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Wireless Transmission Line

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***Abstract:** This paper proposes the concept of invisible transmission line. Proposal is a kind of improved technology for power-coupled wireless power transmission systems. Two adjacent dipole antennas have a strong-coupled position. In this situation, two independent coupled electrical fields in opposite directions occur between each of two charged poles of antennas. In the independent areas, there is an important role on wireless transmission and this almost invisible pair behaves like a metal wire. Based on this idea, the new type of metal plate dipole antenna has been designed and developed. The main purpose of the antenna is to obtain relatively high transmission capacity and to establish radiation control function for practical use. The possibility in circuit simulation found high efficiency. But the results of electromagnetic simulation and experiments on the efficiency were not expected. It was confirmed that the proposed control mechanism works well in the antenna system. This letter describes the wireless power transmission mechanism in a different perspective for the conventional. The index term is Wireless transmission, Electric coupling.*

I. INTRODUCTION

Wireless power transmission is a very important technique for realizing the universal society. In this society, people of all kinds can communicate with each other and everywhere. Thus, the energy to communicate in any situation or any device is required. Wireless power transmission is a very effective technique to provide energy to the communication device without the power unit. Recently, strong-coupled wireless power transmission technology is proposed and displayed. It demonstrates that high efficiency is achieved using this technique. That theory can be considered that two-phase band pass filter using resonant antenna can be considered. For high efficiency the condition of coupling and high Q value on the antenna coupling system will be required. Thus, to bring this technique in practical use, it is necessary to optimize the control mechanism especially on the basis of very accurate system design and environmental conditions for an antenna structure. These are very serious problems and it is difficult to solve these issues in practical products. This letter proposes the concept of the invisible transmission line. Proposal is a kind of improvement technique for a strong system gained from a different perspective. The main purpose of implementing this concept is to achieve relatively high transmission efficiency without excessive use. High Q antenna and to be able to install an appropriate control mechanism easily for practical use.

II. TWO INDEPENDENT COUPLED ELECTRICFIELDS

If we should cut the wire transmission line, then the capacitor is usually placed in the center of the line . The alternating current (AC) signal can be successfully transmitted in this manner and the electric field E is in opposite direction inside each capacitor. Electric field E needs to be different time zones but it is not necessary. This is absolutely wireless power transmission line. This transmission line acts as a wireless power transmission line, it should fulfill the following conditions:

A. Transmission using extremely low capacitance.
B. No interference in each capacitor area.

It is believed that using high capacitance, high power transmission gives very high terminal voltage. It needs to be prepared to avoid the crossstock between the two electric capacitance area . Transferring and obtaining parts is a similar structure of a dipole antenna. Then the main technique of this method is how to configure two independent coupled electrical fields on each poles of two dipole antennas. It can be seen that two independent coupled electrical fields also come in the position of two coupled in strong. Bipolar antenna this concept means that two independent transmission paths (lines) transfer the potential difference from one point to the other. Thus, this concept is a kind of invisible pair of metal wire. Consequently, the condition of obtaining high efficiency in wireless power transmission using two dipole antennas is considered to configure two independent coupled electrical fields. The important point is that two independent coupled electrical fields should be maintained in long distances.

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III. ANTENNA SIMULATION AND EXPERIMENT

A. Antenna Design And In The Near Field

The Dipole antenna, which is employed in this method, becomes a different shape than the traditional. Because the radial direction component of electric field is only required but the horizontal and vertical radiation fields are unnecessary. Each pole of the dipole antenna should act as a charge of charge. The two pole made by the metal plate which are kept separately and the feed line is attached to the center of each metal plate. The dipole antenna was calculated near the electric field of the metal plate. Before each pole plate the radial direction is irradiated and these directions are opposite to each other

Two independent coupled electric fields (strong-coupling) are consisted, when another dipole antenna is placed in front of this antenna. But the distance between two antennas is limited due to near-field distribution. Near fields strength of Ex and Ey. It is shown that Ex component is stronger than Ey within the area of X<0.3m. It means the transmitting efficiency will be down over 0.3m far from the antenna. Because Ex component plays a major role in the power transmission in this concept. Ey component should be suppressed more for increasing the efficiency.

IV. CONCLUSION

Based on the idea of invisible transmission line, which means two independent coupled electric fields between two dipole antenna, new type of dipole antenna is designed and developed. In this antenna, two poles are made by metal plate for keeping charge and taper type feed line is connected to the center of each metal plate. In the circuit simulation, electromagnetic simulation and experiment, the following results were obtained.

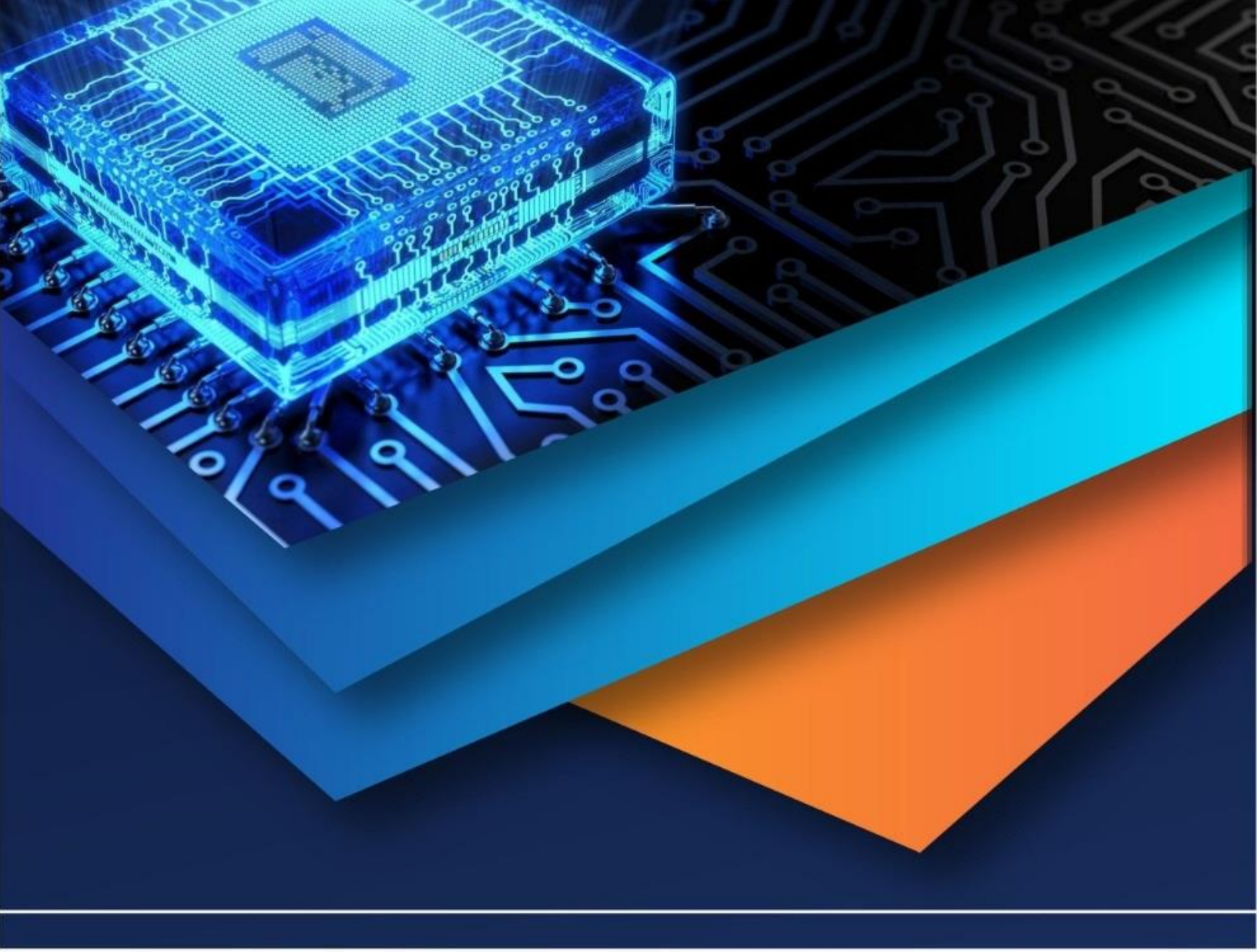
A. In ideal circuit simulation, it means completely independent two coupled electric fields are assumed, transmission efficiency of 43 percent gains despite using only 1fF capacitor.

B. Radial direction electric field component , which plays a major role in the power transmission, is the largest component in the vicinity of the antenna.

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