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Analysis of the coupling factor according to diameter of superconducting transmitting and receiving coils

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Recently, electronic devices using a wireless charging method are increasing with development of technology. The wireless charging method is free from the space limitation and has an advantage in mobility. However, the wireless charging method has a disadvantage that the efficiency is much lower than the wired charging method. In order to improve the efficiency of the wireless charging method, the coupling factor indicating the degree of coupling between the two coils must be increased. The coupling factor varies depending on the design method of the transmitting and receiving coils.

In this paper, to improve the efficiency of the wireless charging method, the coupling factor according to the diameter of superconducting transmitting and receiving coils was analyzed. To analyze the coupling factor, the diameter of the transmitting coil was fixed and the diameter of the receiving coil was changed to a certain size. As a result, it was confirmed that the coupling factor is the highest when the receiving coil has a specific diameter. Whereas when the receiving coil grew above a certain diameter, the coupling factor could be confirmed to be smaller. Through these considerations, It is possible to get the high efficient wireless charging if the transmitting and receiving coils are designed with the optimal coupling factor.

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