Numerical analysis of the electromagnetic field exposure to humans from the mobile phone wireless power charger operated in 125 kHz

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Recently, wireless power chargers for mobile phones, which applied an inductive coupling method and resonant inductive coupling method were developed. Especially, the wireless power chargers applied to the inductive coupling method are commercialized, thus the studies to estimate the safety to human beings were required.

This paper numerically analyzed the whole body specific absorption rate and the induced current on the body by the emission of mobile phone wireless power chargers, which are commercially available.

The wireless power charger was designed in accordance with the Wireless Power Consortium standard version 1.1. As a numerical analysis tool, the FEM algorithm method of the HFSS was applied to design the power charger for calculation.

Before the designed charger was applied for numerical analysis, the electromagnetic field strength of the designed model and the end product of the wireless power charger were compared to check the similarity of designed model for the numerical analysis

The field strength of the end product and the designed model showed a very similar pattern that it was sufficient for the designed charger to be applied for the numerical analysis.
As a next step, the designed wireless power charger was applied to the numerical analysis to calculate the specific absorption rate and induced current density in the body of the body phantom.

According to the result of the numerical analysis, the induced current density in the body was 3.6 mA/m, which is 1.44 % of the ICNIRP reference level. In addition, the localized SAR value was 1.2×10^{-8}W/kg, which is very low compared to the ICNIRP reference level.

As results of the numerical analysis, the output value of the wireless power charger is lower than the reference level of ICNIRP. However, considering the future market status booming and development speed of the technology of the wireless power transfer devices, persistent studies on the electromagnetic field exposure by the various wireless power transfer devices to human are required.

----------Acknowledgement ----------

[1] GABRIEL, S., LAU, RW., GABRIEL C., "The dielectric properties of biological tissues: II. Measurement in the frequency range 10 Hz to 20 GHz," Phys. Med. Biol., 41 (11), pp. 2251-2269, 1996.

[2] Wireless Power Consortium "System Description Wireless Power Transfer Vol 1 Version 1.1" 2012"