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Design of high gain DRA antenna for microwave power transmission

Daotong LI † ‡ and Qiang CHEN ‡

† Center of Communication and Tracking Telemetry Command, Chongqing University, Chongqing China
‡ Graduate School of Engineering, Tohoku University, 6-6-05 Aramaki, Aoba Ward, Sendai, Miyagi 980-0845 Japan
E-mail: † daotong.li.b4@tohoku.ac.jp, ‡ qiang.chen.a5@tohoku.ac.jp

Abstract Microwave wireless power transmission (MWPT) technology possesses broad application prospects in improving the endurance and range of equipments. It also plays significance role in the field of the Internet of Things (IoT), which is a good solution to the problem of energy supply for devices in the IoT. MWPT is a technology that convert electrical energy into electromagnetic (EM) energy and wirelessly transmit microwave electromagnetic energy in space through a transmitting antenna, and converts electromagnetic energy into electric energy by rectenna.

As one of the most important parts of MWPT, the antenna is the interface between EM waves propagating through space and transmitter and receiver. Thus, the antennas with high gain, high efficiency and compact size are urgently desired. Owing to no inherent conductor loss, dielectric resonator antennas (DRAs) have the advantages of high gain, lower losses and higher efficient, especially in the mm-wave frequency band, which are good candidates for WPT applications. Moreover, because the high dielectric constant of the resonator materials is employed, the size of the DRA can be significantly reduced, which is suitable for compact portable wireless devices. In this paper, a novel high-gain wideband cylindrical dielectric resonator antenna (CDRA) based on the proposed multiple modes dielectric resonator is presented. To further enhance the antenna gain, some antenna configurations, such as antenna array and parasitic elements, are carried out. Finally, a demonstration of MWPT based on the proposed DRA antenna array is implemented.

Keywords DRA, high gain, MPT, mm-wave, low loss