Paper ID: 29680
oral
student

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

Author: Mr. Shotaro Katano
The Graduate Universty for Advanced Studies (SOKENDAI), Japan

Ms. Eri Saito
Toyo University, Japan
Dr. Tanaka Koji
ISAS/JAXA, Japan

DIRECTION DETECTION AND POWER TRANSMISSION EXPERIMENT USING C-BAND MICROWAVES TOWARD SPS

Abstract

Solar Power Satellite (SPS) generates electrical power from sunlight in orbit and transmits energy using microwave from space to ground. SPS has been studied and developed as a promising sustainable energy system that provides a solution to the environmental and resource problems of human society. In Japan, JAXA proposes a Tethered-SPS that consists of a power generation/transmission panel. We are studying a large-scale wireless power transmission (WPT) system which is an inherent technology of SPS. SPS detects a direction of rectenna by receiving a pilot signal from rectenna site. Furthermore, spacetenna transmits a microwave beam at same time. Total accuracy of the direction finding system and the microwave beam control system will be required as high as about 0.0005 degrees when the SPS will locate in the geosynchronous orbit. We have been carrying out WPT experiment and direction finding (DF) experiment that is aimed to clarify a microwave beam forming, affected thermal and structural conditions on a phased array antenna system. We made a breadboard model of the phased array antenna system that consists of microwave oscillation, amplification, and the phase control of radiation elements. Also, we carried out the DF experiment that clarifies the requirement for the direction finding system. The DF experiment system consisted of laser section and microwave section. The laser section measures the change of the angle as a reference direction. The microwave section receives a pilot signal by multiple antennas, and the received signal is processed by Software Defined Radio (SDR), and detects an arrival direction.The DF experiment system uses microwaves with frequencies of 2GHz band. An accuracy of direction detection is evaluated by the comparison of reference direction and measured direction by pilot signal.