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HIGH FIDELITY CORRELATION OF DEPLOYABLE STRUCTURES FOR MICRO-SATELLITES

Abstract

Micro-satellites are platforms that have enabled a new wide range of mission that were not thought possible just a few years ago. This is the case of SAR missions that were only seen in much bigger platforms. ICEYE is the pioneer in this field an was the first company in miniaturizing a SAR antenna to the scale of a micro-satellite. Making a sensor as complex and powerful as a SAR antenna into the size of a micro-satellite poses many challenges; power harvesting, heat management but mostly physically fitting a large structure in an smaller size platform. In this last point is where this paper will focus. In the development of the different platforms ICEYE has flown deployable structures played and play a key role. In fact, our mission could not be carried out without them. Hence, there is a constant effort to implement, size and verified this kind of structures so they can be employed in the most reliable manner. In this paper an integrated development approach has been developed to verify by testing a key element in the passive deployments that are under use in the deployable structures present in our platforms. The element used to demonstrated the integrated development is a tape spring. Tape strings are an element consisting of 2 half pipes that store strain energy in stowed configuration that is used to reach a deployed configuration once the structure is released in space. In this case we show how to numerically size tape springs for an application, identify the key material properties via testing and verify the performance of tape springs using machine learning aided image recognition. These three steps that are carried out concurrently so the different models can be updated accordingly leading to a faster and more accurate development of our deployable structures.