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SPACE POWER SYMPOSIUM (C3)
Wireless Power Transmission Technologies, Experiments and Demonstrations (2)

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CONCORD OF SUBSYSTEMS PARAMETERS OF SPACE LASER POWER TRANSMISSION COMPLEX

Abstract

Wireless power transmission (WPT) systems by using of focused microwave and laser beams are very promising in different power engineering applications. Laser radiation is more perspective for WPT than microwave radiation in space applications for WPT through large distance without atmosphere. It is necessary to have high total efficiency of the laser power transmission system. To attain this end the operating parameters of three series subsystems as the laser, the WPT subsystem, and the convertor of laser power into electric power have to be coordinated. Their operating parameters are function of the laser wavelength. The efficiency of the space WPT subsystem is equal to the region of 100The efficiency of the photovoltaic convertor have to increase under increasing of its bandgap because reverse Boltzman's current overcoming potential electric barrier decreases under condition of constant operating temperature. One of perspective modern type of a laser radiation with wavelength of the order of 1 m is a fibre laser. As known, the gas discharge CO2 laser has high output radiation power and high efficiency 10-15% with wavelength $\lambda = 10.6$ μm. However, bandgap of semiconductor under this laser illumination have to be $\Delta E = 0.1$ eV. This circumstance leads to very high reserve Boltzman's current and, as the result, leads to very low efficiency of semiconductor convertor under laser radiation with wavelength $\lambda = 10.6$ μm. The use of the gas discharge CO2 laser needs new combined photovoltaic convertor on the base of thin film solar cells with optical nanoantennas. Optical nanoantennas represent the phased antenna arrays in optical range of electromagnetic radiation on the base of modern carbon nanotubes with length equal to the laser wavelength $\lambda = 10.6$ μm. In this paper are presented the systematic analysis results of the concord of operating subsystems parameters of the space laser WPT complex.