The Earth's Magnetic Field Analyzed as an Electrodynamics Effect

Gennadiy Sokolov, sokolovg@yahoo.com
& Vitali Sokolov, vitali.sokolov@gmail.com
621 Sundance Lane #105, Blacksburg, VA 24060

A new magneto-electric effect is discovered: Earth's magnetic field does not rotate together with Earth, but is stationary relative to an inertial frame. That is, Earth rotates relative to its own magnetic field, and electromotive force $E = BLV$ is induced in each vertically oriented conductor, and creates negative electric charge at the upper end of the conductor that can be detected by an amplifier with field-effect transistor (FET).

1. Introduction

When a conductor moves relative to a magnetic field, an electromotive force (EMF) is induced in the conductor. For conductor length L, velocity V, and magnetic field B, and optimal alignment, this EMF is BVL. However, it is impossible to measure this EMF with a fixed voltmeter without using sliding contacts, since the same opposite EMF is induced in moving measuring wires, and therefore the resulting EMF turns out to be zero. Because of the impossibility to measure the EMF in each individual conductor of a unipolar generator, the so-called Faraday paradox arose: the fact that it is impossible to determine by any measurements whether the magnetic field of axial magnet rotates with the magnet, or remains stationary.

While studying the Faraday Paradox, we developed a method for controlling the EMF of the induction in a conductor by connecting one end of it only to the gate of the field-effect transistor. See Fig. 1.

Figure 1.

The control method is as follows: When the EMF is induced in a single conductor, the electrons are displaced to one end of the conductor, creating a negative electric potential at this end and positive potential at the other end. These potentials differ only by a very small value from the electrostatic potential of a charged ball. If one end of the conductor with induced EMF is connected to the gate of a field-effect transistor, the potential of the gate changes, and therefore the current in the drain circuit changes. After additional amplification, the signal is fed to voltmeter. The voltmeter reads changes with a change in the EMF, and the charge of the conductor end.

Although the input impedance of MOSFET transistor approaches infinity, the input of real amplifiers is finite. Therefore, if the induction EMF has constant magnitude, the charge quickly drains from the conductor, and a voltmeter shows only a short-term pulse.

But if the EMF is *not* constant in magnitude, but changes in time even slowly, the flowing charge is continuously compensated by the changing EMF, some charge is maintained at the gate of MOSFET transistor and the voltmeter shows a voltage, indicating that EMF is inducted in the conductor.

When we move the conductor by hand relative to the magnet, an EMF of several milli-volts is induced in the conductor, and charges are created at its ends. Even an ordinary digital multimeter 100305H, to the input of which only one end of the conductor is connected, responds to this charge, and shows a voltage of several fractions of a milli-volt.

This method of controlling the induction EMF by connecting only one end of the conductor to the gate of MOSFET transistor allowed us to resolve the Faraday Paradox: in the above paper, we proved that the field of a rotating axial magnet does *not* rotate with the magnet but, contrary to special relativity, remains stationary relative to inertial frame.

The fact that the magnetic field does not rotate with the magnet allowed us to predict a new effect: The magnetic field of Earth is stationary relative to an inertial frame, and does not rotate with Earth. As a result of this, an EMF is induced in any vertically located conductor, and a negative potential is created at the upper end of the conductor.

We tested the predicted effect experimentally as follows: Because magnetic field of Earth is stationary and Earth rotates relative to own field, each point of the surface at the equator moves relative to the field with a speed of about 460 m/s. The EMF $E = BLV$ has to be induce in any vertically oriented conductor, and the electrons have to shift to the upper end of the conductor. As result, a positive potential has to create at lower end of the conductor and negative potential at upper end.

If we take the Earth's magnetic field approximately equal to $B = 0.05$ mTl (0.00005 Tl), and the linear velocity of the Earth surface rotation at Virginia latitude of the $V = 300\text{m/s}$, the emf induced in conductor of length $L = 1\text{m}$ should be $E = BLV = 0.00005 \times 1 \times 300$ V.

If we connect the lower end of vertical located conductor to the input of a multi-meter 100305 H, it should show, as stated above, only a short-term pulse. When we connect a conductor 1-2 meter long, the device really shows only a pulse.

But if the effective length of the conductor in vertical direction is not constant and continuously changes (for example, when changing an inclination of the conductor or when changing the height of only one end of a sufficiently long conductor), the EMF induced in the conductor changes also and voltmeter at the amplifier output shows some voltage.

Connecting one end of a 1-2 meter long conductor to one terminal of the multi-meter, we raised or lowered second end of the conductor and observed negative or positive voltage over the time during which the position of the second end of the conductor was changing.

The magnitude of the signal practically does not depend on the speed of movement of the second end of the conductor, or on the orientation relative to the direction of the magnetic field. That is, this experiment proves that the EMF in the conductor appears precisely because of the large linear velocity of the Earth's motion relative to the stationary field, and *not* because of the very low speed with which we move the conductor relative to the field.

The discovered fact that Earth’s magnetic field is at rest relative to an inertial frame can help us to understand, and explain in a different way, many natural phenomena, and, as we assume, can even be used to explain the origin of the Earth’s magnetic field itself.

Since the Earth’s surface moves at a speed of hundreds meters per second, the EMF induced in any vertical conductor $E = BLV$ can affect the rusting of pillars and bridges – an electrochemical process associated with a transfer of electrons from iron to oxygen.

For example, it is possible that in trees the induced EMF supplies electrons to the leaves, where the production of oxygen molecules is also associated with the exchange of electrons. The induction EMF can be essential for explaining such phenomena as Elma lights, thunderstorms and even tornadoes.

It is commonly believed that the upper part of a thundercloud is charged positively, while the lower part is charged negatively, while the Earth is charged positively. This idea was explained by the polarization of water droplets falling through the cloud. A much more logical idea is that the distribution of charges is due to the influence of an induction EMF. Since the Earth’s atmosphere moves relative to magnetic field at the same speed as the Earth’s surface, significant EMFs are induced in humid air moving electrons to the upper parts of the thundercloud.

It is possible that, if we could somehow create conditions such that electrons could continuously drain from the upper end of the conductor into humid atmosphere air, then the current generated by the induction EMF could be used to charge the batteries. And it is almost obvious that a continuous change in the direction of the EMF in the blades of rotating wind generators can create currents that accelerate the wear of bearings, similar to situation in metal cutting machines where large currents can arise due to the significantly lower EMF’s.

We hope that the attentive reader will find many other situations associated with the induction EMF’s and negative charges in upper parts of vertical conductors.