# The thermal induced vibration analysis of tethered solar power satellites on the geo-synchronous orbit

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### Abstract

The tethered solar power satellite (Tethered-SPS) on the geo-synchronous orbit has been proposed as a feasible and practical model, and the temperature has an important effect on its performance and reliability. First, based on the structure characteristics of the on-orbit tethered solar power satellite, the solar panel is modeled for the honeycomb panel. Then, we build the motion equations of the plate by the finite element method and simulate the panel in the ANSYS software. We discuss the vibration of the solar panel induced by the heat load, and the influence of the material parameters on its vibration. The result shows that, due to the panel of surface temperature difference, the solar panel will vibrate under the sudden heat flow on the board. Moreover the material parameters have an important influence on its quasi static displacement and vibration amplitude. The vibration will affect the normal work of the panel. The results provide the basis for the design of the flexible space solar power panels.

**Keywords:** Tethered-SPS; thermal induced vibration; honeycomb panel; finite element method

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