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A PATH TO COTS DEPLOYABLE STRUCTURES, PAVING THE WAY TO ADVANCED NEWSPACE NANOSAT MISSIONS

Abstract

The big advantage of the cube satellite standard is that every satellite has the same geometry geometrical dimension that can be easily accommodated in standard deployers. Therefore, the launch becomes affordable, opening up space for a variety of new players that would not have the chance to build and launch satellites in the past. On the other hand, the downside of this standardized cube geometry is that it limits the functionality of these satellites to what can fit within their box. A way to mitigate this limitation is by using deployable structures, which are stored inside the cube for launch and subsequently unfolded/deployed once the satellite reaches its destination in orbit. These deployable structures enhance the performance of a cube satellite. For example, deployable solar arrays provide higher power generation,deployable reflectors and antennas enable better communication performance or deployable dragsails for passive de-orbit of satellites after their end of mission, reducing space debris. With the advent of NewSpace and the constellations it brings with it, the need for so called Commercial Off The Shelf (COTS) subsystems is more urgently needed than ever to realize cost effective production of hundreds or thousands of satellites. This paper gives an overview of the feasibility of COTS deployable structures and the structures and applications where a custom solution is more advantageous. Possible designs of these deployable structures are presented and discussed. The paper concludes with an outlook to advanced deployable structures that could enable visionary concepts of the future.