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Conceptualizing Space Elevators and Tethered Satellites (3)

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DYNAMICS RESEARCH OF INITIAL TETHER DEPLOYMENT OF LUNAR SPACE ELEVATOR

Abstract

Lunar space elevator is a new cislunar transport system that consists of tether, counterweight, space station, climber and platform. The initial tether deployment of lunar space elevator is a complex dynamic process. This paper adopts lumped mass model, builds up the time-varying dynamics model of initial tether deployment of lunar space elevator. The tether flexibility, elasticity and mass are taken into account. Based on an improved Wilson- method, the dynamic response of the tether under different deployment speed is acquired. The result shows that the tether oscillates with the shape change during the deployment. The amplitude and frequency of oscillate are related to the deployment speed. The result also presents that the free oscillating after deployment is emanative, which means the amplitude continues to increase. So if control methods are not introduced, the security of tether is threatened. The results of this paper could provide a reference when building a lunar space elevator in the future.