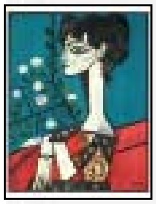


# A Physics Professor



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This document contains a conversation between a professor of physics and myself. The professor chose to remain anonymous and thus his name has been removed.

The topic of the conversation is the Paradox 2 Generator.

Each letter is placed at the beginning of a chapter. The subchapters are then used to respond to each of the points made in the letter. The Blue text at the beginning of each subchapter highlights the portion of the letter that is being discussed

This text provides applications of classical electromagnetic physics to the Paradox 2 Generator which show classical theory.

This text also addresses common questions that we receive.

# 1 The Initial Letter

Robert:

It's unclear to me how the experiment/apparatus contradicts traditional electromagnetic theory.

I would point out that the statement that "classical electromagnetic theory holds that magnetic field energy is distributed transverse to a differential current element (Biot-Savart)" is inaccurate, and demonstrates a misunderstanding of the concept of energy.

I suspect that the direction of the magnetic field is being referenced here, but that is not at all the same as the distribution of energy (which is proportional to the square of the magnetic field, and is not "transverse" to anything).

I also suspect that this experiment seemingly generates rotational energy out of nothing (according to traditional theory). If that is the case, you have an apparatus which exchanges angular momentum and energy carried in the magnetic field (a well-verified characteristic of traditional theory) for angular momentum and energy in the mechanism.

Can you be clearer on what is happening here that is inconsistent with existing theory?

Regards,

Dr. XXXXXXXXXX
Department of Physics
XXXXXX XXXXX University of XXX XXXX

## 1.1 Applications of Classical theory

It's unclear to me how the experiment/apparatus contradicts traditional electromagnetic theory.

DC energy (emf ) is developed in spite of the fact that the amount of flux contained in any loop remains constant (this is covered in detail in the paradox.pdf paper at http://www.distinti.com/paradox).

### 1.1.1 Faraday's Law

The first classical model that we could apply is Faraday's Law which teaches that emf is developed when there is a time rate of change of flux contained within a conductive loop ($emf = -n\frac{d\phi}{dt}$). In the Paradox 2 experiment, the areas move with the magnets. As such there can be no change in flux within the areas. Furthermore, because the magnets are in opposition (and substantially equal in strength), the net flux contained within the areas is substantially zero.

**NOTE: There is a time rate of change of flux in the closing path; however, this only results in AC transients. These AC transients are eliminated by the proper geometry of the closing path. Any remaining transients are removed by the 1Hz Low pass filter.**

### 1.1.2 Motional Electric Law

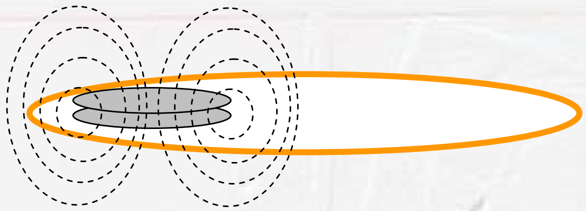
There is another model called the motional electric law $\mathbf{F} = Q\mathbf{v}\times\mathbf{B}$ (there are many forms of this model). The equivalent of this model for the emf in a differential length of wire (fragment) is found by dividing both sides by Q and performing dot product of both sides by the differential length of wire; as follows:

$$\mathbf{E} = \mathbf{v}\times\mathbf{B}$$

$$\int \mathbf{E}\bullet d\mathbf{L} = \int (\mathbf{v}\times\mathbf{B})\bullet d\mathbf{L}$$

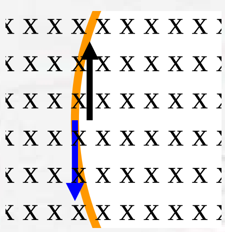
$$emf = \int (\mathbf{v}\times\mathbf{B})\bullet d\mathbf{L}$$

The next question is where could this model be applied? We can eliminate the parts that move with the disk (no relative motion) and the closing path (not possible to develop DC there as per note above). This leaves only the motion of the magnets relative to the outer ring. So let us look at that:

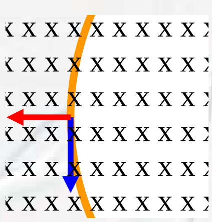


The above diagram shows the field from one magnet. You will notice that the field lines about the copper ring are substantially perpendicular to the plane of the ring. In fact the field is perpendicular to the ring at all points.

The next diagram is a top view of the ring showing the relative velocity (black arrow) of the ring to the magnetic field (The field of ‘x’ represents magnetic field lines going into page). The blue arrow is the direction of a differential length (fragment) of the ring.



If we perform the cross product of the relative velocity and the magnetic field we get a vector with a direction shown by the red arrow in the following diagram. The resultant vector is perpendicular to the relative motion.

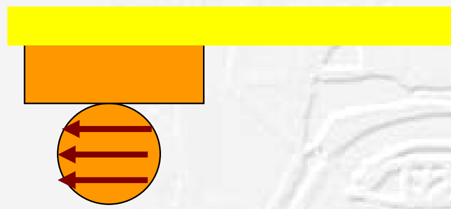


Thus, the dot product of the resultant vector (which is an E field by classical definition) and the direction of the loop (blue) yields zero.

It is not necessary to perform the integration since $0 = (\mathbf{v} \times \mathbf{B}) \bullet d\mathbf{L}$ at all points.

Again, we show no emf contribution from a classical model.

Some try to claim that it is the resultant vector that forces charge into or out of the brush when the brush passes by. We can show that this is not possible by viewing a cross section of the brush contacting the wire.



The circle is the cross section of the wire ring (14 AWG). The brush consists of a 14 AWG segment (orange rectangle) of wire soldered to the underside of the brass shafts (yellow) of the brush assemblies.

The red arrows show the resultant vector (which is an E field by classical definition) induced in the wire. These vectors may produce eddy currents in place; however, they are perpendicular to the direction that current needs to flow in order to produce a detectable emf at the output.

## 1.2 Biot-Savart is a Transverse Field

I would point out that the statement that "classical electromagnetic theory holds that magnetic field energy is distributed transverse to a differential current element (Biot-Savart)" is inaccurate, and demonstrates a misunderstanding of the concept of energy.

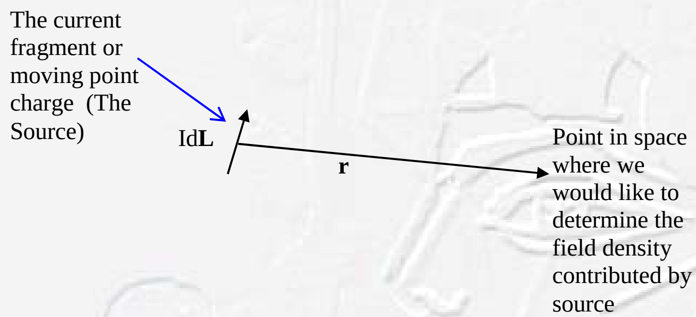
Here is the Biot-Savart Law as printed in my ancient college text

$$d\mathbf{H} = \frac{Id\mathbf{L} \times \mathbf{a}_R}{4\pi R^2}$$

From Engineering Electromagnetics, Fourth Edition by William H. Hayt, Jr. (Page 238).

Here is another form which is equivalent (which we use throughout the New Electromagnetism Papers)

$$d\mathbf{B} = \frac{K_M\, Id\mathbf{L} \times \hat{\mathbf{r}}}{|\mathbf{r}|^2}$$




Because of the cross product, the field contributed by the differential current element (or moving point charge) is maximum when dL and r are perpendicular (transverse) and zero when dL and r are parallel.

## 1.3 Field Energy Confusion

I suspect that the direction of the magnetic field is being referenced here, but that is not at all the same as the distribution of energy (which is proportiona to the square of the magnetic field, and is not "transverse" to anything).

You are correct, energy is scalar and does not have direction; however, I specifically stated that the energy is distributed transverse to a moving charge. Perhaps my use of the word “distributed” is confusing; a longer way to say the same thing is

According to classical field theory, the magnetic field energy created by a moving charge can be found substantially to the sides of a moving charge. There is substantially no energy created in front of (in direction of motion) or behind the moving charge.

I hope this is clearer.

## 1.4 Missing Description of Motor

I also suspect that this experiment seemingly generates rotational energy out of nothing (according to traditional theory).

??? Not sure what you mean. The generator is driven by a standard DC motor and dry cell. If this is not clear from the online documentation please let me know. – NOTE: added section to the online documents to specifically show the motor.

## 1.5 Conservation of Energy

If that is the case, you have an apparatus which exchanges angular momentum and energy carried in the magnetic field (a well-verified characteristic of traditional theory) for angular momentum and energy in the mechanism.

Be careful with conservation of energy techniques. They do not explain how or why things happen. With regard to electromagnetism, they only let you know what the theoretical maximum power output should be. You still need the "valid" fundamental force equations to do anything of value. For example, the expression "what goes up must come down" is a conservation of energy expression in every sense of the word. Try designing an artillery system when you only know that your projectiles must come down. Knowing where and when is more important than knowing that they must. Furthermore, the fundamental force equations predict that it is possible to put a projectile in orbit (and how to do it). Thus, although the energy is conserved, without the fundamental force equations, you can't be sure where the projectile will end up OR if the final form of the energy is kinetic or potential (or some combination thereof).

Also, there are historic examples where researchers attempted to use conservation of energy techniques to derive equations that were impossible to derive from the fundamental force equations. They came up with results that bear no resemblance to reality. See our paper "rules of nature" section 4.5 (http://www.distinti.com/docs/ron.pdf).

It is not that I don't believe in conservation of energy techniques; they are certainly useful tools; however, they are just tools. And like any tool they have limitations that must be understood if they are to be used properly. For example, knowing where magnetic field energy is only gives us the maximum possible output; without knowing the direction of the field we can not configure a pickup loop for optimal energy pickup (except by trial and error).

Thus we are left with a Paradox of Classical Theory. The Conservation of energy techniques tells us that there is rotational energy that could be coupled to the output; however, according to the classical fundamental force equations, there should not be an output.

--Another good reason to call this the Paradox Experiment.

## 1.6 End of message

Can you be clearer on what is happening here that is inconsistent with existing theory?

If I wasn't then let me know.

Also, see our paper "Anomalies and Paradoxes of Classical Electromagnetism" (http://www.distinti.com/docs/apoce.pdf) for a more complete lists.

There are presently 16 mismatches published. We have 3 more that will be added to the paper in the next few days.

Regards,
Robert J Distinti

And thank you, these are very excellent questions.

# 2 The Second Letter

Robert:

Please forgive me, but I am not comfortable with my name being posted with this, so I would request you do not do so.

Without going into detail (and I will admit there is a great deal about your setup that I am not familiar with), I think your responses demonstrate an incomplete understanding of the traditional theory of electromagnetism.

On one particular point, you state the Lorentz force law F = q v x B; you then divide by charge q, and presume that F/q must be the electric field - this is not true. In fact, the force on a charged particle due to its electric charge is F = q E + q v x B. The part due to B is distinct from the contribution of an electric field, and has profoundly different characteristics. For one thing, the integral of v x B dotted into dl is not a meaningful quantity, and does not exhibit the behavior of potential (as you assume it does).

To be fair, I am unfamiliar with your theory and many details of your apparatus. I wish you luck with your endeavors.

Regards,

XXXXXXXXXXXX

## 2.1 Lorentz Force

I think your responses demonstrate an incomplete understanding of the traditional theory of electromagnetism.

On one particular point, you state the Lorentz force law F = q v x B.

This is the Lorentz force law→ F = q E + q v x B

The equation F = q v x B has many names which include:

1) Hall force
2) Motional Electric Law (the term we use)
3) Motional Force Law

Each author is different.

## 2.2 Absolutely correct

On one particular point, you state the Lorentz force law F = q v x B; you then divide by charge q, and presume that F/q must be the electric field - this is not true. In fact, the force on a charged particle due to its electric charge is F = q E + q v x B. The part due to B is distinct from the contribution of an electric field, and has profoundly different characteristics.

The following picture (Figure 2-1) is a scan of page 351 of Engineering Electromagnetics $4^{th}$ Edition by William H. Hayt Jr. Equation 11 in the document clearly shows that this is defined as an electric field. It is even called "motional electric field intensity" in the description.

Now if you want to argue that it is not truly an electric field I agree with you and you are 100% correct with regard to New Electromagnetism; however, by saying that the action of a magnetic field can not create an electric field, you then invalidate Maxwell's Uniform Plane Wave Equations because the following equation is no longer valid.

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t}$$

This is explained in more detail in the next section.

Let us now consider this example using the concept of *motional emf*. The force on a charge $Q$ moving at a velocity $\mathbf{v}$ in a magnetic field $\mathbf{B}$ is

$$\boxed{\mathbf{F} = Q\mathbf{v} \times \mathbf{B}}$$

or

(10) $$\frac{\mathbf{F}}{Q} = \mathbf{v} \times \mathbf{B}$$

The sliding conducting bar is composed of positive and negative charges, and each experiences this force. The force per unit charge, as given by (10), is called the *motional* electric field intensity $\mathbf{E}_m$,

(11) $$\boxed{\mathbf{E}_m = \mathbf{v} \times \mathbf{B}}$$

If the moving conductor were lifted off the rails, this electric field intensity would force electrons to one end of the bar (the far end) until the *static field* due to these charges just balanced the field induced by the motion of the bar. The resultant tangential electric field intensity would then be zero along the length of the bar.

The motional emf produced by the moving conductor is then

(12) $$\text{emf} = \oint \mathbf{E}_m \cdot d\mathbf{L} = \oint (\mathbf{v} \times \mathbf{B}) \cdot d\mathbf{L}$$

AY'S LAW 351

Figure 2-1: Engineering Electromagnetics 4th ed – Hayt

## 2.3 Unbelievable

For one thing, the integral of v x B dotted into dl is
not a meaningful quantity, and does not exhibit the behavior of potential
(as you assume it does).

Again, refer to the scan from the book (Figure 2-1) Equation 12 is

1) $emf = \oint E_m \bullet dL = \oint (v \times B) \bullet dL = -n\frac{d\Phi}{dt}$ (I added Faraday's Law to the end).

So in fact the "integral of v x B dotted into dL" is a meaningful quantity and emf is not potential (I never called it potential). And please don't nit-pick that I did not specify a closed path integral, my application intended to show the emf contribution from any arbitrary section of the loop (which could be the entire loop).

It is important to point out that $\mathbf{E}_m$ is defined in classical electromagnetic field theory as a non-conservative electric field (which sounds to me like an oxymoron – In New Electromagnetism we simply call it a magnetic force per charge field $\mathbf{E}_M$ and avoid the confusion) otherwise, according to Kirchhoff's law $\oint E \bullet dL = \nabla \times \mathbf{E} = 0$ and we would have a paradox.

So it seems like we have fixed everything. Except that we must remember that one of Maxwell's equations is derived from the following excerpt from equation 1 above.

2) $\oint E_m \bullet dL = -\frac{d\Phi}{dt}$ (for n=1)

But then if we were to then continue the derivation, we arrive at the following slightly different version of that well known equation:

3) $\nabla \times \mathbf{E}_m = -\frac{\partial \mathbf{B}}{\partial t}$ (Notice the 'm' subscript which is missing from texts)

But then what about the other equation required for classical electromagnetic propagation

$\nabla \times \mathbf{H} = \frac{\partial \mathbf{D}}{\partial t}$ (for J =0)

Which can be rewritten as

4) $(\nabla \times \mathbf{B})\frac{\mu}{\varepsilon} = \frac{\partial \mathbf{E}}{\partial t}$

How does one couple the non-conservative electric field in 3 with the conservative electric field in 4 to arrive at the famous plane wave equation?

The New Electromagnetic Wave Equation is purely a magnetic field phenomenon (See NIA1); it also shows a wave phenomenon that attenuates with frequency and distance which is not possible with Maxwell's plane wave equation.

## 2.4 End of Message

To be fair, I am unfamiliar with your theory and many details of your apparatus.  I wish you luck with your endeavors.

Thank you.

# 3 Conclusion

It is very distressing that a Professor of Physics could say

"I think your responses demonstrate an incomplete understanding of the traditional theory of electromagnetism."

Or

"For one thing, the integral of v x B dotted into dl is
not a meaningful quantity, and does not exhibit the behavior of potential (as you assume it does)."

When what was explained is correct and in fact identical to derivations found in a respected textbook on classical electromagnetic theory.

Nuff said.