

Theoretical model of vacuum derived from Maxwell's equations leading to electro-gravitation

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Abstract

A theoretical model of ether filling vacuum and space is proposed, derived from a study of Maxwell's equations. This model finds back the energy formula of the photon, proposes a physical meaning for the potential-vector A and for the Lorenz gauge of electromagnetism. This paper also shows the Lorenz gauge is the access door to electro-gravitation.

Keywords

electromagnetism, Maxwell's equations, potential vector, Lorenz gauge, ether, electro-gravitation

Introduction

Origin of electromagnetism and transmission of electromagnetism waves has no explanation with official science.

Cosmology and Quantum Mechanics admit vacuum is filled with energy. This energy density was called ether in the XIXth century.

Can a simple model of ether explain electromagnetism and open the door towards electro-gravitation ?

Background

Maxwell's equations in the vacuum are known today by a set of 4 equations linking the electric E field and magnetic B field as follows :

$$\operatorname{div} \vec{E} = \frac{\rho}{\epsilon_0} \quad (1)$$

$$\operatorname{div} \vec{B} = 0 \quad (2)$$

$$\operatorname{rot} \vec{E} = -\frac{\partial \vec{B}}{\partial t} \quad (3)$$

$$\operatorname{rot} \vec{B} = \mu_0 \vec{j} + \epsilon_0 \mu_0 \frac{\partial \vec{E}}{\partial t} \quad (4)$$

These equations are completed by a set of 2 equations where E and B are derived from a potential V and a potential vector A, verifying :

$$\vec{B} = \operatorname{rot} \vec{A} \quad (5)$$

$$\vec{E} = -\overrightarrow{\operatorname{grad}} V - \frac{\partial \vec{A}}{\partial t} \quad (6)$$

Official science considers today that the potentials A and V have no physical meaning so then can be chosen by a gauge transformation in order to verify

$$\operatorname{div} \vec{A} + \epsilon_0 \mu_0 \frac{\partial V}{\partial t} = 0 \quad (7)$$

thanks to a well chosen function f allowing :

$$V' = V - \frac{\partial f}{\partial t} \quad (8)$$

$$\vec{A}' = \vec{A} + \overrightarrow{\operatorname{grad}} f \quad (9)$$

Relation (7) is called the Lorenz gauge condition [2].

But what if official science position was wrong and A and V had instead a real physical meaning ?

Yet, V is the potential of the field due to the presence of charges, so V has already a physical meaning. What about field A ?

According to physicists Yves Pierseaux and Germain Rousseaux [3], James C. Maxwell considered the potential-vector A as an Electrotonic momentum, making the parallel between a force being the temporal derivative of the momentum and the electric field E issued from the temporal derivative of the potential-vector A in relation (6).

In the 1890's, Nikola Tesla gave several lectures [6] about his experiments with currents of high potential, high frequency where he claimed that ether exists and is both elastic and rigid.

The author demonstrated in [8] that the energy density of the ether is a valid explanation to the origin of gravity and will now provide a potential explanation to electro-gravitics.

The Ether model

Here, we propose a model of the ether, assuming it is comparable to a gas made of elementary particules. What can an ether cell look like ? Let's call it an etheron.

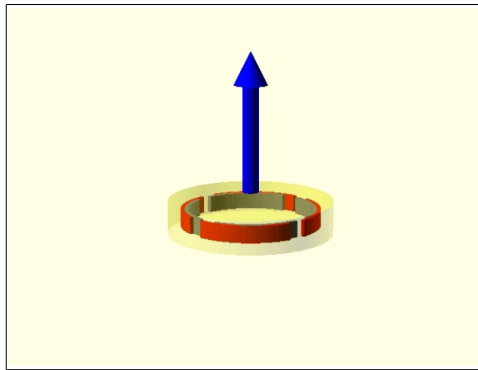
Paul Dirac suggested in 1930 that vacuum is a sea of electrons and positrons [5].

In astrophysics, reconnection of magnetic lines is known to generate pairs of electrons/positrons [7].

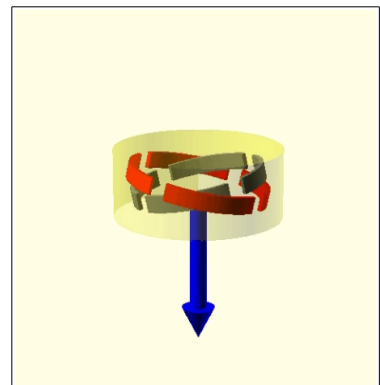
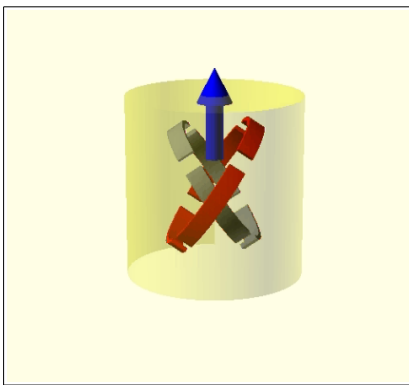
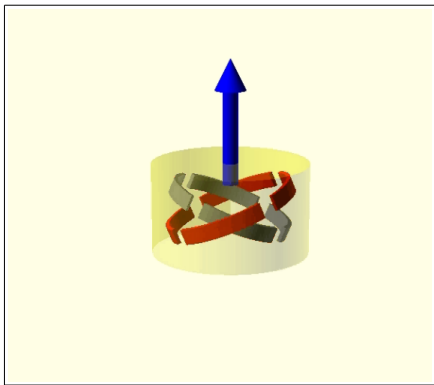
So, our model of etheron will be made of charged energy equivalent to a pair <electron, positron> ie. one positive cloud and one negative cloud not yet condensed into matter, in order to avoid anihilation of matter with anti-matter.

One consequence of (4) is that rotating charges creates a micro-field B, so we will consider that the two clouds of charges in the etheron are rotating, thus creating two spires of current, one with positive charges and the second one with negative charges.

In order to generate a field B, we start with two clouds of charges in contra-rotation in a plane perpendicular to B. In the following figure, B field is represented with a blue arrow, positively charged cloud is in red, and negatively charged cloud is in grey. Let's name z the axis of rotation.



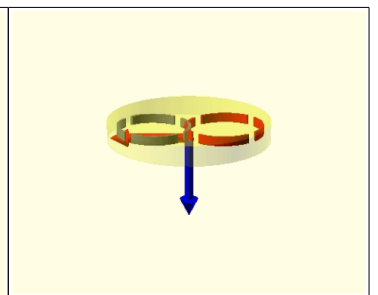
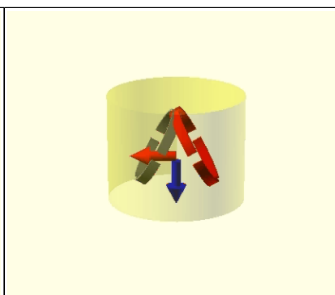
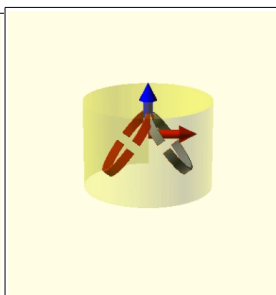
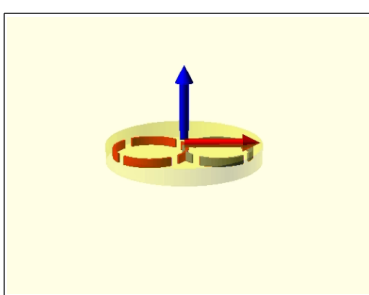
In an electromagnetic wave, E and B fields are synchronised and vary sinusoidally. A simple way to have B field varying sinusoidally is to have these two clouds of charges rotating along an axis perpendicular to B field. Let's name x this second axis of rotation.



In the vacuum far away from any external charge, we can consider that V potential is 0 and inside an electromagnetic wave, (5) is unchanged and (6) becomes :

$$\vec{E} = -\frac{\partial \vec{A}}{\partial t} \quad (10)$$

The two clouds of charges create an electric dipole if the centers of the two clouds are different, so we will assume that the centers of charges are vibrating along the third axis y while they are contra-rotating at the same frequency.



Thus, this simple model provides fields E and B vibrating at the same frequency, according to well-known physics rules cited above.

Kinetic energy of an etheron

The rotational kinetic energy of an etheron can now be determined.

For each charged cloud, the rotational kinetic energy verifies :

$$E_r = \frac{1}{2} \vec{L}_G \cdot \vec{\omega} \quad (11)$$

where \vec{L}_G is the angular momentum of one charged cloud, measured from the inertia matrix I_Δ :

$$\vec{L}_G = I_\Delta \vec{\omega} \quad (12)$$

As seen before, the model assumes the charges are rotating along axis x and z at the same pulsation ω :

$$\vec{L}_G = \begin{pmatrix} I_x & 0 & 0 \\ 0 & I_y & 0 \\ 0 & 0 & I_z \end{pmatrix} \begin{pmatrix} \omega \\ 0 \\ \omega \end{pmatrix} \quad (13)$$

$$\vec{L}_G = \begin{pmatrix} I_x \omega \\ 0 \\ I_z \omega \end{pmatrix} \quad (14)$$

$$E_r = \frac{1}{2} \begin{pmatrix} I_x \omega \\ 0 \\ I_z \omega \end{pmatrix} \cdot \begin{pmatrix} \omega \\ 0 \\ \omega \end{pmatrix} \quad (15)$$

$$E_r = \frac{1}{2} (I_x + I_z) \cdot \omega^2 \quad (16)$$

Let's note L the angular momentum of a charged cloud :

$$L = (I_x + I_z) \cdot \omega \quad (17)$$

In Quantum Mechanics, the quantification principle found by Niels Bohr for an electron states :

$$L = n \cdot \frac{h}{(2 \cdot \pi)} \quad (18)$$

where h is the Planck constant and n an integer starting at n=1. Let's apply this principle with n=1 for each charged cloud :

$$E_r = \frac{1}{2} \left(\frac{h}{(2 \cdot \pi)} \right) \cdot \omega = \frac{1}{2} \left(\frac{h}{(2 \cdot \pi)} \right) \cdot 2 \pi \nu \quad (19)$$

$$E_r = \frac{1}{2} h \nu \quad (20)$$

Since one etheron contains two charged clouds, one cloud with positive charges, the second one with negative charges, the total rotational kinetic energy of the etheron verifies :

$$E_{tot} = h \nu \quad (21)$$

With this simple model of ether, we find that the rotational kinetic energy of an ether cell pulsating at frequency ν is the same than the energy of a photon.

Physical meaning of the potential-vector A

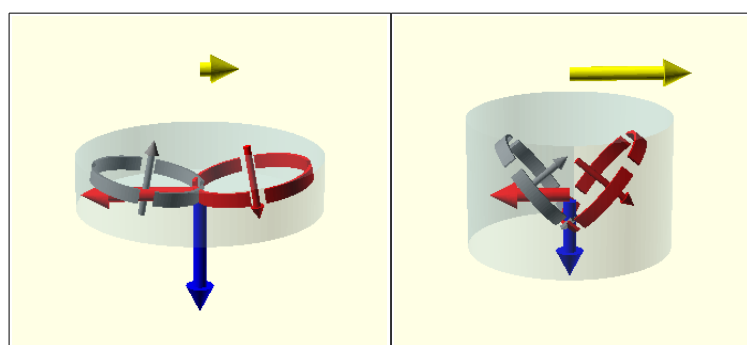
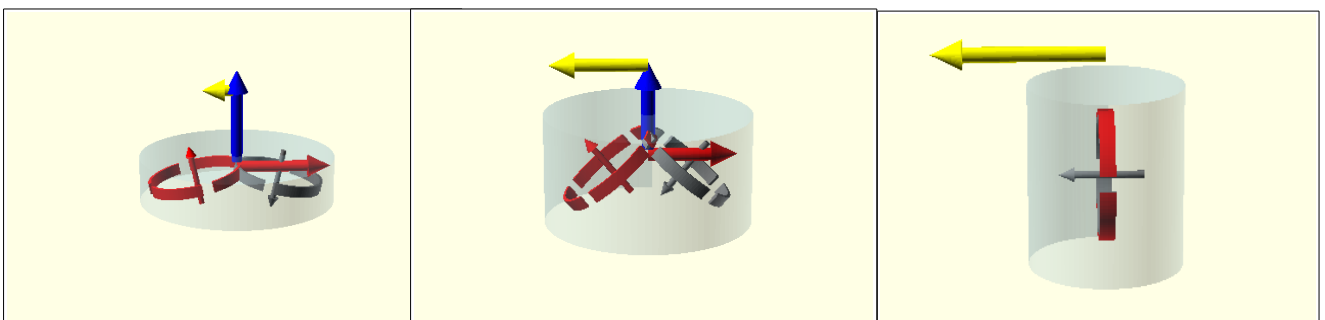
The solution of Maxwell's equations for an electromagnetic wave propagating itself along axis x is in the form :

$$\vec{A} = \begin{pmatrix} 0 \\ -A_0 \cdot \sin\left(\omega\left(t - \frac{x}{c}\right)\right) \\ 0 \end{pmatrix} \quad (22)$$

$$\vec{B} = \begin{pmatrix} 0 \\ 0 \\ \frac{A_0 \cdot \omega}{c} \cdot \cos\left(\omega\left(t - \frac{x}{c}\right)\right) \end{pmatrix} \quad (23)$$

$$\vec{E} = \begin{pmatrix} 0 \\ A_0 \cdot \omega \cdot \cos\left(\omega\left(t - \frac{x}{c}\right)\right) \\ 0 \end{pmatrix} \quad (24)$$

A physical meaning of field A can be found thanks to a 3D display of vector A, compared with the angular momentum of the clouds of charges.



The 3D display shows the potential vector A is proportional to the total angular momentum of the two clouds of charges.

In fact, the double rotation of the clouds of charge generates an angular momentum which is directed only along axis y , since the components of the angular momentum along axis x cancels at any time due to the contra-rotation of the two clouds along axis x .

Total angular momentum \vec{L} for the ether cell verifies :

$$\vec{L} = \begin{pmatrix} 0 \\ -2 \cdot I_z \cdot \omega \cdot \sin\left(\omega\left(t - \frac{x}{c}\right)\right) \\ 0 \end{pmatrix} \quad (25)$$

From (22) and (25) :

$$\vec{L} = \frac{2 \cdot I_z \cdot \omega}{A_0} \vec{A} \quad (26)$$

Relation (26) makes echo with the electrotonic state of the vacuum suggested by Faraday and the electrotonic momentum suggested by Maxwell [3] and shows the potential-vector A has a real physical meaning.

Meaning of the Lorenz gauge condition

This physical meaning of A now leads to understand the physical meaning of the Lorenz gauge (7).

An externally applied potential V stretches the electric dipole made by the two clouds of charges in our model of etheron.

As Nikola Tesla claimed [6], the ether can be elastic but also rigid. Relation (7) can be seen as an Euler equation [9] to remain in the elasticity domain of the ether as long as $\frac{\partial V}{\partial t}$ remains below a given threshold. New physical phenomena appears when high potentials, high frequencies are applied, ie $\frac{\partial V}{\partial t}$ is above this given threshold.

This is this domain that Nikola Tesla explored in the 1890's according to [6]. As he claimed, he was able to feel a pulsating force that seemed to be continuous when the frequency increased.

It can be deduced that relation (7) can be seen as a condition to keep the ether flow without shock waves and with constant pressure.

According to ref [8], ether can be assimilated to a perfect gas, and a variation of ether pressure generates gravitation which is a hydro-dynamic force.

When an electromagnetic device is able to generate high potentials with high frequencies where the Lorenz condition is no more verified, ether pressure is modified. If the pulsations are symmetrical, it is easy to understand that relation (7) will be successively positive and negative, but no average net force will be felt. This is the reason why Nikola Tesla was focussing on the generation of asymmetrical impulses of current with his Tesla coils [6].

For instance, with asymmetrical impulses, Lorenz gauge condition can be verified during a rising phase, while it is no more verified during the falling phase. According to [8], a gravitational force is thus generated at each cycle.

Such an electromagnetic device can be used to generate anti-gravity propulsion at the condition the pulsations are not symmetrical.

Conclusion

The model of ether proposed in this paper is compatible with Dirac's views and allows to understand the photon as the rotational kinetic energy of the ether-cell.

The potential-vector A of electromagnetism appears to have a physical meaning directly linked to the angular momentum of the ether-cell as already proposed by Maxwell.

The Lorenz gauge appears to be the condition to remain in the elasticity domain of the ether.

An electrogravitic force can be produced when the Lorenz gauge condition is no more verified at the condition that asymmetrical pulsations are generated.

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