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# EXPERIMENT AND NUMERICAL SIMULATION OF HYPERVELOCITY IMPACT ON HONEYCOMB BY VOLCANO ROCK SIMULACRUM FOR MICRO-METEOROIDS

**Abstract**

Micro-meteoroids, together with orbital debris, pose significant threat to spacecraft safety in operation and they are often considered as M/OD together. However, the effect of micro-meteoroids is often neglected in risk assessment of spacecraft in space environment, possibly due to their different features from orbital debris such as low density but very high moving speed which can hardly be achieved in laboratories. But it is clear that micro-meteoroids must have different impact damages comparing with orbital debris under the same conditions. To be accurate in risk assessment of spacecraft, particularly avoiding the "over design of shield", the damage characteristics of micro-meteoroids impact on shields should be studied. Porous volcano rock was selected as the simulacrum for micro-meteoroids in this paper due to their similar physical and geometric features. Two-stage light gas gun experiments were carried out for a 6mm diameter volcano rock projectile impact on a typical Al honeycomb structure at an impact angle of 0 degree. The impact velocity was achieved as high as possible by certain technic improvements. An ANSYS/LS-DYNA software was employed and validated by experimental results, in which a porous geometrical model was established for volcano rock projectile. The results of experiment and numerical simulation presented the damage characteristics of the shield impacted by the porous volcano rock simulacrum for micro-meteoroids.