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REVOLUTIONIZING SMALL SATELLITE TECHNOLOGY WITH ADVANCED DEPLOYABLE
STRUCTURAL SYSTEMS

Abstract

The successful deployment of structural booms and arrays is critical for small satellite missions, as they are essential for power, communication, and scientific instrumentation. However, packaging and deploying these components in a reliable and efficient manner remain significant challenges. In response, NASA and DLR have partnered in a collaborative project aimed at addressing these challenges by developing deployable boom and array concepts specifically tailored for small satellite missions.

To accomplish this goal, the paper provides an overview of existing spacecraft deployable appendages, highlighting the specific requirements that are necessary for small satellite missions. Presenting initial concepts for deployable booms and arrays for various small satellite applications. The emphasis is on developing designs that are predictable and ground testable, tolerant of manufacturing imperfections, and equipped with simple and reliable deployment systems.

Small satellites, which are rapidly gaining in popularity due to their lower cost and increased accessibility, typically have limited space and power resources. As such, any structural booms and arrays used in these missions must be compact, lightweight, and easily deployable. Furthermore, because small satellites often operate in harsh space environments, the booms and arrays must be rugged and capable of withstanding extreme temperature fluctuations, radiation exposure, and mechanical stresses.

The development of such deployable boom and array concepts has the potential to revolutionize small satellite missions by enhancing their performance, reliability, and mission duration. By enabling more efficient use of limited space and power resources, these innovations could expand the range of applications for small satellites and accelerate scientific and technological advances in space exploration.

In conclusion, the packaging and reliable deployment of structural booms and arrays for small satellites is a significant challenge that must be overcome to advance space exploration. The collaborative effort between NASA and DLR to develop deployable boom and array concepts specifically tailored for small satellite missions is an important step towards achieving this goal. Through the use of advanced materials and simple, reliable deployment systems, these innovations could enhance the performance and reliability of small satellite missions, revolutionizing space exploration and enabling new scientific and technological breakthroughs.