

Analysis And Implementation Of Wireless Power Transfer Using Tesla Coil

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ABSTRACT

Wireless power transfer is the one which transmit electrical energy from source to the load without using any physical medium like wires. In wireless power transfer technique if power has to be transmitted over a short distance then it should be by magnetic field using inductive coupling between coils of wire. This inductive coupling is able to charge the phone, electric vehicles, for the high input voltage it is capable of glowing the tube lights. Thus, the tesla coil is used which is an air coiled transformer which gives high frequency current and voltage output. This method of transferring power wirelessly will bring a huge in the electrical system by avoiding the loss of power due to short circuit and will lead to revolution in industries.

Keywords: Tesla coil, Transformer, Capacitor, LC Circuit

I. INTRODUCTION

Electrical power is significant to modern system. From the minimal components like sensors, controllers till satellites, it is important to deliver power by other means than transmission lines and cables. In this era of modernization, electricity has become the unavoidable part of life. The major source of conventional form of electricity is through wires. One of the major issue in power system is losses occurring during the transmission and distribution of electric power. Hence to overcome this problem Tesla has proposed methods of transmission of electricity using electromagnetic induction.

The basic concept behind this electromagnetic wireless power transfer is the magnetic induction between the transmitting and receiving coil. Primary coil is the transmitter and the receiver is the secondary coil, magnetic field is generated by the current in the primary coil this field induces current at the receiver. This received current is used to generate the power.

II. RELATED WORK

This survey reveals Wireless power transmission technique and its practicability. It explains theory, design and construction to transmit the power wirelessly [1]. Used Solid State tesla coil to generate high voltage frequency electricity[1]. Main aim in this work is to transmit the power to a long distance. Lasers are used to transmit power through collimated beam of light towards detector, their received photons gets converted to electrical energy. Using this technique it is possible to transmit the power to a long distance.[1]

Wireless data transmission which is efficient with necessary parameter. Direct induction followed by magnetic resonant takes place in order to produce high voltage, high frequency, low alternating current indirectly forming high density flux [2].

Simple tesla coil which produced high voltage and high frequency current at secondary side [3].

Alteration to the existing one by replacing Ac supply with a Dc supply[5]. Due to this the circuit components were also changed. A solid state miniature tesla coil with a slayer exciter was used [5-8].

III. PROPOSED WORK

Electromagnetic induction is the one which produce current across conductor moving through a magnetic field .In our proposed work of tesla coil wireless power transfer using electromagnetic induction is implemented which has the ability to glow the tube light. This technology includes primary and secondary coil. The high voltage is applied to the circuit capacitor will gets fully charged

The 230v 50hz AC is fed into transformer which steps up the input voltage to 15000v. There will be two RC circuit one is primary coil and capacitor, secondary coil and toroid forms the another RC circuit. Resonance of the both the RC circuit is matched. The current flows into the primary coil and the magnetic field is generated around the primary coil. This generates electromotive force on the secondary coil and it induces current in it . The equilibrium state of the electron will be broken when the electrons starts to flow towards top of the secondary coil. Hence electrons will fall down giving raise to a positively charged region. Large number of electrons gets attracted towards top of the secondary coil when it pulls the electrons with more force. The toroid gets saturated and the air around gets ionized as a result a spark is released in the air. The entire process repeats itself every millisecond producing a spark. Coil output depends on various factor such as number of turns of primary coil, the value of capacitor, spark gaps, capacitance, toroid, high voltage input. Glowing of the tube light without connecting to socket is the main advantage of this work.

3.1 METHODOLOGY

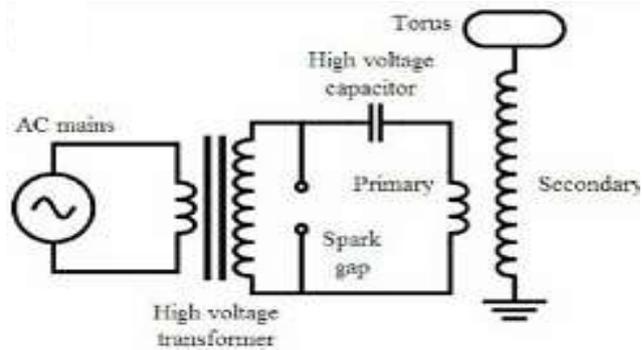


Fig1: Circuit diagram of tesla coil

The principle of this project is to convert 230V low frequency AC to 12V high frequency AC by using an electronic circuit. The tune coil receives this 12V high frequency AC as an input and this tune coil is nothing but a primary coil. Primary coil acts as transmitter and secondary coil acts as receiver. 12v high frequency is developed in secondary coil. The primary coil and secondary coil is separated by 3cm (approximately). The power is transmitted from primary coil to secondary coil to run the load.

IV.RESULTS AND DISCUSSION

Table-1:List of Components

Sl.no.	Component	Rating
1	Transformer	15kv
2	Capacitor	224k
3	Primary winding	No of turns 15
4	Secondary winding	No of turns 800

The below figure shows the tesla coil model. It consist of primary coil, secondary coil, transformer and toroid. When high input voltage is induced to the transformer , magnetic field will produce the current at the receiver. This generated power is capable of glowing the tube light when we brought near to coil.



Fig 2 : Tesla coil

V. CONCLUSION

This project extended the knowledge of electronics and shed some light on the artistic nature of the tesla coil. The coil that was created was capable of producing the electricity which had the capacity of glowing the tube light. While there are lots of developments could be made, our project mainly aims at generating the electricity wirelessly. Tesla coil is a cheap way of generating high voltage at high frequency without complicated circuitry. A tesla coil was used in some spark gap transmitter to generate radio frequency and it helps to shoot lightning bolts.

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