

Introduction To Wireless Power Transfer

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ABSTRACT

This research includes the basic introduction to the concept of wireless power transfer from a source to a load without using conductors. This eliminates the use of conductors which reduces losses associated with it. This technology is a modern way of electrical power transfer. This paper also covers the advantages, disadvantages and applications of wireless power transfer.

Keywords: *Wireless power transfer, basic components, advantages, disadvantages, applications.*

1.INTRODUCTION

Wireless power transfer is a way of transfer of electricity without using wires or conductors. It is mainly useful where transfer of electricity is not possible using conductors. It is a modern way of electrical power transfer. Wireless power can be transferred using various technologies like Inductive coupling based, capacitive coupling based, Electromagnetic radiation, Microwave, Lasers, etc. These technologies can be used for transmitting electricity to short & long distance range [1].

In the early 20th century, Nikola Tesla, a pioneering engineer, invented the Tesla Coil aiming to produce radial electromagnetic waves and thereby transfer electrical power wirelessly. He constructed the Wardencllyffe tower for this purpose as shown below in figure 1.



Fig.1 Wardencllyffe tower also known as Tesla’s tower

Major issue in power system is the losses which occur in the transmission and distribution of electrical power from the generating station. The power losses mainly occur due to resistance of wires or conductors used in the power system [1]. Hence wireless power system is the best alternative for efficient power transfer as it does not involve conductors and hence no losses occur associated with it.

2.BASIC COMPONENTS OF WIRELESS POWER TRANSFER SYSTEM

The basic components of wireless power transfer system include a generator or power supply, a transmitter coil and a receiver coil. The Figure.2 below shows the basic block diagram for wireless power transfer system.

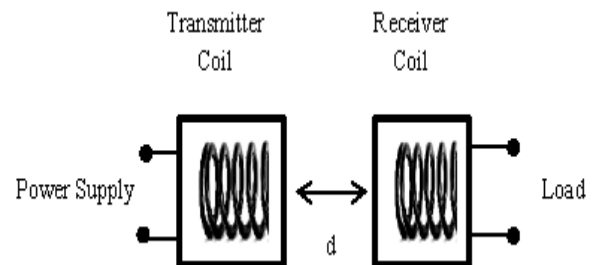


Fig.2 Basic diagram of wireless power transfer system

When power supply is given to the transmitter coil or source coil, magnetic field is produced. This magnetic field links with the receiver coil or load coil due to intersection of the magnetic field which results in transfer of electrical power from the source to load [2]. The efficiency of transfer of electrical power depends on the distance (d) between the source coil and load coil. The efficiency is more when both the coils are at a small distance and efficiency gradually decreases with the increase in the distance [3].

3.ADVANTAGES

Wireless Power Transfer system totally eliminates the transmission line or conductors which are used for electrical power transfer between the generating plants and the various types of loads like industrial loads, domestic loads, commercial loads, etc. The cost of the conductors and the towers to support them are also

eliminated. The losses associated with the conductors will be reduced which will improve the system efficiency. The cost of electrical energy for all types of consumers would also be cheaper. The transfer of electrical power is possible to areas where use of conductors is impossible. Faults related to conductors and short circuit is totally eliminated and finally power theft is not possible at all which increases the system efficiency [4].

4.DISADVANTAGES

The main disadvantage of wireless power transfer system is the capital cost for its initial implementation. The wireless system when in practical functioning will have an effect on the present communication systems which involves mobiles signals, etc due to interference with them. The wireless system will also have an effect on human beings due to its exposure and hence the levels of exposure should be within safe limit as in the operation of mobile signals [4].

5.APPLICATIONS

Electronic portable devices like cell phones, laptops, smart watches, etc which has internal batteries for its functioning can be recharged anywhere without using cords [5]. As global warming is a concern now a days due to greenhouse gas emissions, it can be reduced by using electric vehicles containing internal batteries which can be charged wirelessly [6].

6.CONCLUSIONS

This paper presents the Introduction to Wireless Power Transfer system. The basic components in Wireless Power Transfer System, its advantages, disadvantages and applications are also discussed. This concept is a modern way of power transfer from a source to various loads with ease and no losses.

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