Energy analysis of a Null electromagnetic wave

Author: Moshe Segal moshe_segal@yahoo.com

Abstract

The article deals with the following question: is it possible to detect a Null electromagnetic traveling wave, which is a wave that does not contain any electric or magnetic fields.

The article discusses the above question and shows that any possible answer to that question provides surprising and important new insights.

The article provides a description of how to implement such a Null electromagnetic wave, and it also provides a description of how to carry on a lab experiment which might provide answers to the above question.

As already mentioned above, any answer to the above question also provides surprising and new insights to issues such as:

Energy in general, especially energy embedded in electromagnetic waves and energy embedded in electric and magnetic fields, and even to issues such as new surprising insight into possible new features of electric charges, the charge disappearance in electron positron collisions and even some possible leads related to the Dark Energy issue.

Introduction

The issue of electromagnetic traveling waves interference was already presented and analyzed extensively. Examples of such scenarios might be counter propagating one dimensional two source waves, or a single source wave propagating in two or more dimensions via scattering one portion of the wave into another portion, such as a double slit experiment with a single source. Analysis of these scenarios shows that in these cases, the interference between these waves conserves the wave energy. (Ref 1).

However, the following scenario presents surprising results relating to electric and magnetic fields energies:

A scenario of very focused two source electromagnetic traveling waves, focused such that they can be considered as traveling only in one dimension, which are colliding, and following this collision, the waves consolidate, and continue to travel in the same direction. If the two waves consolidate when they oscillate at exactly the same frequency, have exactly the same intensities in their electric and magnetic fields and are exactly at a phase shift of 180 degrees relative to one another, the resultant electromagnetic wave is a Null wave which does not contain any electric or magnetic fields.

This article presents a description of how to carry on the necessary steps in order to implement the above scenario.

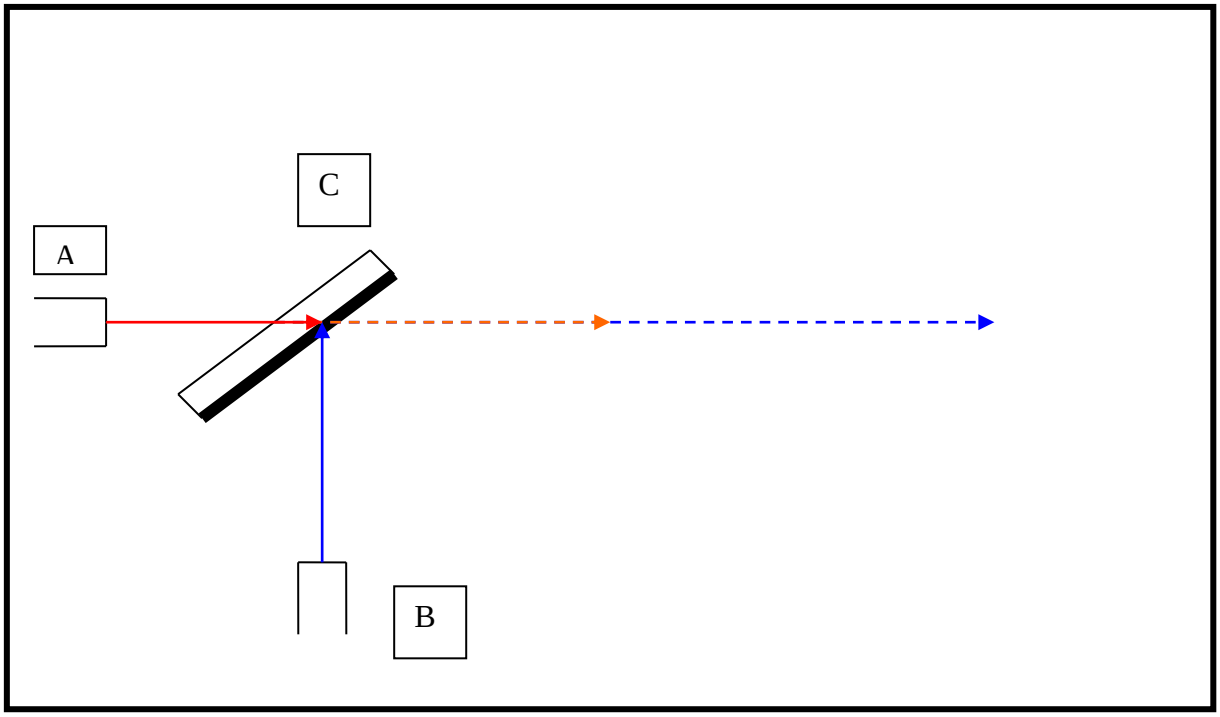
This article deals with the question if it possible to detect such a Null electromagnetic traveling wave, because, as it will be shown, any answer to this question should provide surprising and new insights.

The article describes how to conduct a lab experiment, using the implementation of this Null electromagnetic wave, to provide an answer to the above question. Then, the article analyzes the possible results of this experiment, and discusses the various surprising insights provided by each of these possible answers.

Description of an implementation of a Null electromagnetic traveling wave

The above described scenario of two one dimensional electromagnetic waves which consolidate and become unified, and continue to travel together in the same direction can be implemented as shown by Fig. 1 below:

Fig 1



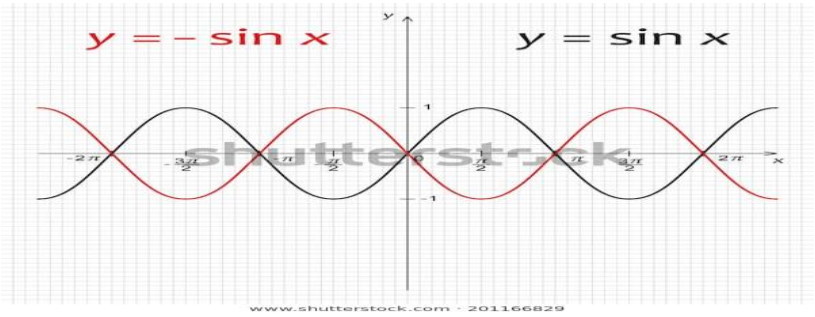
An electromagnetic wave source A generates the very focused first (red) one dimensional electromagnetic traveling wave , which passes through the half transparent mirror C, and is supposed to continue, after it passes the half transparent mirror C (as the dotted red line indicates).

A second electromagnetic wave source B generates the very focused second (blue) one dimensional electromagnetic traveling wave, which is deflected by the mirror C, such that it is supposed to continue on exactly the same line as the first wave (as the dotted blue line indicates).

It might be difficult, technologically, to arrange such an experiment, because the requirement is that the blue wave should arrive at the half transparent mirror C such that it will be deflected in exactly the right angle, in order to consolidate completely with the red wave. And, because the waves are supposed to be very focused and, actually, almost one dimensional, this might be a difficult task to achieve.

If the two waves consolidate when they oscillate at exactly the same frequency, have exactly the same intensities in their electric and magnetic fields and are exactly at a phase shift of 180 degrees relative to one another, the resultant electromagnetic wave is a Null wave which does not contain any electric or magnetic fields. Such a wave is described by Fig. 2 below:

Fig. 2



This figure shows, for example, the electric fields intensities of the two consolidated waves, and also the magnetic fields intensities of these two waves (but the y-axis replaced by z-axis, because the electric and magnetic fields are perpendicular to each other), after the consolidation. It is clear from this figure that the electric and magnetic fields of both waves will disappear after their consolidation, because each field cancels the respective field in the other wave, completely and continuously.

The requirement that the waves consolidate when they oscillate at exactly the same frequency, have exactly the same intensities in their electric and magnetic fields and are exactly at a phase shift of 180 degrees relative to one another might provide extra

complications in carrying on this implementation. But, in principle, this is only a technology issue.

Analysis of new insights if such a Null wave can be detected

In order to answer the question if such a Null wave can be detected, means must be devised, which will be inserted in the line of propagation of the wave, and these means should be designed such that they are expected to be affected by this Null wave.

One such means might be electric charges. Since electric charges are affected by electric and magnetic fields, inserting charges in the line of propagation of the wave might provide the answer if the Null wave really does not contain any electric and magnetic fields. If the inserted charges will not be affected, it will be an indication that these fields in the Null wave really do not exist. It will also provide the understanding that the Null wave cannot be detected by such charges.

Then, if inserted charges cannot be used to detect the Null wave, another type of detector should be devised (of any sort), and inserted in the propagation line of the Null wave, and the output of this detector should be examined, to see if this detector does detect anything.

If such a detector will be devised, and it will detect the Null wave, the following new and important conclusion must be drawn:

The energy in electromagnetic traveling waves is not necessarily embedded in the electric and magnetic fields it carries. This is a surprising new insight, since it is common knowledge that the energy in electromagnetic waves **is** embedded in the electric and magnetic fields it carries. But this Null wave does not contain any such waves, and the above mentioned detector still detected it, so it cannot be that the wave energy is embedded in such fields. This should raise other questions: In what, then, the energy of an electromagnetic wave is embedded? Maybe, in the photons existing in such a wave? And, do these photons remain intact when the electric and magnetic fields of the wave do not

exist? All these are important new insights, and important new questions raised, if it will turn out that such a Null wave can still be detected.

Analysis of new insights if such a Null wave cannot be detected

If no detector can be devised such that it will detect the Null wave, when it is inserted in the line of propagation of the wave, then, two possible conclusions might be drawn:

The first possible conclusion might be that the Null wave is really null and does not contain any energy, and because of this it cannot be detected. But, this **violates the Energy Conservation principle**. Since, this Null wave was created from two separate waves that contained energy. Thus, if this will be really the conclusion drawn from the fact that the Null wave cannot be detected, it will surely be a **very surprising, new and important conclusion**. It will also provide the following conclusion: **energies embedded in electric and magnetic fields can violate the Energy Conservation principle, in certain circumstances**.

The article elaborates more on this possible conclusion in a following section.

The second possible conclusion, from the finding that it was not possible to devise any detector that does detect the Null wave, might be as follows:

The energies in the Null wave are not really annihilated, they still **exist** together, but disable each other, such that it only appears that the Null wave does not have any energy, but because its embedded energies disable each other, it cannot be detected.

An analogy to the above might be the description of what happens to the energy in a rope in a rope pulling game. When two people pull a rope, each in a direction opposite to the other, if their pulling force is exactly equal, the rope does not move. However, this does not mean that the pulling energies that are exerted on the rope really annihilate each other or disappear. These energies are accumulated or amassed in the rope tension.

The same should occur when two electric fields forces (or magnetic fields forces) of exactly the same intensity and opposite polarity annihilate each other. The energies of these electric (or magnetic) fields are not annihilated or disappear, they are accumulated or amassed in the location in space where they reside, but they cannot express themselves. They only disable each other.

Important new insights relating to this possibility will be further discussed in a following section of this article.

Thus, it was shown that any answer to the question if such a Null wave can be detected, will provide surprising **new and important insights**. Thus, this article states that generating such a Null wave, and answering the question if such a Null wave can be detected, might be an important mission.

The Energy Pairs Theory

If the above described experiment to try and detect the above described Null wave could not end in detecting this Null wave, then, the following additional conclusion should also be derived:

Electric fields energies or magnetic fields energies, which are dependent on the existence of a force field (electric or magnetic) in order to exist, can annihilate each other, in certain situations, an annihilation that **seems** to violate the Energy Conservation Principle. And thus, the article assigns such energies to pairs of Energy Pairs.

In light of the above described scenario, this article assigns the energy embedded in electric fields generated by positive charges, and energy embedded in electric fields generated by negative charges to one set of energy pairs. And, this article also assigns the energy embedded in magnetic fields generated by moving positive charges, and energy embedded in magnetic fields generated by moving negative charges to another set of energy pairs.

However, as already mentioned in a previous section of this article, this mutual annihilation of the fields might not be necessarily a violation of the Energy Conservation Principle.

The mutual annihilation of energies belonging to these waves can be viewed not as mutual annihilation but as mutual disabling, assuming that the energies **exist** as Energy Pairs and their mutual disabling is only seen as annihilation.

More on the implications that the energies exist but disable each other, will be further elaborated in a following section of this article.

Energy Pairs might explain Charge disappearance in electron positron collisions

The Energy Pairs theory presented in the previous section of this article can also provide an explanation to the issue why in electron positron collisions only the masses are converted to radiation energy but the charges completely disappear.

This might also provide some support to another assumption which states that electric charge might be also a form of energy as the mass is recognized as a form of energy.

When an electron and a positron collide they annihilate each other and gamma ray photons are emitted, with energy equal to the sum of the energies embedded in the masses of the electron and the positron. However, the charges of the electron and the positron are not converted to any new substance (such as energy) and they simply disappear without leaving any trace of their previous existence. This charge disappearance seem to be an unusual, strange and unexpected mystery, although this charge disappearance obey the charge conservation principle. This charge disappearance is strange, because charge seem to be a basic element in physics, and such basic elements should not disappear.

The Energy Pairs mentioned above provides a reasonable and logic explanation also to this charge disappearance mystery. This is done by assuming that charge is energy and energy embedded in positive charge and energy embedded in negative charge belong to one set of Energy Pairs that might annihilate each other.

Actually, this charge disappearance can also be described **the other way around**, as providing **extra support** to the **assumption that charge is energy**. Because, as electric and magnetic fields energies are shown to annihilate each other and disappear, in certain situations, as the two waves scenario described before indicates, positive and negative charge might also annihilate each other in certain situations, such as, in electron positron collisions, which strengthen the claim that electric charges are also a form of energy.

Consolidating Waves and a possible connection to the issue of the Dark Energy

If the energies do exist but disable each other, which is a possibility that was already described in the previous section, an extrapolation of this assumption can state, that Energy Pairs, or the annihilated waves, can evolve together again, from, what is viewed as nothing, or complete emptiness.

Then, by combining the following: the findings about energy loss of electromagnetic waves which consolidate and become unified and continue to travel together in the same direction, and the assumption that such lost energies can evolve together again from complete emptiness, it can be concluded that electromagnetic waves which consolidate and become unified, and continue to travel together in the same direction, can be seen as a possible source of the Dark Energy which might be also seen as the complete emptiness.

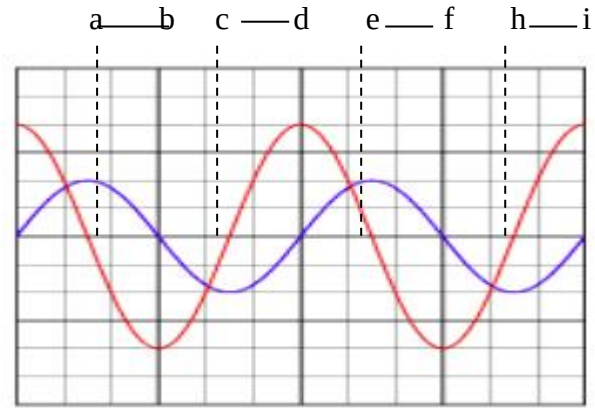
Because, the assumption that the complete emptiness actually contains energy pairs that disable each other, makes it containing energies that are untraceable, as the Dark Energy is. And, the assumption that energy pairs can emerge together from nothing (or complete emptiness) might explain how this Dark Energy is able to enter into activity, in certain conditions.

However, in a scenario were two waves **consolidate and become unified, and continue to travel together in the same direction**, even if they have **any phase shift relative to one another**, or have **different frequency of oscillation**, some of the energy they initially contained will usually **seem** to disappear.

Because, if Fig. 3, for example, represents the oscillation of the electric fields of the two waves at an instant of time, say t=0, because these oscillations have a phase shift relative to one another, there are portions, such as a-b, c-d, e-f and h-i, in each oscillating cycle, where one wave have opposite polarity relative to the other wave.

And, in these portions of the oscillating cycle, portions of one wave will annihilate these portions in the other wave, which will result in reducing the electric field intensity in these portions in the oscillation cycle. This results in an energy loss. And this energy loss will occur continuously, because Fig. 3 represents the waves along **their entire** journey, following their consolidation, because they travel at the same speed along the one dimensional x-axis.

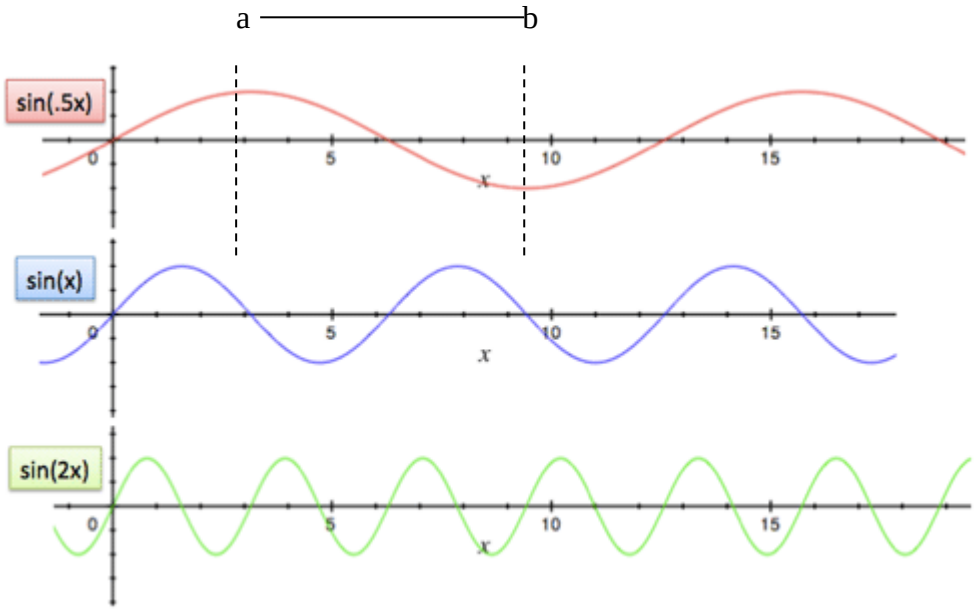
Fig. 3



A similar argument applies to the case of waves which oscillate with different frequencies.

Fig. 4 below shows 3 such waves:

Fig. 4



If the first two waves in Fig. 4 (sin(.5x) and sin(x)), for example, represent the oscillation of the electric fields of the two waves at an instant of time, say t=0, because these oscillations oscillate at different frequencies, there are portions, such as a-b, in each oscillating cycle of the wave sin(.5x), where one wave have opposite polarity relative to the other wave, which results in an energy loss. And this energy loss will occur continuously, because Fig. 4 represents the waves along **their entire** journey, following their consolidation, because they travel at the same speed along the one dimensional x-axis.

So, for waves that **consolidate and become unified, and continue to travel together in the same direction** the Energy Conservation Principle seems to be violated **almost always, and almost in any constellation**.

If the above scenario occurs in outer space, such that the two waves consolidate and become unified, and continue to travel together in the same direction, for a very long journey together, and possibly even a very long time (although they travel at the speed of light), throughout this all long journey, and this all long time, the waves, and their

energy cannot be traced. And, even if we assume that after this long journey the waves, for some reason, become separated again, and they, and their energies become traceable, it will seem as waves and energy are generated out of complete emptiness.

It was also shown before that in the case of electromagnetic waves that consolidate and become unified, and continue to travel together in the same direction, the Energy Conservation Principle seems to be violated **almost always, and almost in any constellation**.

Thus, since a huge portion of the energy in the universe is composed of electromagnetic waves, and these waves might be bended and deflected, the probability that such scenarios occur in the whole universe is big, increasing significantly the possibility that this might **provide an explanation to the issue of Dark Energy**, which is a mystery that the science of physics seeks an explanation to it. Actually, the above described scenario can be also seen as equating the Complete Emptiness with this Dark Energy state.

Summary, Results and Conclusions

This article presents a scenario, of a collision, followed by a consolidation, between two one dimensional electromagnetic waves, which continue to travel together in the same direction, after that consolidation.

The article shows that in the above described scenario a Null electromagnetic wave can be created which contains no electric or magnetic fields.

The article shows how to carry on what is necessary in order to implement such a Null wave and how to conduct an experiment to answer the question if such a Null wave can be detected.

The article analyze all the possible answers to the above question, and shows that every answer to that question provides surprising new and important insights to issues such as:

Energy in general, especially energy embedded in electromagnetic waves and energy embedded in electric and magnetic fields, and even to issues such as new surprising insight into possible new features of electric charges, charge disappearance in electron positron collisions and even some possible leads related to the Dark Energy issue and the possibility of equating the Complete Emptiness with this Dark Energy state.

References

1. Does Destructive Interference
Destroy
Energy?
Kirk T. McDonald
Joseph Henry Laboratories,
Princeton University

This article was wtitten by: Moshe Segal.

Moshe Segal's address is: Ravutzky st. #78 Ra'anana ISRAEL 4322141

Email addresses:

moshe_segal@yahoo.com

moshe_segal@yahoo.com

leasegalster@gmail.com

mirch0@walla.com