Paper ID: 48173
oral

25th IAA SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)
Generic Technologies for Small/Micro Platforms (6A)

Author: Mr. Emilio Lozano
ICEYE, Finland, emilio.lozano@iceye.fi

Mr. Jeremy Lui
ICEYE, Finland, jeremy.lui@iceye.fi
Mr. Toby Harvey
ICEYE, Finland, toby.harvey@iceye.fi

MICRO-SATELLITES DEPLOYABLE STRUCTURES: THE CASE OF THE ICEYE SPACECRAFT

Abstract

Composite materials and, in particular, carbon fiber based composites have well known and proven benefits with regards to mechanical performance and the potential for reducing mass. These materials are not new to space applications, however, there are areas where their use is not fully utilized and their properties not fully exploited. A key area where the use of composites would aid in undertaking tasks with higher mass efficiency and performance are deployable structures. This application is very attractive for micro-satellites because it offers an interesting advantage for relatively small payloads which can perform like traditional larger payloads by reducing the cost of launch through mass and volume reduction. This is currently under study for the family of enhanced ICEYE spacecraft that will soon follow the successful ICEYE X1 into orbit. The selected area for the initial application of this technology and benchmark component in this paper is the deployable solar array of the ICEYE X2. Micro-satellites require smaller torques than bigger satellites to perform their deployment sequences making laminates based in thin-ply technology the optimal choice. However, the failure of thin-ply laminates is not accurately captured by the traditional failure theories. For this reason, a top to bottom design approach for CFRP deployable structures in micro-satellites focusing in the prediction of damage in thin-ply laminates is presented in this paper.