MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Space Structures 2 - Development and Verification (Deployable and Dimensionally Stable Structures) (2)

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CONTROL PARAMETERS TRANSITION DURING DEPLOYING OPERATIONS OF A SPACE FLEXIBLE STRUCTURE VIA MULTI-BODY APPROACH

Abstract

Solar arrays, antennas and in general flexible appendages deploying phase is one of the most critical step of space satellites operations. The continuous structural configuration morphing doesn't allow to uniquely identify the inertial and modal parameters of the ongoing configuration. In this phase the design and the synthesis of controller is a central blocking point for engineering. By continuously varying the geometric configuration of the satellite, a continuous variation of the inertial characteristics (f.i. inertial tensor and static moments) and modal ones (f.i. eigenvalues and eigenvectors, etc...) of the system occurs. In order to improve the controllability of the spacecraft during this phase it could be necessary to have a time dependent set of inertial and structural parameters which needs to be modelled via non conventional structural analysis tools. In this paper a very large flexible spacecraft will be described via multibody approach. The effects of gravity and gravity gradient during the deploying phase of the solar arrays will be investigasted together with the effects of the overall mass variation due to the fuel consumption during a maneuver. Numerical results will be presented and discussed for different scenarios.