

IAF SPACE POWER SYMPOSIUM (C3)
Space Power Systems for Ambitious Missions (4)Author: Ms. Turkey Huseynova
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AN UNEXPECTED MISSION : SPACE POWER SYSTEMS

Abstract

Solar sails with integrated energy harvesting demonstrates a groundbreaking model in space exploration, combine the elegant concept of photon propulsion with the sustainable generation of on-board electrical power. This innovative and interesting approach envisions spacecraft equipped with flexible solar panels woven into their sail structures, enabling simultaneous propulsion and energy absorption from incident sunlight without encountering issues. As the solar sail responds to photon pressure, inducing ongoing acceleration, the integrated solar panels effectively turn captured sunlight into electrical energy. This multi-tasking offers a transformative solution for ambitious space missions in the future. This connected solar energy is wisely stored in on-board batteries and ensuring a constant and reliable power supply during periods of shadow or when the spacecraft is not directly exposed to sunlight. This self-sustaining feature reduces dependence on exact resources, positioning solar sails with energy harvesting as an ideal choice for extended missions where fulfilling resource requirements is unrealistic. Additionally, the concept keeps promise for interstellar exploration, that traditional propulsion methods face crucial limitations. Nevertheless, the recognizing the potential of solar sails with energy harvesting comes with its own set of challenges). Moreover, the sail material must express flexibility to space weather conditions and resist unexpected experience with micrometeoroids or debris. All things considered, this integration of solar sails and energy harvesting technology shows a collaborative border for space agencies and international partnerships. The development of sail structures through in space manufacturing techniques could unlock unseen possibilities for ambitious missions within our solar system and beyond. Moreover, solar sails with energy harvesting show the potential to define the future of space exploration by providing a sustainable and efficient solution for pushing spacecraft and powering their systems into the cosmos.