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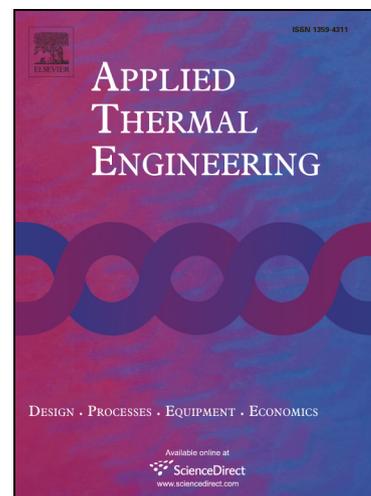
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Thermal characteristics and output power performances analysis of solar powered stratospheric airships

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## Abstract

Thermal characteristics and output power performances are important factors to be considered in the design and operation of long endurance stratospheric airships. The thermal and output power models of stratospheric airships with solar array are established in this paper. Based on the models, a numerical simulation program is developed. The thermal and output power performances of a solar powered airship are simulated. The effects of solar array on the thermal performances of a stratospheric airship are discussed. The factors affecting the output power of solar cells are studied in detail. The results are conducive to understanding the thermal and output power behaviors of solar powered stratospheric airships.

*Keywords:* Stratospheric airships; Solar array; Thermal model; Output power model

## 1. Introduction

The stratospheric airship with solar array, as an ideal vehicle for long endurance, has attracted interests in commerce and military roles. The thermal stability and energy supply are the primary issues to be considered in the design and operation of long endurance stratospheric airships. Thermal stability mainly depends on the thermal behaviors of airships and energy supply is determined by the output power performances of photovoltaic (PV) cells. In order to successfully operate a long endurance stratospheric airship, it is necessary to predict the thermal and output power behaviors before it is designed and launched.

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