

16th IAA SYMPOSIUM ON SPACE DEBRIS (A6)
Impact-Induced Mission Effects and Risk Assessments (3)

Author: Dr. Natalia Goldenko
TSNIIMASH, Russian Federation, goldenkona@tsniimash.ru

Dr. Valery Feldstein
TSNIIMASH, Russian Federation, dinpro@mail.ru

Dr. Eugene Buslov
TSNIIMASH, Russian Federation, jbuslov@mail.ru

Mr. Ilya Komarov
Central Research Institute of Machine Building (TSNIIMASH), Russian Federation,
KomarovIS@tsniimash.ru

MODELING OF THE IMPACT MICROMETEOROID AND ORBITAL DEBRIS ON THE
MICROMETEORIDS AND DEBRIS PROTECTION SYSTEM FOR INFLATABLE MODULES FOR
LUNAR ORBITAL APPLICATION

Abstract

Provides the method of describing the impact micrometeoroid and orbital debris (MMOD) on the Micrometeoroids and Debris Protection System (MDPS) for inflatable modules for lunar orbital application. The fabric materials used to create inflatable modules are proving they can perform just as well as more rigid structures in space, but the impact physics is different. Flexibility of the materials allows the structure to be packaged into a small volume for launch, advances in materials and load path concepts are needed to reduce the weight of these flexible material systems. Advanced flexible polymers and high strength fiber reinforcement should enable lower mass structures. The method for calculating the strength of an MDPS inflatable module consists of two stages. At the first stage, the impact MMOD is numerically modeled on the MDPS of the inflatable module. In the second stage, the analytical calculations of the stress-strain state of the containment loaded localized pulse load Statistic Optimization for MDPS. The development of method of describing the impact MMOD linked with this type of shields will lead to an improvement in their design, in terms of mass, efficiency and costs.