IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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AN EFFICIENT STRUCTURAL ANALYSIS OF NARITCUBE-1 SATELLITE

Abstract

The structure of a satellite is exposed to various types of extreme loads during launch. As a result, designing a satellite structure in accordance with launch vehicle requirements is essential to the safety of a satellite and a rocket. The preliminary method to verify the structural design is to perform structural simulation under loads during the launch sequence defined by a launch provider, such as quasi-static acceleration, sine vibration, acoustic vibration, shock vibration, and random vibration. Generally, a 3-dimensional (3D) model is applied in the structural simulation. Due to the sophistication of the 3D model, the structural simulation takes much time and resources. To minimize time and resources in the simulation phase, using a 2-dimensional (2D) model is implemented. The purpose of this paper is to demonstrate an efficient approach to performing structural analysis with the 2D model of the first 3U CubeSat developed by National Astronomical Research Institute of Thailand (NARIT), which is called NARITCube-1. This paper will present three (3) cases of the structural analysis for NARITCube-1 performed by Ansys Mechanical software. They consist of the structural simulation under quasi-static load and random vibration, including the simulation to investigate the satellite's natural frequency. Furthermore, the information (i.e., solving time, the memory usage of the computer, and the simulation results) from the structural simulation with the 2D model will be compared and analyzed with those from the structural simulation with the 3D model.

Keywords: 3U CubeSat, Structural analysis, NARITCube-1.