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

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DEPLOYMENT DYNAMICS RESEARCH FOR SPACE MEMBRANE STRUCTURE

Abstract

A new research method is introduced to analysis the deployment mechanics and modeling of inflatable membrane structures based on energy-momentum methods.Firstly, rigid-body dynamics and Euler parameter theory are presented. Secondly, a reduced rigidity model in membrane structure is proposed in analysis of the dynamic wringkle and slack during the deployment process of space membrane structure. Thirdly, this new research analysis based on energy-momentum is conducted to analysis the deployment process of reflector and Z-folded inflatable tube.In analysis of Z-folded inflatable tube, interaction between air and structure, influence of self-contact, collision and wrinkle are also considered. The resusts demonstrated energy-momentum method is dominant in geometric nonlinear and mumerical stabilization.