# Energy Pairs and Energy Conservation Issues

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## Abstract

The Energy Pairs Theory is related to the assumption presented in previous articles, that charge might also be considered as a form of energy, as mass turned to be. This assumption was based on important similarities between mass and charge, and on analyzing the energy density equations of electric and magnetic fields

And, since charge comes in two forms, a positive charge and a negative charge, the energies embedded in charges, if this concept is found viable, and supported by additional findings, also must have two forms which the article grouped as as one set of Energy Pair.

This Energy Pairs Theory was used to supply an expanation to the issue of charge disappearance in electron positron collisions.

In this article the Energy Pairs Theory is used to explain Energy Conservation Issues related to Electric and Magnetic Fields.

# Introduction

In two previous articles, named "Electric Charges as Energy Pairs" that can be found at http://viXra.org/abs/1909.0098 and "Charge – Another Form of Energy" that can be found at http://viXra.org/abs/1807.0422 the assumption that charge might be also considered as a form of Energy, as mass turned to be, was presented. This assumption was based on important similarities presented between charge and mass and on analyzing the energy density equations of electric and magnetic fields

And, since charge comes in two forms, a positive charge and a negative charge, the Energies embedded in charges, if this concept is found viable, and supported by additional findings, also must have two forms which the article grouped as as one set of Energy Pair.

This Energy Pairs Theory was used to supply an expanation to the issue of charge disappearance in electron positron collisions, by assuming that energies belonging to an Energy Pair set might annihilate each other, at certain conditions.

In this article the Energy Pairs Theory is used to explain Energy Conservation Issues related to Electric and Magnetic Fields.

Also, since energies belonging to Energy Pairs might annihilate each other, another assumption is presented, that Energy Pairs might also emerge from nothing.

This agrees with Quantum Mechanics physics prediction that there is no such thing as complete emptiness (or abosolute nothing), and it always contains random quantum fluctuations in which negative energy annihilates same amounts of positive energy.

# Energy Pairs might resolve Energy Conservation Issues

The assumption that charge is another form of energy can be used to provide an explanation to a magnetic field potential energy conservation paradox.

This magnetic field potential energy conservation paradox is described as follows:

When a body is charged with electric charges of a certain polarity (such as positive electric charges) and a certain amount of charge, and the body is moved at a spcific constant speed in a certain direction, it creates a magnetic field $B^{->}$ around it whose embedded energy per unit volume u is provided by the following formula:

$u = |B^{->}|^2/(2\,\mu_0)$ (Ref. 2)

Where $\mu_0$ is the vacuum magnetic permeability and is equal to:
$4\pi 10^{-7}$ H/m (Henry per meter).

While the magnetic field $B^{->}$ is described by:

$B^{->} = (\mu_0/(4\pi))(q( v^{->} X\ r^{->} )/r^2)$ (Ref. 1)

When a second body is charged with electric charges of the opposite polarity (negative electric charges) but with the same amount of charge, and that body is also moved at the same constant speed in the same direction, it creates a magnetic field in the same space volume, whose magnitude is still expressed by the same formula that describes the magnetic field $B^{->}$ created by the first body when it was moved, but its direction (or polarity) is inverse to the polarity of the magnetic field $B^{->}$ that the first body created when it was moved. But, the embedded energy per unit volume of the magnetic field created by that second body is still expressed by the formula presented before for energy per unit volume in a magnetic field. (Ref. 2)

When both bodies are tied to an apparatus that keeps them very close to each other, (but inhibits them from being attracted completely to each other), and both bodies are moved together, at the same speed, in the same direction, no magnetic field is created around them (or a negligible magnetic field, because the bodies are not exactly at the same point in space).

The reason why in that third case scenario basically no magnetic field was created is well understood.

Margnetic fields obey the superposition rule. Since the first body creates a magnetic field which has the same intensity, but inverse polarity compared to the magnetic field the second body creates, and both magnetic fields occupy the same volume in space, they cancel each other, and basically no magnetic field is created in that volume in space.

However, there is still a paradox, concerning the conservation of the energy embedded in these two magnetic fields.

The first body does not "know" that a second, inverse magnetic field is created, and it still creates is own magnetic field. This magnetic field embeds an energy per unit volume described by the formula above (Ref. 2). The same is true for the second body. So, the fact that each field cancels the other, contradicts the energy conservation principle, since the energies of both fields also disappear.

A logical explanation to that paradox might be the assumption, that certain energies, such as magnetic fields embedded energies, come in an Energy Pairs form.

And, energies belonging to energy pairs might annihilate each other in certain conditions.

Actually, since the energy density in a magnetic field depends on the magnitude of the magnetic field $B^{->}$ in space at each point, and $B^{->}$ is a vector which can be cancelled by a another vector of similar size but opposite direction, it is obvious that the energy density of a magnetic field is not a complete scalar.

Thus, in case of magnetic fields energy, the condition of annihilation is clear, and it happens when another magnetic field exists at the same space volume, with equal magnitude and opposite direction.

From the above, it is obvious that the Energy Pair for magnetic fields contains the following two energy types: one type is the energy embedded in magnetic fields created by positive charges, the other type is the energy embedded in magnetic fields created by negative charges.

The Energy Pairs assumption is actually derived from the assumption that charge is another form of energy, because such energy must have two values, one for the energy attributed to positive charges, and one for the energy attributed to negative charges.

This naturally results in the energy attribution (or type) assigned to the energy embedded in a magnetic field created by a positive charge, being different from the energy attribution (or type) assigned to the energy embedded in a magnetic field created by a negative charge. And, thus, these two types of magnetic energies belong to one set of Energy Pairs.

Thus, the assumption that charge is another form of energy, also provide the support for assuming that certain energies exist as Energy Pairs.

This brings about another conclusion which implies that energy conservation exists only when the total amount of energy in a specific volume in space contains only one member of energies which belong to this Energy Pairs.

Similarly to the explanation of the magnetic field energy conservation paradox, the Energy Pairs Theory provides a similar explanation to a similar electric field energy conservation paradox.

This electric field energy conservation paradox is very similar to the magnetic field energy conservation paradox. Thus, it will be described here more briefly, since its description is very similar to the description of the magnetic field energy conservation paradox.

When a body is charged with electric positive charges it creates an electric field around it whose embedded energy per unit volume u is provided by the following formula: (Ref. 3)

$u_e = \varepsilon_0 \left|E^{->}\right|^2/(2)$. Where $E^{->}$ is the electric field magnitude in the unit volume, and $\varepsilon_0$ is the vacuum permittivity and is equal to: $8.854187817\ldots x\ 10^{-12}$ F/m (Farad per meter)

When a second body is charged with same amount of negative charges, it creates an electric field whose polarity is inverse to the polarity of the electric field that the first body created.

But, the embedded energy per unit volume of the electric field created by that second body is still expressed by the formula presented before for energy per unit volume in an electric field. (Ref. 3)

When both bodies are tied to an apparatus that keeps them very close to each other, (but inhibits them from being attracted completely to each other), no electric field is created around them (or a negligible electric field, because the bodies are not exactly at the same point in space).

As before, the paradox is, again, the fact that the energies also disappear, although, each charge is not "aware" of the other charge, and, thus, is supposed to create still its own electric field with its own embedded energy.

# Equating Emptiness to Substance

Since Energy Pairs of equal intensities residing in the same space volume annihilates to nothing, then, the Energy Pairs concept can be extrapolated to predict that Energy Pairs can be also generated out of nothing. This concept attributes to the nothing (or complete emptiness) concept the same validity as the validity attibuted to the existance (or substance) concept, and since this concept assumes that something can evolve from nothing, it disgards the need for the concept of creation.

The prediction that Energy Pairs can be generated out of nothing provides also a connection between the Quantum Mechanics physics and rest of physics, because also Quantum Mechanics physics predicts that there is no such thing as complete emptiness (or abosolute nothing), and it always contains random quantum fluctuations in which negative energy annihilates same amounts of positive energy.

## **Summary, Results and Conclusions**

If the assumption of charge being a form of energy, as presented in previous articles, and based on similarities between mass and charge, will be found viable and supported by adiitional findings, then, the Energy Pairs Theory can provide explanations to energy conservation issues in electric and magnetic fields, in addition to supplying explanation to the issue of charge disappearance in electron positron collisions.

Also, since energies belonging to Energy Pairs might annihilate each other, another assumption is presented, that Energy Pairs might also emerge from nothing.

This agrees with Quantum Mechanics physics prediction that there is no such thing as complete emptiness (or abosolute nothing), and it always contains random quantum fluctuations in which negative energy annihilates same amounts of positive energy.

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