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SYSTEM ENGINEERING BASED APPROACH FOR HIGH FEASIBLE ORIGAMI STRUCTURE IN THE DEVELOPMENT OF SPACE SOLAR POWER SATELLITE BUS DESIGNING

Abstract

This paper illustrates and focuses on the advantages and modern approach of the smart origami structure in aerospace application. Origami offers a possible solution to make satellites convenient and helps to fold massive objects in compact sizes. Space industries continuously launch satellites in different orbits however, their modern design and accessibility are still conventional. Since the current design struggles with the big payload, large solar panels, and batteries, it is uneasy to launch and makes launching very costly and risky. So far origami offers a compatible solution for satellite industries even so this technique needs to be more advanced. The primary focus of this paper is on the compact and intelligent mechanized structure of satellites which can overcome many problems like launching, deployment and directly reduce the mission cost. The developed concept of the world's first advanced universal mechanism of satellite allows it to fold, unfold and auto-adjust its own payload with the fairing size of any rocket. With the case study for Energy Orbit's satellite, the Energy Orbit is a small space solar power satellite for laser-based power transmission in low earth orbit. It uses traditional origami folding methods however in an intelligent way or it can convert its structure into any compatible size including solar panels and other components. The system engineering model and mathematical calculations that describe the compactness of fabrication that is intensive in size but very efficient in space and it reduce the launching cost, risk of components failure, and keep the valuable components safe inside the bus at the time of re-entry on earth, with reduces the risk of debris formation. The design required fewer apparatus and moderate power for deployment and made it possible to launch big modules conveniently and maintain the feasibility of the mission.