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Author: Mr. Aahan Shah
Birla Institute of Technology and Science(BITS), India, ahaanshah2409@gmail.com

Mr. Rohan Malik
Birla Institute of Technology and Science(BITS), India, f20180780@pilani.bits-pilani.ac.in
Mr. Mridul Saxena
Birla Institute of Technology and Science(BITS), India, mridulsaxena2001@gmail.com
Mr. Kartikey Srivastava
Birla Institute of Technology and Science(BITS), India, kartikey.srivastav08@gmail.com
Mr. Pratheek Mitra
Birla Institute of Technology and Science(BITS), India, pratheekmitra@gmail.com

STRUCTURAL AND VIBRATIONAL ANALYSIS OF STRUCTURE OF A 3U CUBESAT

Abstract

This paper presents the analysis of the static and dynamic performance of the structure of a 3U CubeSat designed by the students of Team Anant, BITS Pilani by Finite Element Method software. The loads are investigated and checked according to the strength and stiffness requirements specified by the candidate launchers. The material and dimensions of the structure of the satellite are following the requirements imposed by the P-POD. The complex model was defeatured to reduce the running time for the simulations. Boundary conditions used for simulation of the P-POD and modelling of bolts in the model using the software are described. The static response of the structure was simulated for the quasi-static launch loads along different orientations due to uncertainty in the final orientation of the satellite in the Launch Vehicle. Modal analysis was performed to check for compliance with the stiffness requirements in both longitudinal and lateral directions. Simulations were performed for the Sinusoidal and Random Vibration Test Levels specified by the launch provider. Fatigue life analysis of the structure was performed to ensure that it will successfully bear the launch loads. The structure of the 3U CubeSat meets all the loading requirements and it is ensured that the stresses and deflections in the structure are well within acceptable levels.