

# Wireless Power Transfer System Composed of Toroid Solenoid and Parallel Plate Capacitor

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Abstract

A wireless power transfer system is proposed combining toroid solenoid and parallel plate capacitor.

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A wireless power transfer system is proposed combining toroid solenoid and parallel plate capacitor. The toroid solenoid is transmitter and the parallel plate capacitor is receiver. As shown in Figure 1, the parallel plate capacitor is placed in the center of toroid solenoid. There is a hole in the center of bottom plate. One electrode is connected to the bottom plate. Another electrode is connected to the top plate through the hole of bottom plate. The capacitor is connected to a resonant circuit with a loading resistor. The alternative current through solenoid will generate electromagnetic force (emf) along the central axis of toroid. The capacitor can pick up the emf along the central electrode and this emf will transfer power to the loading of the resonant circuit. In the meanwhile, the current through the central electrode and the displacement current through the plates have opposite direction and their induced magnetic field cancel each other so that there is no magnetic field feedback to the solenoid. In summary, the toroid solenoid can transfer power to the capacitor, but the capacitor cannot reflect impedance to the solenoid. Such a WPT system has a very low input impedance since the non-radiation toroid and none reflected impedance from the capacitor.

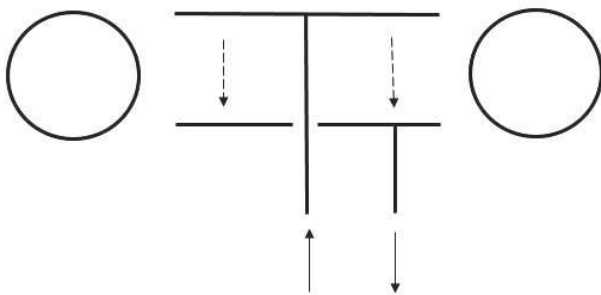


Figure 1: A parallel plate capacitor is placed in the center of toroid solenoid. The solid arrows indicate the current. The dashed arrows indicate the displacement current.