Solar Power Radio Integrated Transmitter (SPRITZ) Unit for SPS

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National Space Development Agency of Japan (NASDA) and RASC, Kyoto University developed a system called SPRITZ (Solar Power Radio Integrated Transmitter '00) as an activity result of the SSPS Committee in FY2000. The SSPS is a huge solar power satellite that generates a million kW by solar cells. The electric power is transmitted via microwave from the SSPS to the ground. We have developed the SPRITZ to test a technology of an integrated unit which is composed of a solar-cell based electric power generator, a dc-to-microwave converter, an active phased array for power beaming and a rectenna array power receiver.
The SPRITZ includes a 3-meter-high, hexagon-shaped device, consisting of a 5.8GHz solid-state microwave transmitter, power receiving antenna, solar cells and halogen lamps. The power density of the light emitted from the halogen lamp unit is close to that of the sunlight. The microwave-transmitter radiates a microwave power beam from 100 elements circular polarization microstrip antenna at the bottom of the transmitter unit. The microwave power beam is about 20 centimeters in diameter and is controllable by computer control of the phase of each element of the transmitter array. A light-emitting diode (LED) is connected to each rentenna element to show the arrival of the electric power to the location where the rectenna element is placed. The hexagon-shaped SPRITZ-like unit can be connected to each other to produce a larger scale power station in space. NASDA in Japan is planning to put Solar Power System as an extension of the SPRITZ in orbit around 2020. Specifications of SPRITZ are as follows;

- Size (in mm) : $2{,}000^{D}$ x $2{,}300^{W}$ x $2{,}850^{H}$
- Solar Simulator : 133 x 75W Halogen Lamps
- Solar Cells : Output > 166W (about 15% in efficiency)
- Solid-state Microwave Transmitter :
  Frequency of 5.770GHz, 25W Output, Active Phased Array Antenna(10 x 10 elements), and 3bit Phase Control
- Power Receiving Antenna : 1,848 rectennas and LED

More detailed information will be presented at the poster with video and photos. The SPRITZ are produced by a team of NASDA, RASC (Radio Science Center) of Kyoto University, Mitsubishi Heavy Industries, Ltd., Shimizu Corporation, Sekisui Jushi Corporation, and Mitsubishi Research Institute, Inc.

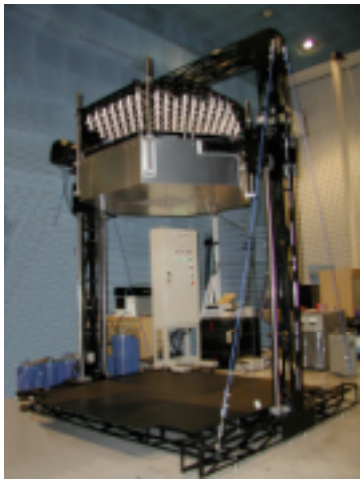

Fig. 1 SPRITZ