

Experiment about advanced wave or advanced potential by classical method

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Abstract: Experiments to produce advanced wave and send single from current to the past is proposed using classical method. The experiment method is by change the impedance of the load, then output power of the power source is measured. According to the mutual energy theorem, the load will suck the energy from the source by advanced wave or potential, hence the change in the power source should happens before the change of the load. Hence it is possible to send the signal to the past. The communication from current time to the past time should be possible. 3 experiments will be applied to test it. The experiments are all classical with using the quantum entangle effects.

1. Introduction

Similar to the retarded wave or retarded potential, advanced wave or advanced potential is another solution of Maxwell equations. 1905 Einstein has debated with Ritz about the existence of the advanced potential. 1945 Wheeler and Feynman introduced the absorber theory which is based on existence of advanced potential[1,2]. The absorber theory is further developed to form the transactional interpretation of quantum mechanics, which is done by J. Cramer in 1986[3-5]. In 1978 Wheeler introduced the delayed choice experiment, which implies advanced wave[6]. The delayed choice experiment is further developed to the delayed choice quantum eraser experiment[7], and quantum entanglement ghost image and the ghost image clearly offers the advanced wave picture[8]. In 2014 John Cramer discussed the possibility to send signal to the past by using the quantum entangle effect, but it seems he get negative results[9]. In classic electromagnetic theory, W. J Welch introduced the advanced potential to his time-domain reciprocity theorem in 1960[10]. The mutual energy theorem is introduced by this author in 1987[11-13], later this theorem is further developed by introduced the concept of mutual energy, mutual energy current in 2016. Mutual energy current is inner product of the advanced potential and the retarded potential. In mutual energy theorem there is an important concept that the absorber or the receiver sends advanced potential which is received by the emitter or transmitter[14-16]. The emitter sends out the retarded potential and this potential is received by the receiver. The mutual energy theorem tell us that the advanced potential sucks the energy from the emitter or transmitter. The sucked energy power is equal to the power received by the absorber or the receiver. The mutual energy current (or flux) through any surface between the emitter and the absorber is also equal to the power sent out by the emitter or the power the absorber received. The mutual energy theorem can be applied to double slits and to explain the details what happens for the transfer of energy when light go through the double slits. The mutual energy theorem build a clear picture of the photon model. Photon is nothing else, it is just the mutual energy current. The Photon is more like an energy package than a particle. This model avoided the wave function collapse and easy to explain the quantum phenomena like double slits experiments, delayed choice and quantum entangle experiment. Even the advanced potential is so important, many physicist and engineers still don't accept it because the simple causality consideration. Hence to show the advanced potential is existent in experiment is very important. This article introduced a few method to measure the advanced potential. Experiments to produce advanced wave and to send signal from current

time to the past time is proposed. The experiment method is by change the impedance of the load, then the output power of the power source is measured. According to the mutual energy theorem the power changes of the source should happen before the power change of the load.

2. The antenna impedance directivity diagram

Ritz introduced the emission theory[17,18] and Wheeler and Feynman introduced the absorber theory. According emission theory, the emitter can send out retarded wave by themselves. According to the absorber theory, the emitter cannot send out the retarded wave unless there are absorber which gives the influences to the emitter and that makes the emitter sent out the waves. The influences of the absorber is at far away and in the future. The absorber sends the advanced wave. In order to experiment the existent of advanced potential we can test the two theory by following method.

Build a system with two communication antennas, antenna 1 is a transmitter, antenna 2 is a receiver. Build the two antennas face to face, in this case assume the antenna 2 can receive at least a big amount of energy sent from antenna 1, for example, can receive at least 10%. We measure the impedance of the antenna 1. Assume the antenna 2 can be removed and can be quickly put back. We let the antenna 1 sent a short time impulse. If the theory of Ritz is correct, the measured impedance between two situations (1) the antenna 2 existent and (2) the antenna does not existent should not have any difference. Since according to emission theory, the absorber can only send reflect waves which is retarded potential and need a time to reach antenna 1. The influence of antenna 2 should not have any immediately influence, hence in the time the wave of antenna 1 send out there is no any difference whether the antenna 2 existent. In the other hand if the absorber theory is corrected. The antenna 2 will send the advanced wave back to the antenna 1. This wave is advanced wave and hence give an influence to the antenna 1 immediately. The signal sends from antenna 1 to antenna 2 is T , the signal sends from antenna 2 to antenna 1 will spends a negative time $-T$. The total time spends is $T+(-T)=0$. Antenna 1 should fell there is immediately difference between the two situations (the antenna 2 is existent or it is not existent). If the absorber theory wins that means the advanced wave is extent.

Assume the absorber theory is corrected, then we can measure the transmitter antenna impedance directivity diagram, which shows the future absorber distribution in each direction of the space. The measurement should use short impulse, this way all the reflected wave still does not have enough time to comeback. Figure 1 gives the picture of the experiment system. Figure 1 up-part shows in the system there is only a transmitter and it sends a short impulse. Figure 1 down-part shows there is a receiver also. The receiver have a load which absorber the energy sent from the transmitter antenna 1.

The above antenna system can be replaced as laser light source and detector. We can use the laser source scan the whole space to find out the angle absorber distribution of corresponding light frequency.

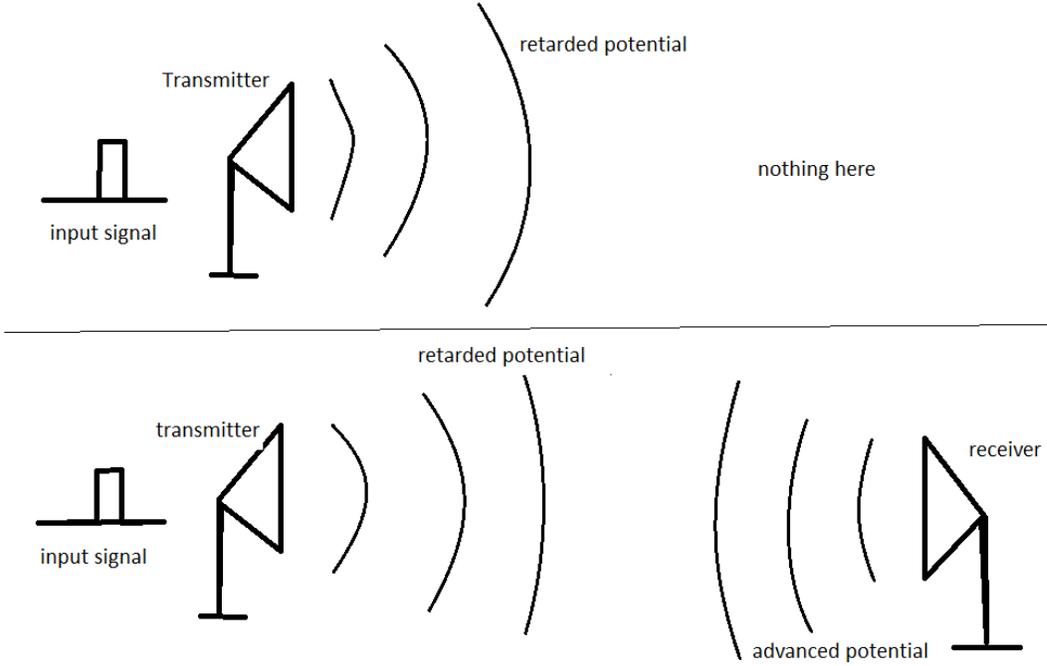


Fig 1. Compare the above two situations, the impedance of the transmitter. The input is very short impulse. The reflect wave (which is retarded potential) of the antenna 2 should have not enough time to send back. But the advanced wave will send back the signal to the transmitter to suck the energy. If absorber theory is correct, the above two situation will offer different results. If the emission theory is correct the above two situations should have no any difference, which will shows which theory is corrected and whether advanced wave existent or not.

3. Electricity source and load method.

In the following we assume that the absorber theory is correct. Hence the advanced potential is existent. For the mutual energy theorem there is a surface integral, the surface integral vanishes only when the two fields one is retarded and the other is advanced. Hence in this situation the mutual energy theorem can be applied.

Assume there are two antenna, antenna 1 is a transmitter and antenna 2 is a receiver. They are put in empty space. Assume the electromagnetic fields send by the transmitter is $\zeta_1 = [\mathbf{E}_1, \mathbf{H}_1]$, the electromagnetic field of receiver is $\zeta_2 = [\mathbf{E}_2, \mathbf{H}_2]$. The current of the transmitter is J_1 , the current of receiver is J_2 . J_2 is caused by J_1 . Assume that, $[\epsilon, \mu] = [\epsilon_0, \mu_0]$. Here ϵ, μ are permittivity and permeability. $[\epsilon_0, \mu_0]$ are that in in empty space.

According to the mutual energy theorem[11-16] the sucked energy from the source by the advanced potential sent by the receiver is equal to the received energy i.e.,

$$(1) - \int_{V_1} (E_2^* \cdot J_1) dV = \int_{V_2} (E_1 \cdot J_2^*) dV$$

In the mutual energy theorem $\int_{V_1} (E_2^* \cdot J_1) dV$ is received energy of J_1 , we know that the transmitter or antenna 1 sends out energy hence the received energy of antenna 1 is negative. Hence $-\int_{V_1} (E_2^* \cdot J_1) dV$

expresses the emitted energy of the transmitter or antenna 1. $\int_{V_2} (E_1 \cdot J_2^*)dV$ is the received energy of the receiver or antenna 2. The above formula did not consider the loss in the media, that means the media is lossless, i.e.,

$$(2) \quad \epsilon^\dagger = \epsilon, \quad \mu^\dagger = \mu$$

Where $\epsilon^\dagger = (\epsilon^*)^T$, $\mu^\dagger = (\mu^*)^T$. “*” is complex conjugate, “T” is matrix transpose, If Eq.(2) does not satisfy, the media is lossy, the above mutual energy formula need to be modified as[15,16],

$$(3) \quad -\int_{V_1} (E_2^* \cdot J_1)dV = \int_{V_2} (E_1 \cdot J_2^*)dV + Loss$$

Where *Loss* is the energy loss between the source and the load. According the mutual energy theorem the J_2 is the current of the load which will send advanced potential. Hence in the above formula E_2 is advanced potential. This means the change of E_2 take place earlier than the change of the current J_2 . In the Eq.(3) we have considered that the surface integral vanishes,

$$(4) \quad (\zeta_1, \zeta_2) \equiv \oint_{\Gamma} (\mathbf{E}_1 \times \mathbf{H}_2^* + \mathbf{E}_2^* \times \mathbf{H}_1) \cdot \vec{n}d\Gamma = 0$$

Where Γ is a big sphere surface with infinite radius R. Eq.(4) is the condition that Eq.(3) is established. Eq.(4) is established need the two fields ζ_1 and ζ_2 one is retarded potential and another is advanced potential.

We know that, if we open our switch, the light is immediately send out from the load(assume the load is a light bulb). We also know that the power station is far away from the load, the power station must offer the power a time earlier, then the load can have an immediately light.

Assume there is a source which can be a high frequency generator, or a source of microwave. There is a load. Between the source and load the wave can be transmitted. Assume the energy is transmitted from source by ether through power line, coaxial-cable, or two antennas one is a transmitter and another is a receiver.

Assume the amount of load can be changed quickly, hence J_2 is changed. That will cause the field ζ_2 to be changed, that in turn will course the sucked energy from J_1 to be changed. The change of J_1 will cause the output power of source change. We should be possible to measure the change of the power of the source.

For example we change amount of load and measure the changes of the power of the source. If the changes of the source is correlated to the load and happens early than the change of the load, that means the signal can be transferred to the past and hence further prove that the advanced potential is existent. The following figure offers this kind antenna system.

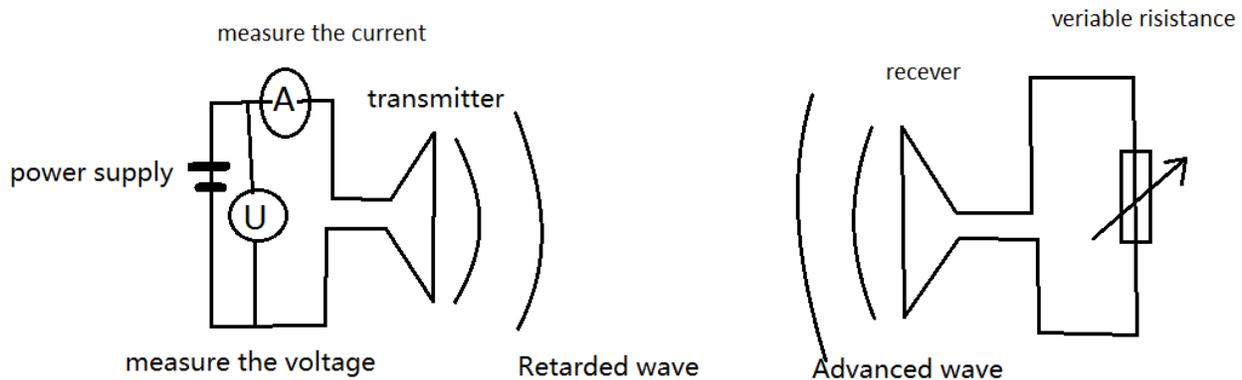


Figure 2. In the receiver there is a load. The resistant of the load is variable. The load of the receiver is changed quickly. The power of the transmitter can be measured by measuring its current and voltage. We can find the correlation between the impedance change and the power change of the source power. If the source power change happens before the impedance change of the receiver load, a signal has been sent to the past.

The two antenna system of Figure 2 can be replaced by power line, coaxial cable, wave guide or any things electromagnetic wave can be transferred, see figure 3. The load is at the right end and is a variable resistant which can be changed very fast randomly. There is a high frequency power source in the left. The voltage and current can be measured to tell the output of the power source. Assume the cable has 2.5 meter. The changes of the power of the source should happens 9 ns before the change of the load in right end. If this is true, the signal is send to the past and advanced wave is existent.

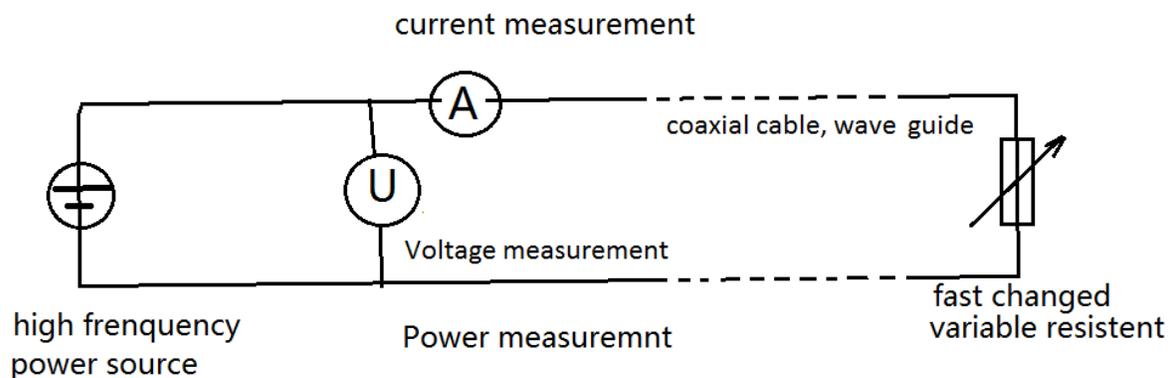


Figure 3. Figure 3 can replace Figure 2. In case figure 2 does not work we can test figure 3. Figure 3 is also a litter bit easy to implemnt.

The above coaxial cable or wave guide can also be replaced as a transformator. The primary coil and the secondary coil of the transformator is separated 2.5 meter. We know that the secondary coil sucks the

energy from primary coil and we know that if the load power in secondary coil is changed the power of the first coil has to be changed. Now the only thing we have to do is test whether the source power change happens before the load change.

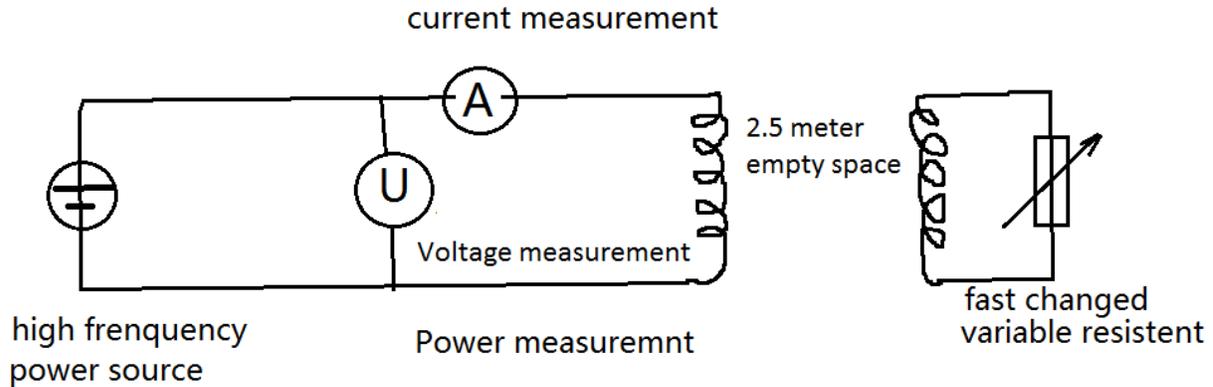


Figure 4. Figure 4 is an alternative choice for figure 3. We have known the secondary coil of the transformer sucks the energy of the primary coil. The secondary coil will suck the energy from the primary coil, this is similar to the receiver antenna suck the energy from the transmitter energy. Hence the transformer is also suite to do this kind of experiment. Perhaps the scattering effect of transformer is less than antennas. When the secondary coil is separated with the primary coil, the two coil can also be seen as antennas.

4. Conclusion

We have proposed a method which can check whether the absorber theory of Wheeler and Feynman is correct or the emission theory of Ritz is correct, which in turn can tell us whether advanced wave is existent or not. Assume the absorber theory is correct, it is possible for us to offer methods to measure the advance wave and send the current signal to the past. The above methods are all classical method do not need any complicated entangle quantum effects and hence should be very easy to be tested.

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