

SPACE PROPULSION SYMPOSIUM (C4)
Interactive Presentations (IP)

Author: Ms. Tanvi Katke

College of Engineering, Pune, India, katketm13.mech@coep.ac.in

Mr. Abhijit Rathod

College of Engineering, Pune, India, rathodal12.mech@coep.ac.in

Mr. Pratik Nimbalkar

College of Engineering Pune, India, nimbalkarpc13.meta@coep.ac.in

Mr. Jerrin Job Sibychan

College of Engineering, Pune, India, jerrinjs14.mech@coep.ac.in

Mr. Hrishikesh Dhende

College of Engineering, Pune, India, dhendehp14.mech@coep.ac.in

Mr. Ajinkya Hire

College Of Engineering , Pune, India, hireac14.meta@coep.ac.in

Ms. Mansi Kabade

College of Engineering Pune, India, kabademm15.mech@coep.ac.in

A MODULAR, VIABLE AND VERSATILE SYSTEM FOR DEPLOYMENT OF SOLAR SAIL IN A 3U
SATELLITE**Abstract**

The number of CubeSat and Nano Satellite missions has been increasing. These satellites after the end of their useful mission life or maybe earlier, become defunct and constitute space debris then. Space debris have become a serious concern for the space community as it can be associated with hazards like in-orbit collisions. Hence, tremendous importance is now being given to deorbit the satellites soon after the end of their mission life. Solar Sail has been gaining importance as a mean to achieve deorbiting using solar pressure and atmospheric drag. A nanosatellite having dimensions 160 x 160 x 260 mm is proposed by the students of College of Engineering, Pune with a mission objective to demonstrate orbit maneuvering from low earth orbit to a higher orbit using Solar Sail and ultimately causing the satellite to deorbit. Utility of the satellite will be radiation monitoring and characterization of charged particle density at various altitudes and locations in space. Solar Sail is a large reflective surface made of thin polymer sheet with Aluminium coating on its reflective side. Initially being in stowed state, the Solar Sail needs to be deployed in order to perform its function. Solar Sail of area 45 sq. m. is proposed and a deployment system has been designed. Dimensional as well as space constraints have been kept in mind while designing the whole system. The design is such that it accommodates all the components within 160 x 160 mm of satellite cross-section. Less than 35 percent of the total volume has been used for the whole deployment system ensuring additional room for the payload and other systems. Being a student satellite project, it is vital for the satellite to be low cost, low mass and design-wise simple. In order to achieve these objectives, an effort has been made to design a cost-efficient, robust and viable Solar Sail Deployment System. This paper presents various parameters that have been considered while designing the system for robustness and simplicity. The design approach along with analysis of possible options and their repercussions have also been deliberated and discussed.