

## 周边桁架可展开天线展开过程运动分析及控制

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**摘要** 根据周边桁架式可展开空间天线的结构特点, 先建立周边单元浮动坐标系, 采用坐标变换方法, 得出了周边单元间的运动变换关系, 建立了该天线通用的展开过程运动分析模型, 可分析展开过程中结构上任意点的位置、速度和加速度。为避免展开过程中冲击过大, 对周边单元的展开速度进行规划。根据驱动绳索的运动与单元展开运动之间的变换关系, 将周边单元的运动规划转化为展开绳索的运动控制, 对天线的展开实施位置控制。仿真实例表明该控制方法可使天线按照规划的展开角变化规律平稳展开。

**关键词** [周边桁架](#) [可展天线](#) [展开过程](#) [运动分析](#) [位置控制](#)

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## Deployment kinematic analysis and control of hoop truss deployable antenna

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### Abstract

Based on the structural characteristics of the hoop truss deployable space antenna, body-fixed coordinates are attached at the hoop modules, and the motion transformation relation between two hoop modules is derived using the method of coordinate transformation. The general model for deployment kinematic analysis is established. The model can be applied to carry out the position, velocity and acceleration analysis of any point on the structure. In order to avoid too large an impact in the deployable process, the deployment velocity of the hoop module is planned. The motion relation between the driving cable and the hoop module is given. The motion planning of the hoop module is transformed into the motion control of the driving cable, which can realize the deploying position control of the antenna. Finally, numerical simulations show the control method can make the antenna calmly deploy following the specified deployable motion. <BR>

**Key words** [hoop truss](#) [deployable antenna](#) [deployable process](#) [kinematic analysis](#) [position control](#)

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