Economical use of wireless power transmission at domestic areas

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Abstract**—***Our project is based on wired and wireless power transmission in industrial area and residential area. By implementing this types of system we can improve transmission and an economical transmission can be achieved. The cost of transmission lines and losses, as well as difficulties encountered in building new transmission lines, would often limit the available transmission capacity. Besides, in a deregulated electric service environment an effective electric grid is vital to the competitive environment of reliable electric service. In recent years, greater demands have been placed on the transmission network and Increasing demands, lack of long-term planning and the need to provide open access electricity market for generating companies and utility customers. Wireless power transfer (WPT) is the transmission of electrical power from a power source to a consuming device without using discrete manmade conductors. Wireless power transfer technology can potentially reduce or eliminate the need for wires and batteries.*

Keywords*- Power transmission, wired power transmission, domestic power transmission, tesla coil, wireless power transmission, transmission system*

I. INTRODUCTION

Price is a main factor distinguishing wired- and wireless-technology options in a business. Wireless options command a price premium that can make purchasing wired computers, printers and other devices a financial benefit. Before making the decision to purchase hard-wired technology products, a review of the restrictions and limitations of the selections is necessary. Business and employee needs may override any cost considerations. Electric power system stability is one of challenging problem to protect the system operation. So it is of vital importance to examine and protect the power system equipment. Continuous power can be achieved for domestic use by wireless power transmission system. Tesla coil power transmission gives way to enlighten house while there is a power cutoff .

II. RELATED WORK

In [1] The Yagi antenna, patented in 1926, allows directional communication using electromagnetic waves, and is now installed on millions of houses throughout the world for radio and television reception. He also tried, unsuccessfully, to introduce a wireless power transmission system.

In [2] Nikola Tesla, experimented with transmitting power by inductive and capacitive coupling using high AC voltages generated with his Tesla coil. He attempted to develop a wireless lighting system based on near-field inductive and capacitive coupling and conducted a series of public demonstrations where he lit Geissler tubes and even incandescent light bulbs from across a stage.

In [3] Wang haiming, "Researches on power supply for the high voltage unit of the active electronic cuurent transducer," Electrotechnical Journal

III. SYSTEM BLOCK DIAGRAM

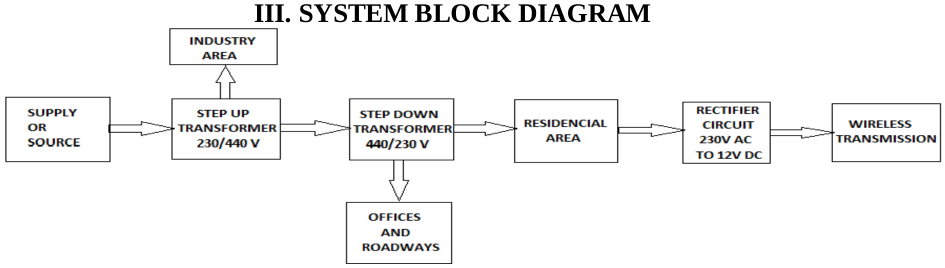

Figure 1: System Block Diagram

The supply of 230 v is taken as reference. Any high voltage can be selected to be step down to 440v. this voltage is used for industrial area. Further it is step down to 230 v for domestic use. At home by implementing wireless power transmission by tesla coil we can enlighten house at low voltage.

IV.TESLA COIL DESIGN

As there are five basic fundamental components of a tesla coil, there are five basic fundamental design parameters:

1. Output Characteristics Voltage Transformer
2. Size and Dimensions of Primary Coil
3. Size of Primary Capacitor
4. Size and Dimensions of Secondary Coil
5. Size and Dimensions of Toroid (Secondary Top Load)

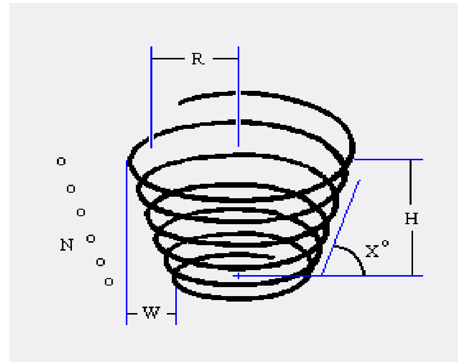

Figure 2. Tesla Coil design

4.1 For primary coil:

L1 = (N x R) ^2 / (9 x R + 10 x H)

L2 = (N x R) ^2 / (8 x R + 11 x W)

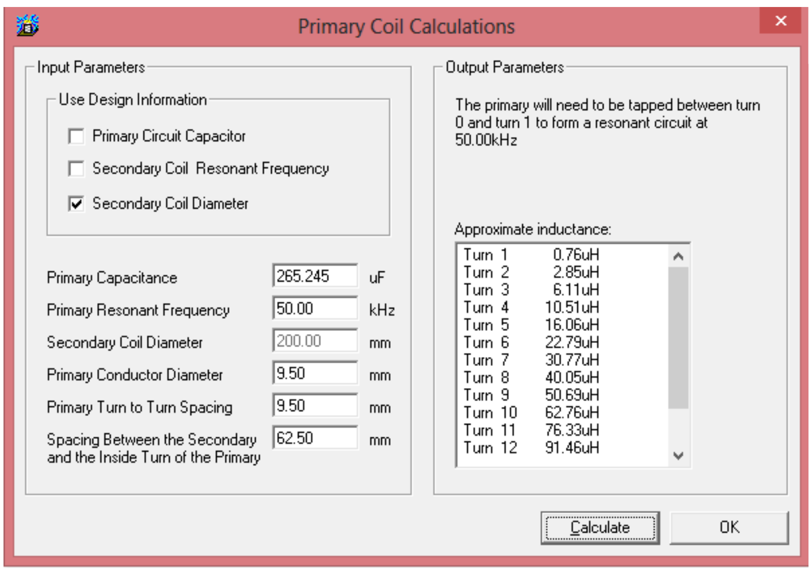

Figure 3. Primary coil calculation

4.2 For secondary coil:

The secondary coil is used with the top load to create the secondary LC circuit. The secondary coil should generally have about 800 to 1200 turns. Some secondary coils can have almost 2000 turns. Magnet wire is used to wind the coil. There's always a little space between turns, so the equation assumes the coil turns are 97% perfect. Secondary Coil Turns = (1/ Magnet Wire Diameter + 0.000001)) × Secondary Wire winding Height × 0.97

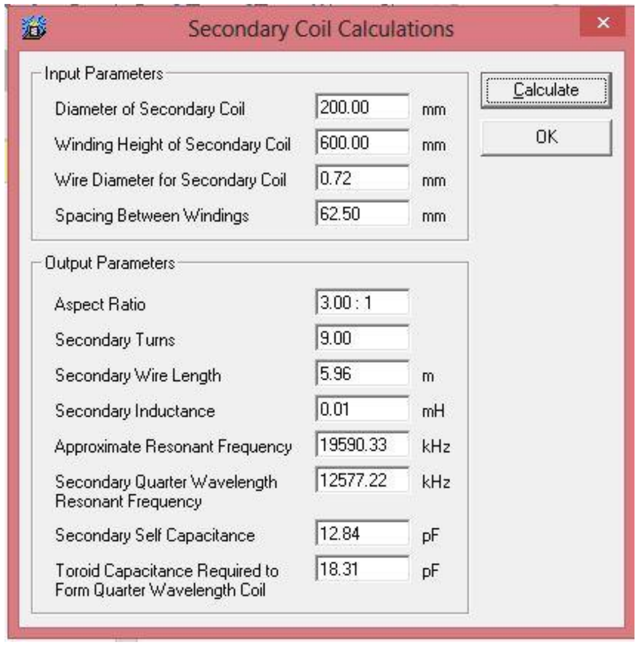

Figure 4. Secondary coil calculation

4.3 For transformer:

Vi × Ii = Vo × Io

Where:

Vi = Input voltage in Volt

Ii = Input current in Amps

Vo = Output voltage in Volts

Io = Output current in Amps

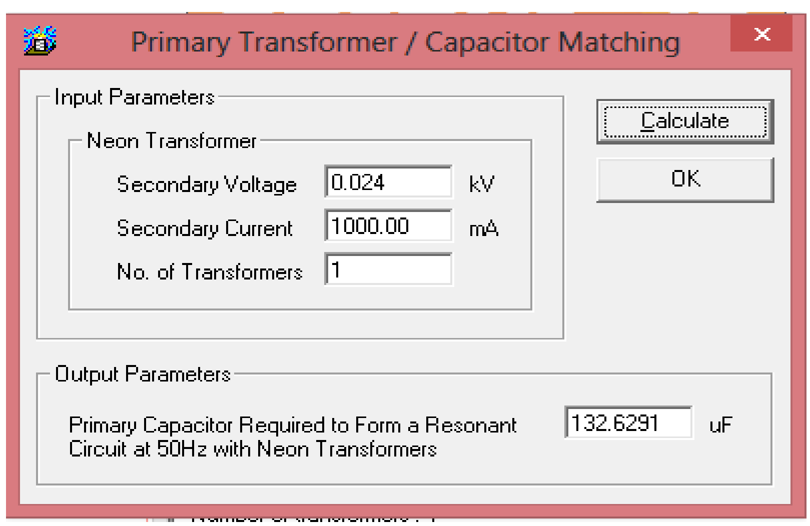

Figure 5. Primary transformer calculation

4.4 Measuring Instruments

- Primary capacitor:It is used to set primary coil circuit at resonant frequency.

- Transformer :It is used to step down voltage
- Multimeter:Multimeter required to find primary and secondary coil current and voltage and resonant frequency, input capacitance for designing tesla coil. Most DMMs will offer a variety of measurements. The basic measurements will include:
  - Current (DC)
  - Current (AC)
  - Voltage (DC)
  - Voltage (AC)
  - Resistance

However, using integrated circuit technology, most digital multimeters are able to offer additional test capabilities. These may include some of the following:

- Capacitance
- Temperature
- Frequency
- Transistor test
- Continuity (buzzer)
- Tesla Coil CAD :

Tesla coil CAD is a software which is used to design tesla coil.it determines primary and secondary turns ratio,resonant frequency, input capacitance etc. This software is basically work on equation for designing the tesla coil.

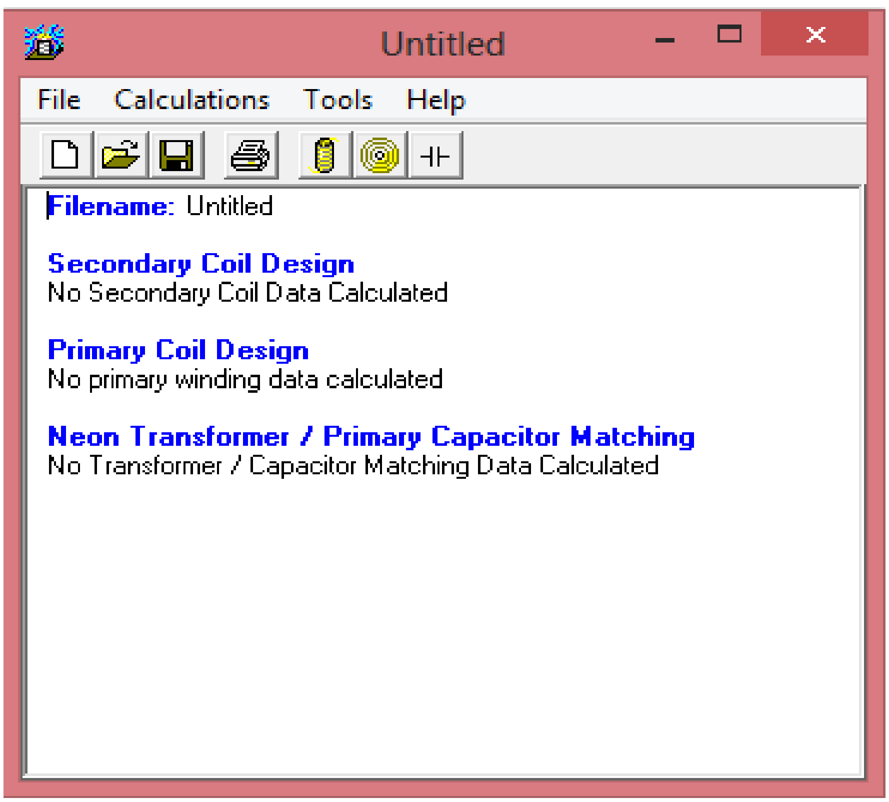

Figure 6. Tesla CAD software

V. WIRED V/S WIRELESS POWER TRANSMISSION

Table 1. Comparison of wired and wireless power transmission

SPECIFICATION	WIRED POWER TRANSMISSION	WIRELESS POWER TRANSMISSION
Installation	Wired network installation is cumbersome and it requires more time	Wireless network installation is easy and it requires less time
Mobility	Limited, as it operates in the area covered by connected systems with the wired network	Not limited, as it operates in the entire wireless network coverage
Stand by power usage	Higher	Lower
Natural resources required to manufacture	High	Low
Cost of transportation energy	High	Low
Amount of toxic and non-biodegradable electronic waste	High	Low
Power consumption	High	Low
Use of manpower, resources, facilities	More	Less

VI .CONCLUSION

From this paper we concluded that wireless power transmission by tesla coil is more efficient, economical, reliable, and safer than wired power transmission at domestic level.

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