Development of High Accuracy Analysis Method for Wireless Energy Transfer with High Efficiency

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Abstract

Wireless energy transfer technique, which is the transmission of electrical energy from a power source to an electrical load without interconnecting conductors, is attracting attention as improvement of convenience. A short-distance wireless charging system of low power becomes widely used in the market, and a middle- or a long-distance wireless transfer technique with resonant coupling has been developed toward high power. With wireless energy transfer, the efficiency and the standby energy are more significant problems. Efficiency of wireless energy transfer by electromagnetic induction can be improved close to a high-frequency inverter system such as switching power supply through system design with emphasis on efficiency. The aim of the project is to develop a wireless energy transfer with high efficiency through the computation of the eddy current loss of the coils in the wireless energy transfer.

In this report, it is clarified that the AC resistance of the coil is decreased by the transposition of the parallel wires. In addition, the loss under the condition of an actual drive is calculated using the AC resistance calculated with the Earth Simulator.

Keywords: large-scale simulation, electromagnetic field analysis, wireless energy transfer, AC resistance, transposition