

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

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EXPLORATION OF INTERNATIONAL SPACE STATIONS TRANSPORT VEHICLES SOLAR
ARRAYS USAGE AS RECEIVERS OF INFRARED LASER RADIATION FOR WIRELESS ENERGY
TRANSFER

Abstract

Concept of wireless electric energy transfer in outer-space is described in this paper. Traditionally two types of wireless electric energy transfer systems are considered – microwave and infrared channels. Choice of infrared range is substantiated. Facilities of conventional solar arrays usage as infrared radiation receivers are described. Estimations of infrared radiation to electricity conversion efficiency of solar arrays are reported. Measurement data of various photovoltaic receivers (GaAs, Si) efficiencies for monochromatic infrared radiation of various incident irradiance are considered in this paper. An investigation of illumination irregularity of photovoltaic converter surface effect to photovoltaic efficiency is made. Battery construction peculiarity for monochromatic infrared radiation for terrestrial and space applications, possible problems of this battery construction (heat questions, and illumination irregularity) is discussed. Space experiment of beaming power transfer by semiconductor infrared laser, which will be on the board of ISS, to solar arrays of transport cargo vehicles is suggested. The main purpose of this space experiment is the demonstration of such method of spacecrafts energy supply feasibility, and also identification of possible defects of subsystems and following improvement on basis of this identification for the purpose of application such system for technological space modules. Efficiency estimations of such transmission for transport cargo vehicles solar batteries given in terrestrial experiments with solar batteries of these space vehicles are reported.