Stratospheric Solar Power Generation

Downloadable! Current stratospheric airships generally employ photovoltaic cycle energy systems. Accurately calculating their power generation is significant for airships" overall design and mission planning. However, the power generation of solar arrays on stratospheric airships is challenging to model and calculate due to the dynamic nature of the airships" flight, resulting in ...

Light scattering calculations and data show that stratospheric aerosols reduce direct sunlight by about 4 W for every watt reflected to outer space, so a significant reduction in the efficiency of solar power generation systems using parabolic or other concentrating optics is expected. Light scattering calculations and data show that stratospheric aerosols reduce direct ...

for its power generation system [2, 3]. Flexible amorphous silicon (a-Si) and cop-per indium gallium selenide (CIGS) solar cells are light weight, but they also have ... modules could meet environment application need of the UAVs and stratospheric airships. 2 The IMM 3J Solar Cells and Modules Fabrication Process

The stratospheric airship is a type of aerostat that uses solar energy as its power source and can fly continuously for months or even years in near space. The rapid and accurate prediction of the output power of its solar ...

second is the output power model of solar array, includin g the solar radiation model, po- sition calculation model of the sun and the numerica l calculation model of output power model for curved ...

stratospheric solar-powered airship Jun Li, Mingyun Lv and Kangwen Sun ... solar power generation system with photovoltaics and fuel cells and so on. A project9 was worked within 16

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They are also called high-altitude scientific balloon and stratospheric airship because it often works in the altitude range of 25,000 m in stratosphere . ... In the process of energy system design, it is very important to accurately model the solar array and predict the power generation in time. FIGURE 1.

The contribution of the paper lies in introducing a data-driven surrogate modeling approach to predict solar array output power in stratospheric airships. It significantly ...

Solar energy is the ideal power choice for long-endurance stratospheric airships. The output performance of

solar array on stratospheric airship is affected by several major factors: flying ...

We construct a high-precision calculation model for real-time power generation for the stratospheric airship solar array. Model corrections are conducted for the case where the photovoltaic conversion efficiency of solar ...

prediction of the power generation of the vehicle during flight. Finally, the data obtained from flight tests of the stratospheric aerostat and high-altitude scientific balloon are verified and ...

One consequence of deliberate enhancement of the stratospheric aerosol layer would be a significant reduction in the efficiency of solar power generation systems using parabolic or other ...

An optimization model of the optimum area of solar array for a stratospheric solar-powered airship is developed. The objective of the optimization is to reduce the mass of the solar array on an ...

It is also noticed that, although the mass ratio of the solar array is relatively low referring to the total mass of stratospheric airship, its performance of output power significantly affects the optimal configuration of the airship, ...

Accurately calculating their power generation is significant for airships" overall design and mission planning. ... Expand. 2. PDF. ... An analytical formula of power generated by the cylindrical solar cell array of a stratospheric airship was derived,and in order to compute the power of the solar cell array with more complex curved ...

The stratospheric airship is a type of aerostat that uses solar energy as its power source and can fly continuously for months or even years in near space.

For low altitude unmanned aerial vehicles (UAVs) that use electric propulsion are limited in flight duration now and due in part to the weight of energy storage, the ability to supplement available battery power with solar energy can allow for longer mission times and extended range [].For high altitude long endurance (HALE) vehicles and stratospheric airships, ...

Sustainable power generation on solar photovoltaic (SPV) modules integrated lighter-than-air platforms (LTAPs) is a daunting task since they are exposed to variants in environmental factors like ...

power generation of the solar array and analyzed the effect of wind-induced oscillations. Pande et al. [19] conducted an analysis using three types of solar cells to assess the in- ... the output power of a stratospheric airship solar array by considering thermal effects. Li et al. [25] investigated the impact of factors such as latitude, wind ...

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the stratospheric solar-powered platform @article{Li2018AnAF, title={An approach for estimating perpetual endurance of the stratospheric solar-powered platform}, author={Jun Li and Jun Liao and Yuxin Liao and Huafei Du and Shibin Luo and Weiyu Zhu and Mingyun Lv}, ...

Some researchers projected the solar array onto the direction of solar incident light, 6 or the coordinate planes of the earth coordinate system. 7 The output power can be calculated as the product of the projected area, irradiance, and photoelectric conversion efficiency. Other researchers 8, 9, 10 considered the solar array as a continuous surface and ...

The power generation system must have the capability to provide power to all the loads and last for up to six days. If just consisting of batteries without an independent external source of energy, the battery volume and mass would be impractical. In this project, we designed a candidate solar power generation subsystem for the STRATOS program.

Stratospheric airships are near-space vehicles that rely on lighter-than-air gas in their body to generate lift. 1 Stratospheric airships can fly continuously for months or even years, allowing them to be used in disaster monitoring, communications relay, search and rescue, and other applications. 2, 3 Stratospheric airships derive power from a cyclical energy system ...

output power, (2) a reduction in solar cell material bandgap and power generation effi-ciency, and (3) an increase in the capacitive effect of the solar cell, compromising the sta-bility of photovoltaic power generation [6]. A precise model for predicting the tempera-ture of a solar cell is critical in solar cell operating features analysis [5].