

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
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DESIGN AND PROTOTYPING OF NOVEL ANTENNA DEPLOYMENT SYSTEM FOR CUBESATS

Abstract

This paper describes a design of the Antenna Deployment Mechanism made by the students of Team Anant, BITS Pilani for wire antennas of both monopole and dipole configurations to be used on-board their 3U CubeSat. The antennas remain in a stowed configuration during launch and are deployed once the satellite reaches orbit. The deployment mechanism is designed to deploy the antenna in the required orientation and to minimize the potential failures. Material and stiffness for the antenna have been finalized taking into account several factors such as requirement, availability, and success rate of deployment. Principles used to decide the spring for deployment door have been described in the paper. It has been ensured that the door remains locked in its position after deployment. Impact due to collision of the deployment doors with the satellite structure has also been minimized. Ample measures have been taken to prevent deployment failure due to cold welding in space. The antennas have also been electrically insulated from the rest of the structure of the satellite. The contour for support of stowed antennas has been designed to minimize the stress acting on the stowed antenna to prevent deformation of the antenna. Mass and space optimization considerations among other factors are described in detail in this paper. A burn-wire mechanism has been used for deploying the antennas at the appropriate time. A feedback mechanism has also been integrated into the circuit to signal the successful deployment of the antennas. The deployment process was also tested on 3D printed models of the designed antenna deployment system to check for possible errors and the reliability of the feedback mechanism.