

Study on Wireless Power Distribution System for Buildings

Tatsuhiko Adachi

Laboratory of Space Radio Science, RISH, Kyoto University

INTRODUCTION

Building designs that aims at the convenient improvement of the floor outlet and the free access floor have recently increased. However, the construction cost is expensive. Moreover, in architectural industry, the structure that can flexibly correspond to the demand that diversifies and upgrades along with an economic activity are hoped for. In this research, we suggest wireless power distribution system for buildings as a new application of microwave power transmission in order to solve the above-mentioned problem. This system supplies electric power wirelessly by using building materials as a microwave transmission line. The purpose of the present research is to confirm the feasibility and to clarify the technical problems.

DECK PLATE WAVEGUIDE

First, we described analyses and experimental results concerning basic characteristic of the deck plate waveguide. As a result, we have found out the connection method between the deck plate and the cover board is important to transmit microwave power efficiently. The attenuation constant of the deck plate waveguide was measured to be 0.02dB/m when the contact resistance between the deck plate and the cover board was reduced.

MICROWAVE POWER DISTRIBUTION SYSTEM

We developed the variable power divider whose changeability is from -10dB to -3dB. And we constructed the power distribution system that actively did the distribution control. Next, we examined the methods to take out microwave power from the deck plate waveguide. And, we analyzed the method of using a coaxial probe and established the design technique.

SUMMARY

Finally, we did a practical examination of the whole system based on the abovementioned experiments. As a result, total efficiency is 45%. And we designed the wireless power distribution system in detail, and explained its technical problems.

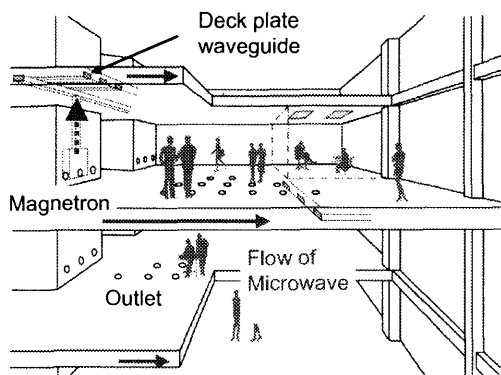


Figure 1 Conceptual diagram

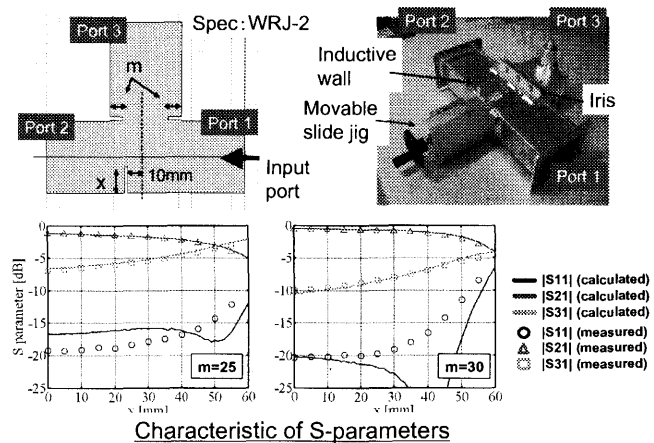


Figure 2 Variable Power Divider