

東京大学 大学院新領域創成科学研究科  
基盤科学研究系 先端エネルギー工学専攻  
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# Automated Impedance Matching System for Robust Wireless Power Transfer via Magnetic Resonance Coupling

－ 自動インピーダンス整合による磁界共振結合  
ワイヤレス電力伝送システムのロバスト化－

学生証番号 47106069 Beh Teck Chuan  
(指導教員 堀 洋一 教授)

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Recently, a highly efficiency mid-range wireless power transfer technology using electromagnetic resonance coupling was proposed, and has received much attention due to its practical range and efficiency. The resonance frequency of the resonators changes as the gap between the resonators change. However, when this technology is applied in the MHz range, the usable frequency is bounded by the Industrial, Scientific, Medical band. Therefore, to achieve maximum power transmission efficiency, the resonance frequency has to be fixed within the ISM band. In this paper, an automated Impedance Matching (IM) system is proposed to maintain maximum efficiency by matching the resonators. This includes achieving resonance by matching the resonance frequency of the resonator pair to that of the power source, and by making a sharper peak at the resonance frequency. The simulation and experiments verify that the IM circuit can induce resonation for different air gaps, improving the power efficiency. The IM circuit is also automated, to make the system more flexible towards varying air gaps. A high speed matching algorithm based on the Golden Section Search optimization technique was proposed to improve the matching speed, and study the maximum achievable matching speed of an IM system that automates by observing and minimizing the reflected wave at the transmitting side of the system.