

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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SELECTION OF MATERIALS FOR A 3U SATELLITE EQUIPPED WITH SOLAR SAIL

Abstract

The students of 'College of Engineering Pune' are developing a 3U satellite having dimensions 100 x 100 x 340.5 mm. The mission objective is to justify Solar Sail as an alternative mean of space travel, to maneuver from low earth orbit to a higher orbit and to collect useful scientific data during its journey. This paper presents a study of interaction between various design parameters to enable selection of suitable materials for the satellite components. This is to ensure the satellite can withstand and perform efficiently under harsh space conditions. The satellite must be designed for extreme temperature fluctuations, shock and harsh vibrations during ejection and launch. It must sustain the radiation exposure and vacuum conditions. Material of the solar sail is extremely crucial. Solar Sail must be lightweight and highly reflective in order to achieve effective maneuvering. Further, the booms which support the Solar Sail demand high stiffness and machinability. A number of such criteria, which are of paramount importance for any small satellite mission, have been detailed. The paper also presents the results of various tests performed on the materials in order to validate their properties. The surface treatments to which the selected materials are subjected, in order to augment and optimize their performance, are also discussed.