



A Physics Professor #4



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This document contains a letter written to someone else that was then passed on to me.

It is probably the most coherent attempt to explain the Paradox 2 Generator.

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.

Paradox 2 Experiment



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1 The Letter (to someone else)

I looked at the apparatus and immediately saw what they were driving at. It is a variation on the Faraday generator.

Take a cylindrical magnet. Make sliding connections at the axis and at the periphery. Connect the wires through a galvanometer, but make sure that all wires are in a plane that contains the axis of the magnet. Now rotate the magnet. Experimentally, you measure an emf.

Now explain it.

The loop comprising the external wires and the line joining the periphery to the axis is parallel to the magnetic field. The magnetic flux through the loop is zero, and the rate of change of same is zero. Hence the emf should be zero. ($d\phi / dt = 0$).

Look at it another way, considering the instantaneous "wire" connecting the axis to the periphery. It moves with an r -variable velocity ($v = r\omega$) through a magnetic field; therefore there IS an emf. Integrate, and you get the correct experimental answer.

"As concluded in preceding sections, classical magnetic flux theory provides no practical explanation ..."

There are also cases (REAL ones, involving REAL generators that produce the electrical power that runs our computers) that are impossible to explain by wires moving through magnetic fields, but are easy to explain by flux changes. (Here, the magnetic field is channeled through iron. The wires that we pretend are in a magnetic field are actually in a cavity where the magnetic field is utterly negligible.)

1.1 Faraday's Law

Take a cylindrical magnet. Make sliding connections at the axis and at the periphery. Connect the wires through a galvanometer, but make sure that all



wires are in a plane that contains the axis of the magnet. Now rotate the magnet. Experimentally, you measure and emf.

Now explain it.

The loop comprising the external wires and the line joining the periphery to the axis is parallel to the magnetic field. The magnetic flux through the loop is zero, and the rate of change of same is zero. Hence the emf should be zero. ($d\phi / dt = 0$).

Agree.

(For those readers who don't understand, he has correctly reasoned that Faraday's Law predicts no output of the Paradox 2)

1.2 Motional Electric Law

Look at it another way, considering the instantaneous "wire" connecting the axis to the periphery. It moves with an r-variable velocity ($v = r\omega$) through a magnetic field; therefore there IS an emf. Integrate, and you get the correct experimental answer.

Incorrect

The motional Electric Law $\mathbf{F} = Q\mathbf{v} \times \mathbf{B}$ does predict an emf; however, it is orthogonal to the wire. Here is the proof which has already been published in the paper pdx_prof1a.pdf.

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:

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

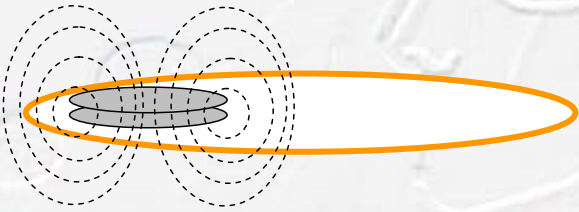
$$\int \mathbf{E} \cdot d\mathbf{L} = \int (\mathbf{v} \times \mathbf{B}) \cdot d\mathbf{L}$$

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



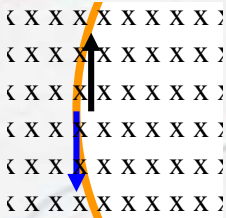
Note: The above derivation is well known, and is found in many competent text books; see pdx_prof1a.pdf for a scan from a well regarded text book that contains a derivation almost identical to this.

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 in pdx_prof1a.pdf). This leaves only the motion of the magnets relative to the outer ring. So let us look at that:

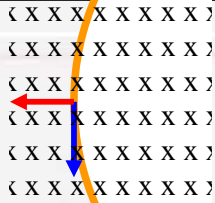


The above diagram shows the field from one magnet. You will notice that the field lines about the copper ring are substantially perpendicular to the plane of the ring. In fact the field is perpendicular to the ring at all points.

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.

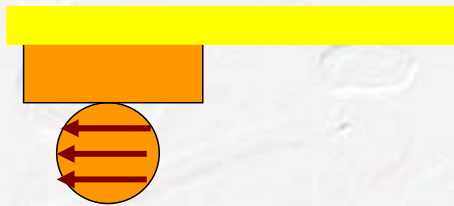


Thus, the dot product of the resultant vector (which is an E field by classical definition) and the direction of the loop (blue) yields zero.

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

1.3 Closing remarks

"As concluded in preceding sections, classical magnetic flux theory provides no practical explanation ..."

There are also cases (REAL ones, involving REAL generators that produce the electrical power that runs our computers) that are impossible to explain



by wires moving through magnetic fields, but are easy to explain by flux changes. (Here, the magnetic field is channeled through iron. The wires that we pretend are in a magnetic field are actually in a cavity where the magnetic field is utterly negligible.)

These are just closing remarks which highlight the difference between Faraday's Law and the Motional Electric Law. He should note that we have successfully demonstrated that Faraday's Law is a subset of the Motional Electric Law in the paper classic flux anomaly (classfluxan.pdf). They are not separate effects in spite of the flux models used to describe them.

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2 Conclusion

It would be nice if people actually brushed up on their classical theory or at least read the free papers that we publish.



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