

SPACE POWER SYMPOSIUM (C3)  
Technologies and Experiments related to Wireless Power Transmission (2)

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GROUND DEMONSTRATION EXPERIMENT AND ELEMENTAL TECHNOLOGY DEVELOPMENT  
OF LASER BASED SPACE SOLAR POWER SYSTEM

**Abstract**

Japan Aerospace Exploration Agency (JAXA) has studied Space Solar Power Systems (SSPS) using laser and microwave beams. Current laser based SSPS study at JAXA consists of three main subjects, ground demonstration experiment, elemental technology development and concept study of in-orbit demonstration experiment. For technology demonstration on the ground in L-SSPS, oscillation experiment of direct solar pumping solid-state laser and transmission experiment using laser beam direction control technology are studied. In the oscillation experiment of 100W-class system, condensed solar irradiance dependence of laser output, relation between laser material quality and laser output, thermal effect in laser oscillation (thermal birefringence) are evaluated. In the transmission experiment of 10W-class system, scintillation of laser beam in atmosphere, coarse and fine pointing mechanism, optical medium corresponding to high power laser (continuous wave) are investigated. And some elemental technologies such as quality improvement of Nd/Cr:YAG ceramic laser material, laser beam control technology (acquisition, tracking and pointing), atmospheric transmission property in near-infrared laser beam and photovoltaic cell converting from near-infrared laser beam to electricity are researched. In the quality improvement of Nd/Cr:YAG ceramic laser material, scattering coefficient and homogeneity of refractive index were improved to the optical grade of Nd:YAG single crystal. In the atmospheric transmission property, The light of wavelength 1064nm in sunlight is observed, and the atmospheric transmittance through year is evaluated.