

SPACE POWER SYMPOSIUM (C3)

Wireless Power Transmission Technologies, Experiments and Demonstrations (2)

Author: Mr. Hyoungwan Woo

Kyushu Institute of Technology, Japan, j589503g@tobata.isc.kyutech.ac.jp

Dr. Arifur Khan

LaSEINE, Kyushu Institute of Technology, Japan, markhan@ele.kyutech.ac.jp

Dr. Hirokazu Masui

Kyushu Institute of Technology, Japan, masui@ele.kyutech.ac.jp

Prof. Mengu Cho

Kyushu Institute of Technology, Japan, cho@ele.kyutech.ac.jp

Dr. Takehiro Miyakawa

Japan Aerospace Exploration Agency (JAXA), Japan, miyakawa.takehiro@jaxa.jp

Mr. Tatsuhito Fujita

Japan Aerospace Exploration Agency (JAXA), Japan, fujita.tatsuhito@jaxa.jp

DISCHARGE OBSERVATION ON ANTENNA SURFACE RADIATING HIGH POWER MICROWAVE
IN PLASMA ENVIRONMENT**Abstract**

Space Solar Power System (SSPS) transfers enormous amount of electrical energy through microwave. Flight demonstration onboard a small satellite in Low Earth Orbit is now under consideration. When a high power microwave is irradiated from antenna in LEO plasma environment, there is a concern about multi-pactoring discharge caused by interaction between the plasma and the microwave. There has been no experimental observation on such interaction phenomenon. Verification experiment is essential for Space Solar Power System to become a reality. We have set-up an experimental system that can simulate the radiation of high power microwave in dense plasma in a vacuum chamber. A RF plasma source is installed to the chamber and can produce the Argon plasma environment of $10E13/ m^3$ with 1eV temperature under a back pressure of 10E-5Pa. A circular, rectangular and array patch antenna (Teflon as substrate), a circular patch antenna (Glass epoxy as substrate) have been installed inside the vacuum chamber, separately. The antenna is connected to a magnetron that can produce 5.8GHz microwave up to 400W power. We examined interaction between patch antennas surface and microwave in a vacuum chamber. We observed discharge on the patch antenna depending on the microwave strength and plasma environment.