

HUMAN SPACE ENDEAVOURS SYMPOSIUM (B3)
ISS Utilisation (3)

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ISS – TEST BED FOR THE FUTURE SOLAR SAIL SYSTEMS

Abstract

Large scale space structures, such as solar sails, will be able to become a vital part of space exploration. The BMSTU-Sail project was proposed to test frameless thin-filmed solar sail, deploying by centrifugal force. It is not possible to conduct a full test of deployment process of solar sail on Earth. There are also no good ways to neutralize Earth gravity during deployment process. For the space-based experiments there is a problem of achieving data from deployment process. ISS has various advantages to provide full coverage of solar sail deployment process.

BMSTU-Sail experiment is to be held on ISS in late 2013. The main experiment sequence is:

1. Thin film solar sail demonstrator is deploying from testbed picosatellite launched by ISS crew member during EVA.
2. Deployment process starts in the safe distance from the ISS structure.
3. ISS crew member takes photo and video images of thin-filmed structure deploying process.

Mission analysis showed that the probability of solar sail impact to ISS after deployment is small enough to comply ISS safety regulations. Picosatellite transmits to the ground stations scientific data related to deployment process and onboard equipment after leaving from crew members and ISS's field of view. Most of works were conducted by BMSTU students. In addition to scientific experiment it has large educational part. This space experiment allows students to gain experience in the fields of picosatellite design and scientific instruments design for the manned space station, it promotes aerospace education and space research.