconspicuous, and for the nylon projectile, the influence of alternating temperature processing of projectile was obvious.