

SPACE POWER SYMPOSIUM (C3)  
Space Power Experiments Applications and Benefits (4)

Author: Prof. Nobuyuki Kaya  
Kobe University, Japan, kaya@kobe-u.ac.jp

Mr. Masashi Iwashita  
Kobe University, Japan, masashi@phobos.cs.kobe-u.ac.jp

Mr. John C. Mankins  
ARTEMIS Innovation Management Solutions, LLC, United States, john.c.mankins@artemisinnovation.com

THE SECOND MICROWAVE POWER BEAMING EXPERIMENT IN HAWAII

**Abstract**

We believe nothing is more effective for the development of the microwave power transmission technology than to operate step-by-step experiments and thus to accumulate critical data. We succeeded in the three rocket experiments called by MINIX1) in 1983, ISY-METS1) in 1993 of the ISY year, and FUROSHIKI in 2006. We also succeeded in the three demonstrations called by MILAX1) in 1992, Kansai-demo in 1994 and ETHER1) in 1995. The objectives of the rocket experiments are to study nonlinear interactions of the microwave power beam in the space plasma environment and to demonstrate the power transmission in space. We succeeded in the demonstration of the microwave power transmission using a model airplane. We also performed a point-to-point microwave power transmission demonstration (Kansai-demo) for the ground use, and the power transmission demonstration toward a small airship for the future stratospheric platforms. We believe the beam control system of the microwave is one of the most important and critical issues to realize the SPS. The retrodirective antenna is a very promising technology using pilot signal radiated from the receiving site to the transmitting antenna. We have already performed the small demonstration2) on the retrodirective antenna at the IAF Congress at Amsterdam in 1999. We carried out the beam control test at a long distance from Mt. Haleakea at Maui Island to Mt. Mauna Lea in the big island in Hawaii. The distance between two mountains is about 150 km, which is a quarter of the distance between the low earth orbit and the ground. This transmission test is equivalent to the LEO space demonstration. We tried to verify the fundamental function of the retrodirective antenna system with several small transmitting antenna elements and by measuring the power distribution of the microwave at the Mt. Mauna Loa. We have already performed the first experiment in Hawaii last May supported by the Discovery Channel for the TV show. The Space Canada held the international conference on the Solar Power Satellite in September, 2009 in Toronto. We succeeded in the microwave power beaming test in the conference. We have a plan to perform the experiment in Hawaii in order to examine these microwave transmitters for a long distance between the Maui Island and the Big Island in 2010. We will present our detailed system for this second experiment in Hawaii and the follow up experiments at the conference.