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# ANALYSIS OF COILABLE LATTICE MAST

**Abstract**

Deployable structures are used widely in space science and aero/space technology. Deformations and motions of the elastic rod are the key problems in analyses of coilable lattice mast. This paper concentrates on the deformations of the elastic rod and how these effects are analyzed in terms of finite segment approach. The analysis process of large deformation rod are consist of three typical states, deployed phasetransition phase and retracted phase.

In the deployed phase, elastic rod is in an upright position and in press condition, close to instability condition. Deformations in unit length can be attained in terms of generalized Hooke law for the assumption that dynamic effect is not considered. Nonetheless, another more complex process is in the following phase. More attention should be paid on the transition phase because of its complexity. Consequently the helical configuration can be treated as the quasi-equilibrium state in the coiling process. However, deformations are complicated because of its mechanical behaviors are combined with shear, pressure and torque. Finite segment approach is applied to determine the strain and deformation per unit length, and the weakest point can be attained through comparative analysis. In the retracted phase, the elastic rod folds up due to bending, and all the elastic energy and resilience are stored in that way. It is fortunate that the results in different phases can be obtained by numerical approach. It was shown from these results that elastic rod was unstable in the transition phase.

According to above analyses, compared with results in different phases, the primary factors related with structural design are attained. These results may provide some reasonable references on the design of coiled deployable truss structures.