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

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# DEVELOPMENT OF THE BEAM STEERING CONTROLLERS FOR MICROWAVE POWER TRANSMISSION GROUND EXPERIMENT

**Abstract**

The Japan Aerospace Exploration Agency (JAXA) has been studying Space Solar Power Systems (SSPS) since 1998. The SSPS converts the space solar energy into microwave or laser, and transmits it to the earth. The SSPS in the geostationary orbit can collect the power at any time of the day and night, and transmit gigawatts of power to a power receiving subsystem on the earth. To achieve this, a power transmitting subsystem in the square kilometer scale is required in the case of microwave power transmission (MPT). As a result, it is absolutely necessary to construct a number of transmitting modules in the power transmitting subsystem, and to transmit microwave beam pointing accurately to the power receiving subsystem on the earth. To achieve a MPT technology which is one of the most important technologies to realize the SSPS, JAXA and the Institute for Unmanned Space Experiment Free Flyer are planning to conduct a MPT ground experiment in fiscal 2014. In the joint effort, we are in charge of a beam steering control (BSC) subsystem which is important among MPT technologies. We have defined the functions and specifications of the BSC Breadboard Models (BBMs), and shown the analyzed the beam pointing accuracy in the MPT ground experiment. It has been found that the beam pointing accuracy of the ground experiment system is within 0.5 degrees rms, which guarantees the high pointing-accuracy for the commercial SSPS. Based on the results of BBMs, the design of the BSC subsystem will be fixed. Using the BBMs of the BSC subsystem, we will conduct the functional verification of a REV method and a monopulse method. We have two test items. First, we will check the detection of the arrival angle of the pilot signal. At a tracking receiver, we receive the "sum" and "difference" signals derived from the pilot signal, and pass an angle error signal to a CPU card. Then, we confirm that phase control signal which comes from the CPU card is correct. Second, we confirm that phase differences which are set initially are corrected for three transmitting modules using the REV method. This paper describes functions, specification of the BSC BBMs, investigation results of the beam pointing accuracy, and results of the manufacturing tests for the BSC BBMs.