Wireless transmission of energy

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1. Introduction

Nicola Tesla designed in the year 1891 an innovative transformer and in this way he initiated the issue of a wireless transmission of energy. It was supposed to be achieved by huge constructions called Tesla Towers.

2. Theoretical part

The aim of my project was the analysis of a concept wireless transmission of electric energy by means of electromagnetic waves. The frequency of the waves is given with the formula:

$$f = \frac{1}{2\pi\sqrt{L_2 C_2}}$$

The formula for received power:

$$P = UI$$

C_2 - capacity in the oscillation circuit [F]

L_2 - inductance of the oscillation circuit[H]

U – received voltage[V]

I – received current [I]

3. Experimental part

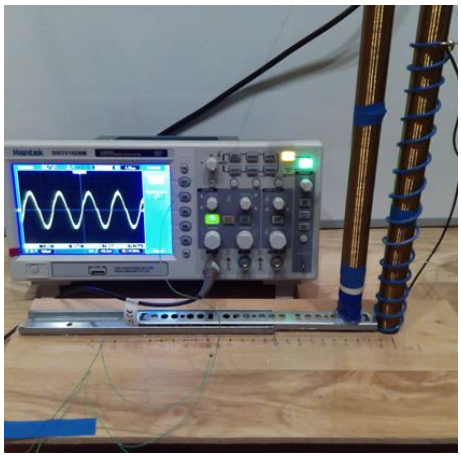

Fig. 1 Experimental Kit

Within my research I constructed a transmitting/receiving model based on the Tesla's transformer, that consists of two coils: the transmitter and the receiver. The receiver is installed on a fence, so it can be receded and bringing closer to the transmitter. I have measured the voltage and the current on the receiving coil with different distance of transfer. The emitted power was constant and equal 960W.

4. Results

Using my device I was able to conduct the transfer for short distances – smaller than 0,5m. The received power with 4cm distance was approx. 4W, what gives us 0,4% efficiency. Even though it was very small value it is enough to run small devices. Now I`m going to do the same measurements, but using different types of transmitting coil, to emit waves with another frequency.

5. Conclusions

Approximation of the diagram shown in Fig. 2 may be made with high accuracy by means of a third degree polynomial. Using excel and other programs the exact formula describing the transmission effectiveness depending on transfer distance and waves frequency can be created.

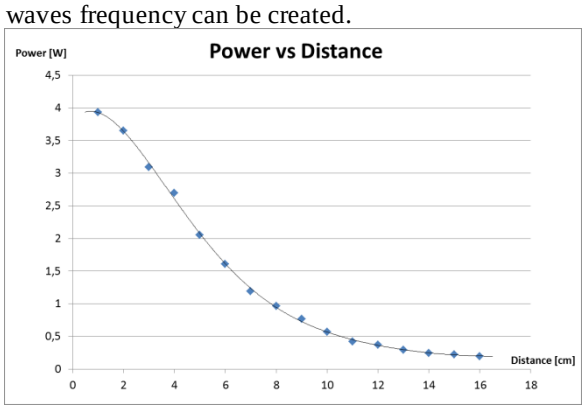

Fig. 2 The power vs distance chart

6. References

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