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

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MODEL AND ANALYSIS OF BI-HOOP CIRCULAR DEPLOYABLE TRUSS

Abstract

The structure of satellite antenna is confronted with increasing requirement of large-scale which contradicts with the capacity of transportation. The solution is to adopt deployable structures with high deployed-folded ratio for antenna. Large amounts of researches have been carried out and lots of achievements are acquired. For example, the concept of circular deployable truss was proposed and its validity as the boundary truss system of satellite antennas was examined.

Uni-Hoop Circular Deployable Truss (UCDT) has plenty of advantages, such as high deployed-folded ratio, light weight, easy to deploy, and so on. However, UCDT cannot satisfy the demand of high stiffness when applied to the antennas with larger diameter. In order to improve the stiffness of the boundary truss system of deployable antennas, two UCDTs are connected together through scissor elements to generate an innovative structure called Bi-Hoop Circular Deployable Truss (BCDT). This paper describes the prototype of DCDT and studies the structural behavior of the new deployable system.

In this paper, two kinds of BCDT, BCDT-I and BCDT-II, with different layout of truss element, are suggested. Geometrical requirements to form BCDT are derived. By means of software ADAMS, the deploying process of BCDT is simulated. Based on the numerical results, a BCDT model with 2-meter diameter is designed and assembled. The cable network is designed to form the reflecting surface of the antennas model. The surface of cable net is measured and the precision comparing with paraboloid is investigated.