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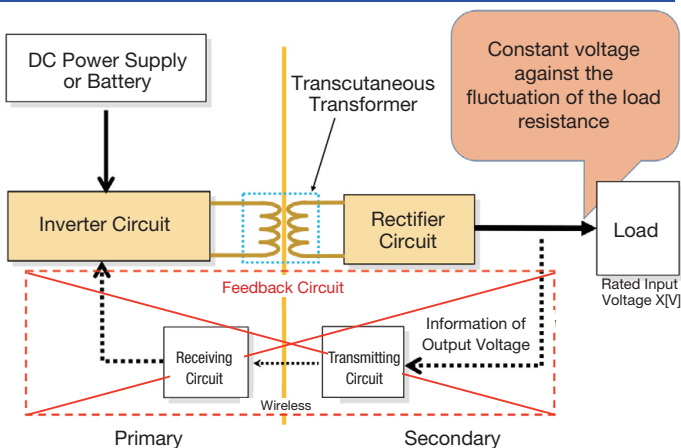
Purpose of Research

The wireless energy transmission using electromagnetic induction or magnetic resonance has already been put into practical use. However, this technology has the following problems: 1) output voltage is fluctuated depending on distance between coils, 2) transmission efficiency decreases depending on distance between coils, 3) output voltage is fluctuated due to load fluctuation, 4) electromagnetic radiation noise is high, and 5) safety to the human body is not confirmed yet. Thus it can be used on the limited condition. This study has a purpose to overcome such a conventional problem and to develop the technology for wireless energy transmission which enables safe and risk-free charging.

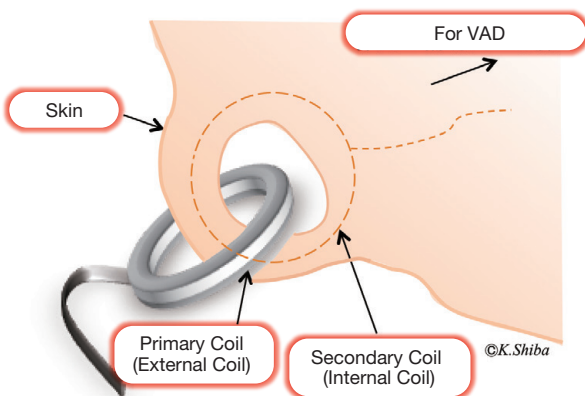
Summary of Research

This wireless energy transmission system has excellent features such as high energy transmission efficiency (98% between coils), output voltage (= electrical power) never changes even when the load varies, it is kept at constant level even when relative locations between primary coil and secondary coil are changed and lower electromagnetic noise, and so on.

Our Proposal Wireless Energy Transmission System



Example of Energy Transmission for Ventricular Assist Device



Comparison with Conventional or Competitive Technology

Since it has a structure that a ring of the secondary coil is clamped by a ferrite core wound by the primary coil, the physical distance between the primary and secondary coils is limited. However, higher transmission efficiency and secure electrical insulation are achieved, and they are able to be detachable very easily.

Expected Applications

- Wirelessly charging household appliances with several tens- or hundreds-watt (charging mobile device, in particular mobile phone or smartphone, rechargeable vacuum cleaner, rechargeable electric power tools, etc.)
- Wireless energy transmission for implantable medical equipments (such as ventricular assist device)
- Charging connector for electric vehicle, etc.

Challenges in Implementation

The implantable medical equipment has a main problem that the medical equipment requires design and manufacture of a specific medical packaging. When it is used for the household appliance or the electric vehicle, finally, dosimetry evaluation and EMC evaluation are also needed according to the output voltage.

What We Expect from Companies

We are finding collaborative project partner companies which intend to jointly develop a wireless energy transmission system with a medical equipment manufacture. This technology would be effectively introduced in companies which want to develop charging device for the household appliances and electric vehicle, so we are willing to undertake joint project with such companies.

Future Developments

Energy can be transmitted wirelessly only by clamping even when the electric vehicle or the mobile device is charged. Thus safe charging can be realized since it can be insulated even outdoors. Furthermore, the AC-AC energy transmission efficiency is 98% or higher. We can offer advices in accordance with the desired applications. Please do not hesitate to contact us.

- Awards: JSAO Best Paper Awards (2001) in Circulatory System, etc.
- Intellectual Property: Japanese Patent Application No. 2014-146119 “Wireless Energy Transmission Apparatus and Electrical Device”
- Prototype: Present
- Sample: May be provided. Decision on this made after discussion with requester.