

**Development and a field experiment of a retrodirective system
for microwave power transmission**

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Although we have studied so far microwave power transmission with mainly indoor experiment using an anechoic chamber, the microwave power transmission will be used outdoor such as SPS (Solar Power Satellite). Because our present experimental systems are too large and heavy, we need to develop a field experiment system which is light, small, and low cost. Outdoor noises make the accuracy of DOA (Direction Of Arrival) estimation worse and we have to study DOA estimation methods robust against noise.

We have developed a field experiment system of a microwave power transmission system composed of a beam transmitting system and a pilot signal transmitting system. There are two ideas for field experiments, one is an airship experiment, and the other is a software retrodirective system experiment.

In the airship experiment, we estimate DOA with the developed field experiment system. We performed indoor and field experiments. In the indoor experiment we could totally estimate the DOA accurately.

As we changed the distance between the two reception antenna elements longer to evaluate the estimation accuracy, the accuracy became better. In the field experiment the result was worse than that of the indoor experiment. But we considered that there were no problems for the airship experiment.

In the software retrodirective system experiment, we used phased array antennas composed of eight elements for the microwave power transmission and array antennas composed of four elements for the DOA estimation. In the indoor experiment we could estimate DOA accurately and the DOA estimation program could follow with the direction of the pilot signal as it moved continuously. We could also transmit the microwave power accurately to the DOA. In the field experiment we could also accurately estimate DOA and the accuracy of the field experiment was almost equal to that of the indoor experiment.

We also studied the "TF (Time Frequency)-MUSIC" method, a DOA estimation method robust against noise compared with the MUSIC method. This method estimates DOA on the time-frequency domain. We compared these methods and found the superiority of the TF-MUSIC method to the MUSIC method under low SNR.

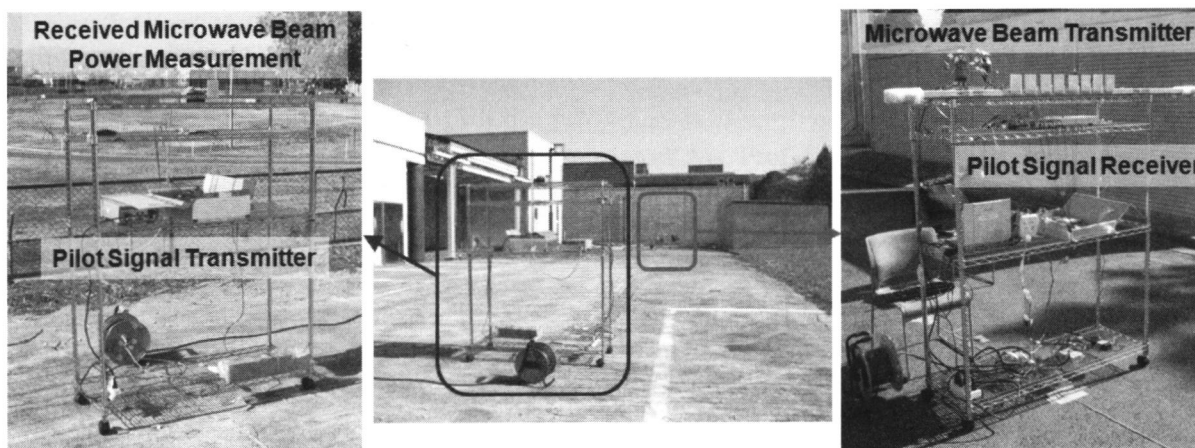


Fig. Out-door experiment on DOA measurement and retrodirective system.