DEVICE FOR WIRELESS POWER TRANSFER

DESCRIPTION OF THE INVENTION

The wireless energy transfer technology used by researchers of the UPV is based on the phenomenon called magnetic resonant coupling. This is produced when a resonant object is moved in close proximity to a second resonant element and both resonant frequencies are equal or similar. This physical proximity, which does not imply direct contact, produces an energy coupling from the first device that acts as the source, to the second that acts as the load.

This phenomenon is produced because at relatively short distances any open resonant device creates an area of evanescent electromagnetic field around itself that accumulates reactive energy (non radiated). This field accumulation is not useful, for example, for transferring energy at long distances but it is useful for intermediate distances.

The prototype system designed by the researchers at the Wave Phenomena Group of the UPV consists of two resonators made with radial photonic crystals. A coaxial connector excites one of them, and the second one acts as the receiver. The resonators have a special design; they consist of 4 layers of two types of concentric materials.

The permittivity and permeability profiles in the concentric layers enable a highly resonant system with the strong coupling between both devices, facilitating the energy transfer.

APPLICATIONS

The main applications of this type of technology are:

- Charging (or re-charging) of mobile or portable equipment that has a limited battery range and needs to be charged periodically.
- Power supply for devices designed for very low mobility environments (i.e. a desktop including keyboard, mouse, audio or video devices, etc.).
- Power supply for robots, sensors or guided vehicles.
- Bioelectronic applications (cardiac pacemakers, defibrillators, etc.).

TECHNICAL ADVANTAGES AND INDUSTRIAL BENEFITS

- With regard to the transfer systems based on magnetic induction, this system achieves good wireless transfer efficiencies higher than 50% at intermediate distances (<40 cm). Full system efficiencies may depend on specific application requirements.
- Relative orientation between the source and load elements is not a critical parameter for the system operation as it is in fact in magnetic induction systems. The UPV system offers the possibility of relative movement between the source and the load.
- The system is scalable in frequency and, depending on the application, it can be designed to fit with specific frequency or geometry requirements

STATE OF DEVELOPMENT

The research group has designed and simulated the operation of the device.

IP

On October 11, 2013, the Universitat Politècnica de València requested patent protection from the Spanish Patent and Trademark Office (OEPM), with the reference P201331500. This patent has been extended to the international PCT framework in August 2014.

DESIRED COOPERATION

The UPV is searching for companies interested in establishing arrangements to licence the patent and commercialize the system

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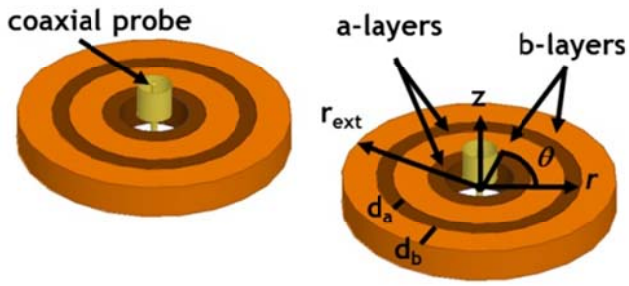
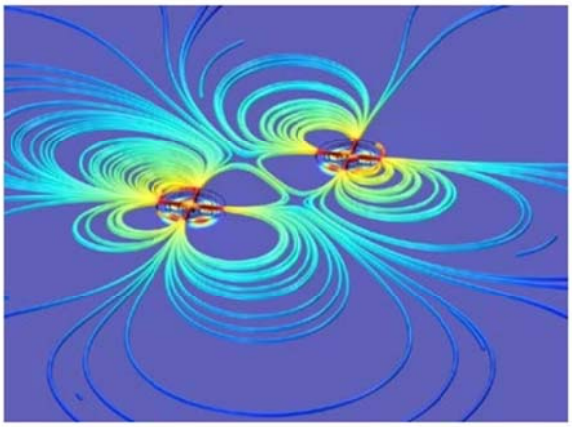
RELATED PICTURES



Picture 1: Schematic of the power transfer system based on RPCs with coaxial connectors



Picture 2: Simulation of system: Surface map of electric field and magnetic field lines. The magnetic field lines show the coupling between the two resonators.

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