Research on a fast method of phase control process for microwave power transmission

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People have paid more and more attentions to SPS (space power satellite). One of the most important issues of MPT (microwave power transmission) system in the SPS is highly effective power transmission. Since there is phase difference of the microwaves between different antennas, the microwaves from different antennas will offset each other. The concept of phase synchronization between antennas is put forward. This research is based on a fast phase control method which is called parallelization method.

Firstly, we introduce a phase control method which is mostly used in a MPT system. Then we compare this method with a parallelization method which we researched.

Secondly, we conducted certification experiments with one signal generator and two signal generators by using the parallelization method. The error of the experiments with one signal generator was about 1.4 degrees, after using an approximation straight line method to eliminate the error caused by the phase difference between two signal generators, the error of the experiments with two signal generators was 3.7 degrees.

At last we developed a phase control feedback system, this feedback system can make the phases of two signal generators synchronous. The error was less than 4 degrees. We conducted wireless experiments to test the feedback system. In the wireless environment, the feedback system could control the phase difference between two signals effectively. We found that the power at the receiving antenna got bigger after the phase difference was controlled by the feedback system between two antennas. Therefore the effectiveness of this feedback system was confirmed.