

MATERIALS AND STRUCTURES SYMPOSIUM (C2)

Space Structures 2 - Development and Verification (Deployable and Dimensionally Stable Structures) (2)

Author: Prof. Yasuyuki Miyazaki
Nihon University, Japan

A SIMPLE DEPLOYMENT MECHANISM OF PANEL STRUCTURE FOR MICRO SATELLITE AND ITS VERIFICATION

Abstract

The utilization of the micro satellites less than 50kg has been rapidly growing and lots of micro satellites are going to be launched within a few years. In the micro satellite mission, more simple deployment mechanism for solar panel is required to reduce the cost. The mechanism does not have to guarantee the high accuracy for e.g. the deployment angle, but it should promise low cost. On the other hand, the mission with high precision antenna, e.g. synthetic aperture radar or active phased array, requires much more accurate mechanism for the deployment of the panel antenna with low cost. The author has newly developed a simple hinge with latch mechanism and a hold-release mechanism for solar panel which will be launched next year. The verification method and results of these mechanisms are shown in this paper, which suggests the way to estimate the reliability of a newly developed deployable structure quickly. A prototype model of the deployment mechanism for high precision panel antenna has been also developed. The highly accurate simple joint is achieved by using hyper elastic wires. The preliminary verification results are introduced in this paper. In the above examples, the verification method includes the testing results and the numerical simulation. The total evaluation method of the shape accuracy of the panel structure is presented which consider the geometrical effect of the position error of the hinge and latch parts and the elastic deformation induced by those errors. The quick prediction method of the shape accuracy of the panel structure by the combination of the testing and the numerical results is discussed through these examples. These results will contribute the research and development of low-cost and/or high precision deployable structure with appropriate reliability and mission assurance.