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SOLAR SAIL DEPLOYMENT AND STORAGE MECHANISM USING SHAPE MEMORY ALLOYS
AND ORIGAMI INSPIRED STRUCTURES**Abstract**

Solar sails offer propellant-free propulsion as long as the mass of the spacecraft is kept at a minimum. This allows the solar photons to produce a characteristic acceleration giving it its thrust. Due to the recent development of Chipsats - spacecraft with a mass of a few grams- the idea of combining these with solar sails for ambitious space missions has emerged. The most critical element in any solar sail mission is the deployment of the sail. A number of solutions exist for solar sail deployment on larger spacecraft, mostly based on mechanical energy such as springs and actuators, as well as rotational energy from the rotation of sail. However, the deployment of sails for extremely small satellites has not been explored much yet. This paper presents different deployment methods (sail storage + deployment) for small sails less than one square-meter. It also touches base with exploring new ideas for sail storage and deployment based on centrifugal forces, origami or such patterns observed in nature, and the use of shape memory alloys, as well as downsizing attempts of current mechanical methods.