

MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Smart Materials and Adaptive Structures (5)

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DEVELOPMENT OF A COMPOSITE BASED WIRING TECHNIQUE FOR SMALL SATELLITE
APPLICATIONS

Abstract

Towards the stages of completion, wiring and wire routing has turns out to be a big challenge especially for small satellites who in their pursuit of miniaturization have already made a variety of trade- offs for space inside the satellite. This paper will demonstrate a new structural design that will incorporate wiring strategy as the primary factor of consideration for baseline design. The approach is a top down design methodology in which the structure is designed once the other subsystems near completion. The idea is to incorporate conducting pathways for electric signals within the primary structure using cables and other conductors sandwiched in a composite panel. This conducting material could be rout as a network throughout the structure and whenever a connection needs to be made with a component, a conducting lead may be branched out from the appropriate location close to the component and a direct connection can be made. This strategy solves a number of complications during wiring phase such as bridging of wires from one part of the satellite to other. Use of special harnessing points for wire harness, paraphernalia like cable ties, cable tie mounts, heat shrink sleeves and Kapton tape can be avoided thus saving mass and space that can be directed for the implementation of the payload applications, hence increasing the cost effectiveness by increasing the scope of the number of experiments that can be implemented through a small satellite. This paper discusses the design and fabrication aspects and also the mechanical and electrical testing and analysis of the proposed idea. The advantages and applications such as use on conventional satellites have also been discussed.