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## COMPUTATION AND DYNAMIC ANALYSIS OF DEPLOYMENT OF INFLATABLE MEMBRANE STRUCTURE FOR DEBRIS REMOVAL

## Abstract

The growth of space debris has seriously affected the sustainable use of space resources. The deorbit technology has gradually become an active area of research in the field. The solar sail with inflatable structure has broad application prospects in debris removal, which possesses merits, such as low consumption, high safety and low control precision. In this paper, based on the finite element method, the dynamic equations of an inflatable membrane structure in space environment is established. In order to reduce the calculation time without loss of accuracy of key parameters of inflatable structure, a fast computation method is presented, in which the classification of elements is defined and mesh grouping standards are proposed; then, the simulation result is studied to demonstrate the effectiveness of the fast computation method. Afterwards, in the dynamic analysis, the effects of membrane material, deployment rate, curl degree, aerodynamic forces and gravity on the deployment of inflatable membrane structure are studied, which can help reveal the dynamic characteristics of inflatable membrane structure in the deployment.