

# Tethered Solar Power Station Satellite

What is tethered solar power satellite?

Tethered solar power satellite (Tethered-SPS) consisting of a large panel with a capability of power generation/transmission and a bus system which are connected by multi-wires is proposed as an innovative solar power satellite (SPS). The power generation/transmission panel is composed of a huge number of perfectly equivalent power modules.

Who invented the tethered solar power satellite?

An artist conception of the tethered solar power satellite (Tethered-SPS) is shown in Fig. 1. This concept was first developed by a study team organized by Institute for Unmanned Space Experiment Free Flyer (USEF) in 2001 and 2002.

What is a tether satellite?

A tether satellite is a satellite connected to another by a space tether. A number of satellites have been launched to test tether technologies, with varying degrees of success. There are many different (and overlapping) types of tether. Momentum exchange tethers are one of many applications for space tethers.

What is tethered SPS?

Ishimura and Higuchi (2008) studied the coupled phenomenon among attitude motion, tether vibration, and orbital motion by treating Tethered SPS as a tethered satellite system (two tip particles connected by a massless spring). Li et al. (2018) established a dynamic model of Tethered SPS by simplifying the solar panel as a rigid body.

Is the tethered-SPS a practical SPS model?

The power from the 50 Tethered-SPS (60 GW maximum) is superimposed. As a conclusion, the Tethered-SPS is a highly practical SPS model, with a number of advantages in the production, integration, construction, and operation as compared with the past SPS models.

Is tethered SPS a dynamic system?

A new dynamic model of Tethered SPS is proposed based on ANCF and the orbit-attitude-vibration coupled dynamic phenomena are studied. Simulation results revealed that the attitude of the system is unstable when the mass of the bus system is relatively small, because the attitude of the solar panel is in an unstable equilibrium point.

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Solar power satellite (SPS) is a renewable and infinite energy system in the Geostationary Earth Orbit, which works as an electric power plant in space. Main theme of our ...

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The technologies for the Solar Power Satellite (SPS) have been well studied on the ground and now it is highly required to make demonstration experiments in space as the next logical step. ...

A new orbit-attitude-vibration coupled dynamic model of the tethered solar power satellite (Tethered SPS) is established based on absolute nodal coordinate formulation. The Hamilton's equation of the system is derived by introducing generalized momentum through Legendre transformation. ... Cheng et al. [24] planned the assembly scheme of a ...

Space solar power satellite (SSPS) is a tremendous energy system that collects and converts solar power to electric power in space, and then transmits the electric power to earth wirelessly.

The Space Solar Power Satellite is an ultra-large space structure, which collects sunlight directly in space and then transmits it into the ground. Since the idea was invented in 1968, scientists around the world have proposed several typical conceptual design models. Nevertheless, the conceptual models have not been implemented for technological, ...

Key Words : Solar power satellite, Small satellite, Micro wave power transmission ... Tethered -SPS with the power storage system. It is composed of 625 units of Tethered -SPS. The size of the power ... Ground station JAXA ground stations Fig. 6 ...

The dynamic behavior of the tethered space solar power station is studied via numerical simulation. Without any initial state errors, the in-orbit movement of the tethered ...

A novel design project for space solar power station (SSPS-OMEGA) Acta Astronaut., 121 (2016), pp. 51-58. View PDF View article Google Scholar [8] ... Active vibration control of tethered solar power satellite during attitude maneuvering. J. Vib. Eng., 33 (2012), pp. 605-611. View in Scopus Google Scholar [19]

A solar power system, in which a large flat panel with a capability of power generation and transmission is suspended by multi-wires, is proposed as an innovative Solar Power Satellite ...

Space solar power satellite (SSPS) is a prodigious energy system that collects and converts solar power to electric power in space, and then transmits the electric power to Earth wirelessly. The main principle of this system is to supply constant solar energy by placing collectors in geo-synchronous orbit and collecting it on an Earth-based receiver, known as a ...

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A solar power system, in which a flat panel of the size of 2 km by 1.9 km with a capability of power generation and transmission is suspended by multi-wires connected to a bus system 10 km ...

Another one is the Tethered Solar Power Satellite [7], [8], proposed by Japanese government METI and USEF, a concept to reduce the system complexity and mass. ... Space solar power station, also known as SSPS, is presented first as a well-known utilization of space energy, and we go through the international progress, evolution of the ...

Tethered solar power satellite (Tethered-SPS) consisting of a large panel with a capability of power generation/transmission and a bus system which are connected by multi-wires is ...

AbstractTo collect solar energy in outer space, Tethered Collecting Solar Power Satellite Systems have been proposed by several authors in the last years. A geostationary orbit would be the best location for a space-based solar power. However, a ...

A new orbit-attitude-vibration coupled dynamic model of the tethered solar power satellite (Tethered SPS) is established based on absolute nodal coordinate formulation. The ...

A procedure is proposed to establish the dynamical model and analyze the dynamic behaviors of a tethered space solar power station. The solar panels are modeled by the use of absolute nodal ...

Since the introduction of SPS in the United States, several configurations have been proposed by Japan, such as the tethered solar power satellite (Tethered-SPS) and the NASDA reference system . China also attached great importance to the research of SPS and proposed MR-SPS [9, 10] and SSPS-OMEGA .

The concept of a space solar power station (SSPS) was proposed in 1968 as a potential approach for solving the energy crisis. In the past 50 years, several structural concepts have been proposed, but none have been sent into orbit. One of the main challenges of the SSPS is dynamic behavior prediction, which can supply the necessary information for control ...

the diurnal day-night cycle, the concept of a Geostationary Tethered Collecting Solar Power Satellite System has been proposed by several authors in the last years. This tethered system consists of a long tether used to link two bodies: a ... station keeping, and retrieval stages. Various methods for controlling tether deployment/retrieval ...

suggested, and a solar power satellite (SPS) concept was proposed by Glaser [1, 2] half a century ago to evade the above effects. To realize the collection of solar energy in space according to the idea by Glaser, the construction of an ultra-large solar receiving device in space, called the space solar power station (SSPS), is one of the key ...

In this paper, the research progress of multi-agent attitude coordinated control of space solar power station

(SSPS)-energy transmission system (ETS) is reviewed. Firstly, the development of concepts of typical microwave-based SSPS is discussed, and the advantages and disadvantages of microwave and laser energy wireless transmission methods are compared ...

Control algorithms are studied for the attitude motion and vibration of a tethered Space Solar Power Satellite (SSPS). Control abilities on the attitude motion of the system and on the vibration ...

Space solar power satellite (SSPS) is a tremendous energy system that collects and converts solar power to electric power in space, and then transmits the electric power to earth wirelessly [1]. Since it was proposed by Dr. Peter Glaser in 1968 [2], it started to attract attention worldwide, and various concepts were proposed in the United States, Japan, Europe, and ...

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