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UNVEILING LESSONS FROM BUILDING AND OPERATING NEXT-GENERATION SOLAR SAIL TECHNOLOGY: NASA'S ACS3 MISSION

Abstract

NASA's ACS3 mission, launched on April 23rd, 2024, aboard Rocket Lab's Electron, aims to demonstrate composite materials' potential in solar sail propulsion for deep space exploration. ACS3 utilizes lightweight, flexible, carbon fiber-reinforced composite boom material to reduce weight and enhance structural integrity. The 12U CubeSat will deploy an 80 square meter solar sail using four 7-meter booms, aided by an innovative tape-spool boom extraction system. By harnessing sunlight for propulsion, ACS3 eliminates the need for conventional rocket propellant, offering a sustainable solution for extended missions. The presentation will delve into mission operations post-launch, sharing initial findings and lessons learned during the first few months of on-orbit activities. These insights will inform larger-scale solar sail development, benefiting missions like space weather monitoring and asteroid reconnaissance. ACS3 showcases advanced materials and deployment methods, advancing small satellite mission capabilities.