

## Study on the Stability of Large Space Expandable Parabolic Cylindrical Antenna

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**Abstract :** Parabolic cylindrical deployable antenna has the characteristics of wide cutting width, strong directivity, high gain, and easy automatic beam scanning. While, due to its large size, high flexibility, and strong coupling, the deployment process of parabolic cylindrical deployable antenna presents such problems as unsynchronized deployment speed, large local deformation and discontinuous switching of deployment state. A large deployable parabolic cylindrical antenna is taken as the research object, and the problem of unfolding process instability of cylindrical antenna is studied in the paper, which is caused by multiple factors such as multiple closed loops, elastic deformation, motion friction, and gap collision. Firstly, the multi-flexible system dynamics model of large-scale parabolic cylindrical antenna is established to study the influence of friction and elastic deformation on the stability of large multi-closed loop antenna. Secondly, the evaluation method of antenna expansion stability is studied, and the quantitative index of antenna configuration design is proposed to provide a theoretical basis for improving the overall performance of the antenna. Finally, through simulation analysis and experiment, the development dynamics and stability of large-scale parabolic cylindrical antennas are verified by in-depth analysis, and the principles for improving the stability of antenna deployment are summarized.

**Keywords :** multibody dynamics, expandable parabolic cylindrical antenna, stability, flexible deformation

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