

Proposal of New Deployable Structure and Analysis of Its Transformation Process

Masao Takatsuka

This paper presents a new deployable structure and its transformation process by calculation of rigid body motion. The objective of the present study is to propose a new deployment system which can fold a flat structure two-dimensionally and deploy it in two-direction simultaneously in space. The background of this study is that such a 2D-deployment system is required for transportation and construction of huge flat space structures such as a solar power satellite which was proposed by Dr. Peter Glaser in 1968 as a concept to construct huge solar cell panels in space and transmit electric energy to the earth as a solution to the environmental problem. Our previous study had already proposed an original deployment system which is composed mainly of square panels, 2D-deployable scissors masts, and tilted rotational axes. This deployable structure can be stabilized with a spring and analyzed by non-linear static structural analysis as a stable structure. However, we also needed to simulate its transformation process as an unstable structure in consideration of the panel thickness. For that issue, the present paper presents a new rigid body simulation and its calculation procedure.