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Innovative and Visionary Space Systems (1)

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INNOVATIVE AND VISIONARY SPACE SYSTEMS: SPACE-BASED SOLAR POWER SYSTEMS

Abstract

Energy self-sufficiency is dependent on conserving energy resources, and with the rise in global warming, environmental planning has become a crucial factor for development. The development of Space-Based Solar Power technology is crucial in achieving sustainability goals and fulfilling energy requirements for environmental planning. Consequently, Space-Based Solar Power research has become a leading field in the aerospace industry. In this technology, solar energy is collected through solar collectors or light structures of solar arrays and converted into microwave or laser energy for transmission to Earth. Compared to other energy sources, microwave energy is safer for living beings. Given this, the idea of generating solar power from space has generated much interest among space enthusiasts for innovative solutions. The concept of SBSP has been under development for several decades, and significant progress has been made in the design of solar power satellites and wireless power transmission systems. The idea is to place the solar panels in space, where the intensity of solar energy is much higher than on Earth due to the lack of atmospheric interference, and transmit the collected energy to Earth in the form of microwaves or laser beams. The energy would then be received by large rectifying antennas on Earth, which would convert the microwaves or laser beams into electrical power. This system would provide a reliable and continuous source of energy, as SBPS can operate around the clock and from a fixed position relative to Earth. However, the development and deployment of SBSP present significant technical and economic challenges. One of the main challenges is the high cost of launching large solar panels and other components into space. This cost may be reduced in the future by the development of reusable rockets and other technologies. Another challenge is the development of efficient and reliable wireless power transmission systems that can deliver energy to Earth without significant loss or interference. Finally, there are concerns about the potential environmental and health impacts of microwave or laser beams transmitted over long distances. This paper examines cost-effective technologies for Space-Based Solar Power, the impact of orbital parameters on launching costs and efficiency for Space-Based Solar Power.