

Modeling and Design of Rectenna for Low Power Medical Implants

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Abstract : Wireless power transfer is continuously becoming more powerful and compact in medical implantable devices and the wide range of applications. A rectenna is designed for wireless power transfer technique that can be applied to medical implant devices. The experiment is performed using ANSYS HFSS, a full wave electromagnetic simulation. The dipole antenna combinations operating at 2.4 GHz are used for wireless power transfer and the maximum DC voltage reception by the implant considering International Commission on Non-Ionizing Radiation Protection (ICNIRP) regulation. The power receiving dipole antenna is placed inside the cylindrical geometry having the similar properties of the human body at the frequency of 2.4 GHz. Our design can provide the power at the depth of 5 mm skin and 5mm of bone for the implant. The voltage doubler/quadrupler rectifier in ANSYS Simplorer is used to calculate the exact DC current utilized by implant inside the human body. The qualitative design and analysis of this wireless power transfer method could also be used for other biomedical implants systems such as cardiac pacemaker, insulin pump, and retinal implants.

Keywords : dipole antenna, medical implants, wireless power transfer, rectifier

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