

## Lorentz' EMF Experiment

Peng Kuan 彭寬 titang78@gmail.com

Thursday, June 07, 2012

I have explained the inconsistency of the theory of EMF generation by Lorentz force in the article [Lorentz' EMF paradox](#)

<http://pengkuanem.blogspot.fr/2012/05/lorentz-emf.html>

<https://docs.google.com/open?id=0B3YDEaOyRUwccTlqdS0wcllzTXc>

The last argument of this article is that the capacitor would not be charged by the bar moving in a magnetic field (see the Figure 3 of [Lorentz' EMF paradox](#)). This argument needs more explanation. Let us see how a capacitor is charged by an electrostatic field. In the Figure 1, a plate capacitor is charged by the charged rod nearby because free electrons are pushed by the electrostatic field and move into the top plate through the wire.

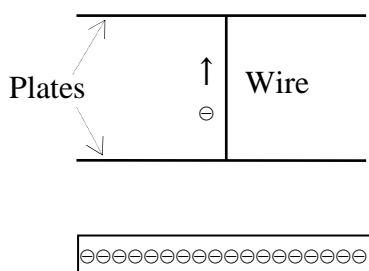


Figure 1

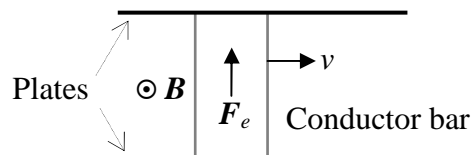


Figure 2

Without the wire, the 2 plates are at different potential because of the electrostatic field. Once connected through the wire, free electrons flow from the bottom plate into the top one and the capacitor reaches electrostatic equilibrium. Then, the connection is cut and the rod removed. The 2 plates have a difference of quantity of electron, which is the charge of the capacitor.

Let us see how the capacitor will behave without electrostatic field but the wire moves in a magnetic field  $\mathbf{B}$  and the plates are immobile (See the Figure 2). First, the plates are not connected. There is not electrostatic field and the 2 plates have the same potential. The conductor bar (the wire) moves in the magnetic field, the free electrons in it feel an upward Lorentz force  $\mathbf{F}_e$ . The bar reaches electrostatic equilibrium, then is connected to the 2 plates.

Before connection, the surface of the bar was equipotential. Then, it is connected to the plates that were at the same potential. The connection does not bring any force on the electrons in the bar, thus they will not flow. Then, the connection is cut. The plates have the same quantity of electron and the capacitor is not charged.

The Figure 3 describes the design of an experiment that shows the mechanism of charge by Lorentz force. A magnetic field is created perpendicularly to the bar and the direction of its movement. By moving the bar will finally quit the plates and leave the capacitor charged at the tension equal to the EMF, that is, 0 volt.

In comparison, let us calculate the EMF according to the theory of generation by Lorentz force. With  $v$  the velocity,  $B$  the magnetic field and  $l$  the length of the bar, the EMF is:

$$U = v B l$$

Let us pioneer a new physics.

Today's Pioneer, Tomorrow's Master. Join the master team of future

By spreading and discussing the paradoxes and the new law and carrying the experiments out.

With a strong magnet, one can obtain a magnetic field of 1 Tesla. For a bar with length of 0.1 m and velocity 10 m/s, the EMF is:

$$U=1 \text{ volt}$$

The experimental setup is made of 2 plates to which is connected a movable bar through electric brushes. A magnetic field is created around the bar (see the Figure 3). The 2 plates constitute a capacitor that will be charged by the bar. Being not a loop, the EMF in the setup is generated by Lorentz force only. The bar is put into movement, charges the capacitor with its EMF and quits the plates. But the EMF is 0 volt, and the capacitor is not charged.

As a base of comparison, a closed loop is made with the same plates and bar, but the ends of the plates are connected to each other through a little capacitor (see the Figure 4). The EMF in this setup can be explained either by Lorentz force or by flux variation. According to the theory of generation by Lorentz force, the 2 setups should give the same tension as only Lorentz force is considered for moving wire, whereas my prediction is 0 volt for the first experiment and 1 volt for the second because the EMF is generated by flux variation.

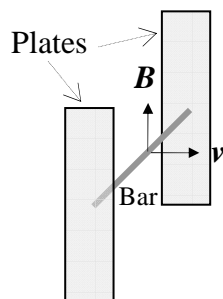


Figure 3

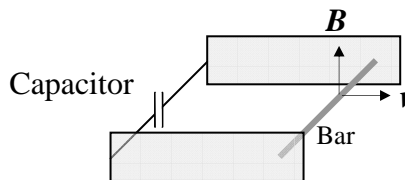


Figure 4

This experiment will decide definitely whether Lorentz force can generate EMF or not. Until now, I have proposed 2 experiments, this one and the one that tests the inconsistency of the Lorentz force law with the Newton's third law, proposed in the article [The Lorentz torque experiment](http://pengkuanem.blogspot.com/2012/03/lorentz-torque-experiment.html), <http://pengkuanem.blogspot.com/2012/03/lorentz-torque-experiment.html>

The corresponding analytical proofs are presented in the following articles:  
[Lorentz' EMF paradox](http://pengkuanem.blogspot.fr/2012/05/lorentz-emf.html), <http://pengkuanem.blogspot.fr/2012/05/lorentz-emf.html>  
[B-cutting paradox](http://pengkuanem.blogspot.fr/2012/05/b-cutting.html), <http://pengkuanem.blogspot.fr/2012/05/b-cutting.html>  
[Synthesis of the inconsistency of the Lorentz force law](http://pengkuanem.blogspot.com/2012/04/synthesis.html)  
<http://pengkuanem.blogspot.com/2012/04/synthesis.html>

Considering these inconsistencies, independent and theoretically undeniable, the Lorentz force law can not be saved. We are at a turning point of history that will change electromagnetism and the whole physics in consequence. Carrying these experiments out will give the experimenters the extraordinary feeling of making history.