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A consequence of the Rowland effect: The intrinsic magnetic field of electron is not a dipole.

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1 PRESENTATION

The magnetic field of a conductor crossed by a current of 0 to 2.5 A, rotating at speeds between 100 and 260 revolutions per second is five to fifteen times higher than that produced by a current of the same intensity in the motionless conductor.

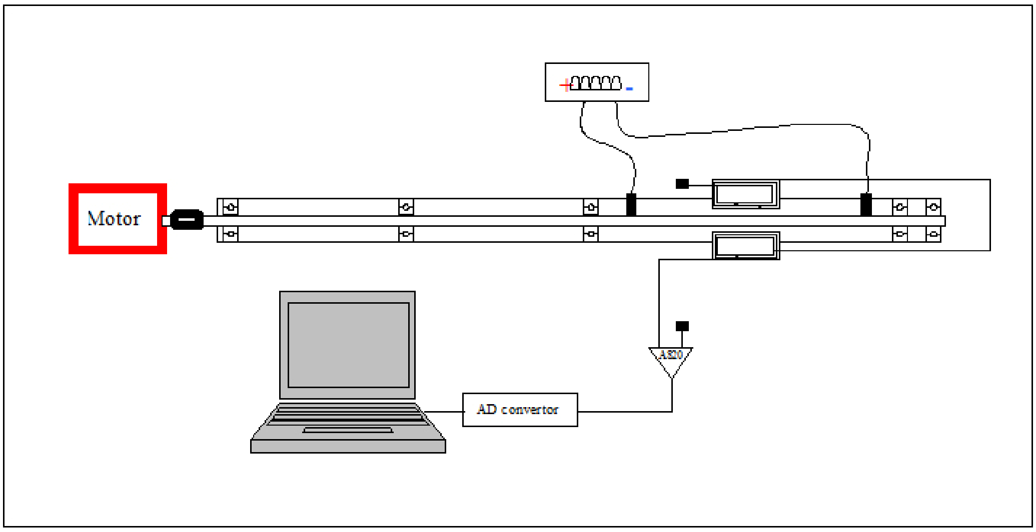
The electrons are rotating with the conductor. The magnetic field results from the Rowland effect. But if the magnetic field of the rotating electrons was likened to the field of a loop, it could not be detected by measuring coils which are parallel to the conductor.

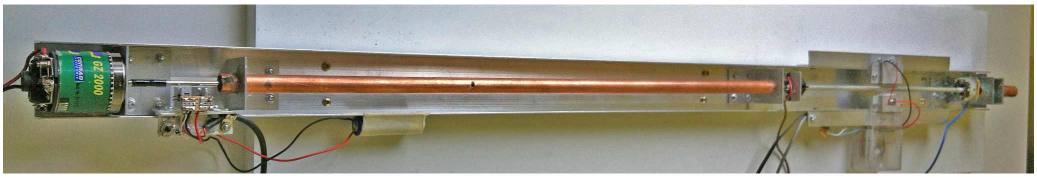
Thus, this magnetic field can only result from the intrinsic magnetic field of the electrons aligned in the conductor axis by precession effect.

But the position of the coils relative to the conductor does not allow to detect dipole fields. The coils can measure the rotational magnetic field of a variable current, but can not detect a variable dipole field.

It is therefore necessary that the magnetic field of the electron has a rotational structure that can be measured by the coils.

2 DEVICE

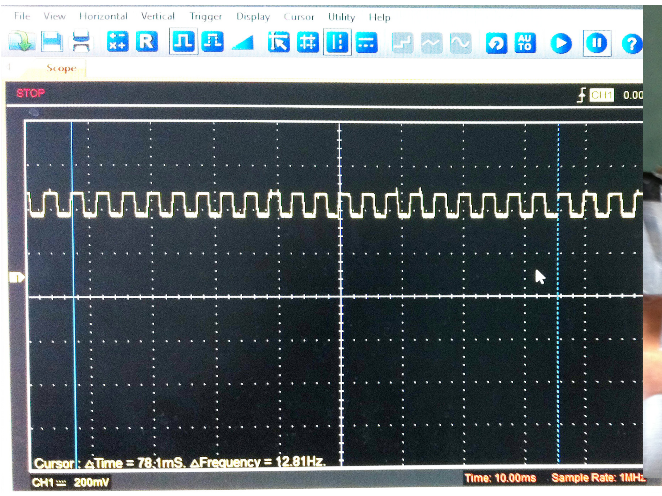


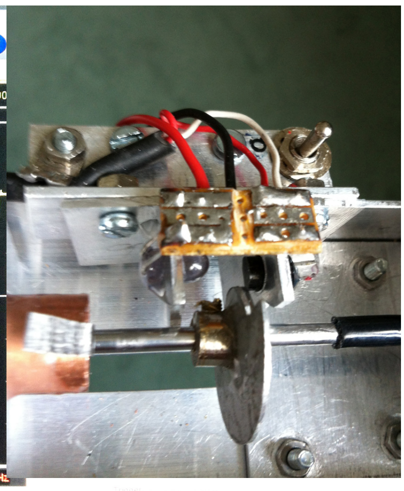


The conductor is a copper tube 4 mm OD diameter and 280mm long, fixed at its ends to two steel rods of 3 mm diameter. One of the rods has a length of about 700 mm and is guided by three ball bearings inserted in a 10 mm ID diameter support tube. An electric motor 12 VDC, 25 A 15600 RPM is fixed to the other end of the rod and fixed to the support tube. The other rod 50 mm long, is guided by two ball bearings. The two steel rodss are fixed to the copper tube by insulating connectors. The current is delivered to the conductor by carbon contacts maintained by springs.

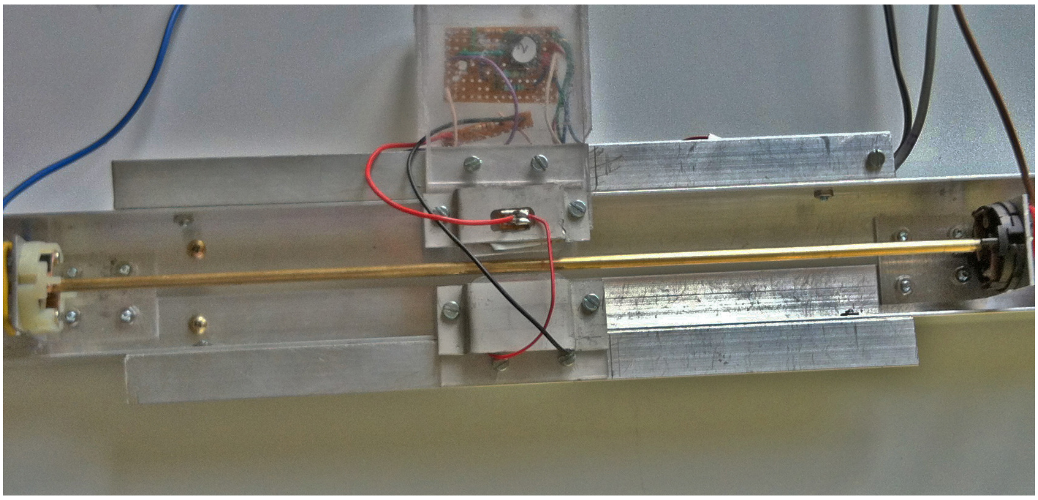
The power supplies are located more than one meter from the device. The motor itself is 700 mm from the sensor located in the middle of the rotating tube.

The motor speed is measured by an UV door: 12.81 Hz for 20 wave lengths: 256 Hz.

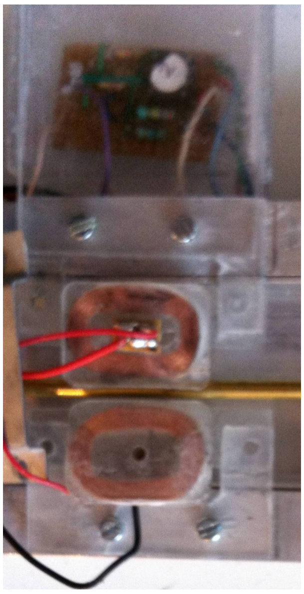




3 SENSOR



The magnetic field of the pulsating current at 100 Hz passing through the rotating tube is of the order of 10E-7 Tesla. It is measured by a sensor with two coils in series situated on either side of the rotating tube and contained in its plane.

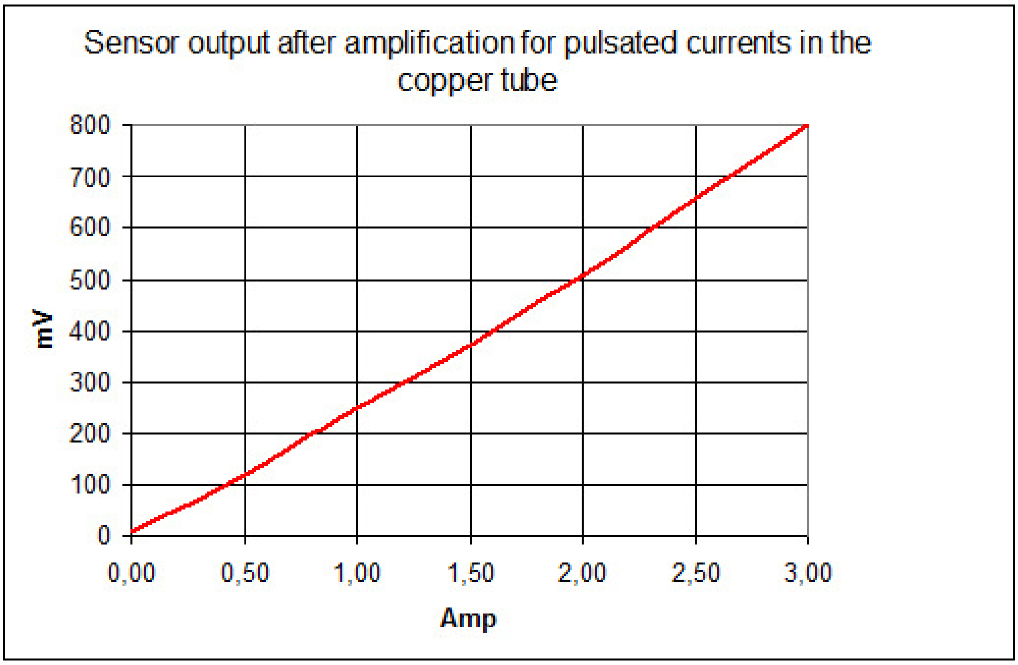


Both sensor coils consist of approximately 1200 turns of copper wire 0.1 mm diameter.

The sensor signal is sent to an integrated linear amplifier AD 820 The gain is 200. The offset is not corrected. The amplifier is supplied with +15 V regulated monopolar.

The rotating tube is supplied with 9V AC rectified but not filtered. This results in a pulse at 100 Hz of the current in the tube. This pulse induces a voltage in the sensor coils. The sensor can not distinguish the direction of the magnetic field as the variation of the inductor current sign changes at each half period. The amplifier allows only positive changes to allow measurement with a voltmeter.

The amplified signal is measured by a digital voltmeter. It is also sent to a digital to analog converter connected to a USB port of a computer with a digital oscilloscope.



This curve shows the voltage delivered by the coils measured after amplification as a function of the current in the motionless conductor.

4 MEASUREMENTS

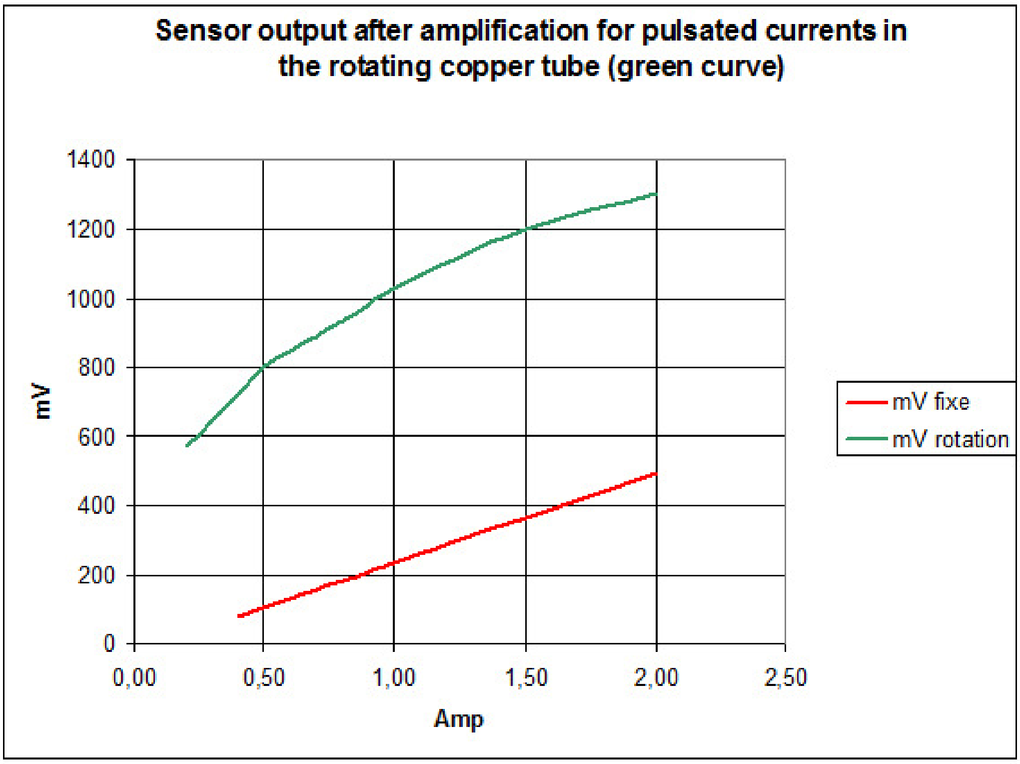
The voltage is measured after the amplifier for the intensities of 0, 1 and 2A. Measurements were replicated dozens of times in each direction of rotation and each direction of the current in the conductor.

In the absence of current, the rotation produces no magnetic field.

The starting and stopping the motor as well as the power supplies needed for the experiment cause no voltage measured after the amplifier when the conductor is not crossed by any current.

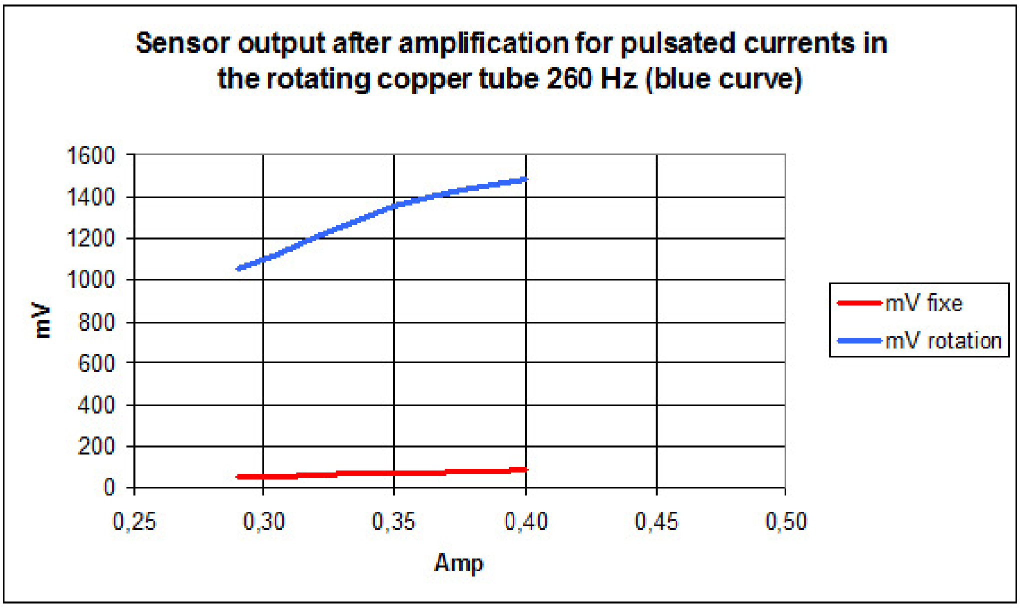
The intensity drop in the conductor resulting from the rotation is about 0.5 A corresponding to the increase of the contact resistance.

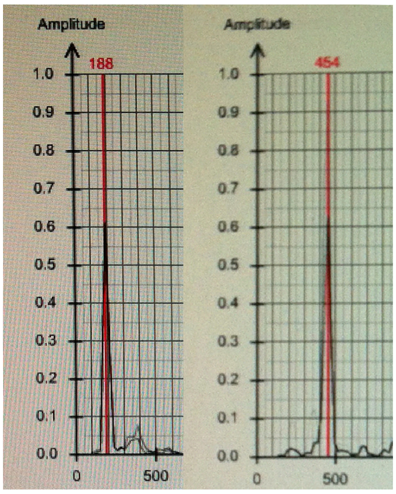
Instead of falling in proportion to the drop in intensity of the current in the rotating tube, there is a very significant rise of the magnetic field measured by the sensor.



The field is three to seven times higher than the field of the same current in the motionless conductor.

The rotating conductor has been shortened to 140 mm in order to reduce the vibrations and enabling measuring the rotation speed. The rotation speed was much higher than in the previous configuration. It reached 256 revolutions per second. The field is fifteen times higher than the field of the same current in the motionless conductor.





In this configuration, the sound frequency of the device is more than twice that with the first conductor 300 mm long. The speed should then be a quarter; or 90 revolutions per second. This speed is confirmed by the fact that the current in the motor increases from 10 to 20 amps. Under these conditions, the magnetic field would be proportional to the rotational speed of the conductor.

The vibrations were still significant so it was not possible to verify systematically the effect of the rotational speed on the magnetic field with this device.

5 ANALYSIS OF CAUSES OF THE INCREASE OF THE MAGNETIC FIELD

The Tolman-Stewart effect that occurs when the rotation is sharply set on or off can not be the cause of the observed phenomenon since it is permanent. Moreover, the magnetic field that would be created by the rotation of the electrons with the conductor can be likened to the field outside of a solenoid of infinite length, so there is virtually zero.

The conductive tube is made of copper and is thus not magnetic. It can not therefore be a Barnett effect.

In addition, in the Tolman-Stewart effect as in the Barnett effect the magnetic field is found to be in the axis of the conductor. The sensor can not detect such a field.

It can only be a Rowland effect. The rotation of the electrons around the conductor axis causes a magnetic field. This phenomenon is the cause of the very large increase of the magnetic field of the rotating conductor.

This effect obviously depends on the direction of rotation, but the current in the conductor being rectified two phases and the sensor amplifier being supplied with monopolar voltage, there is always an increase of the induced voltage with the same sign.

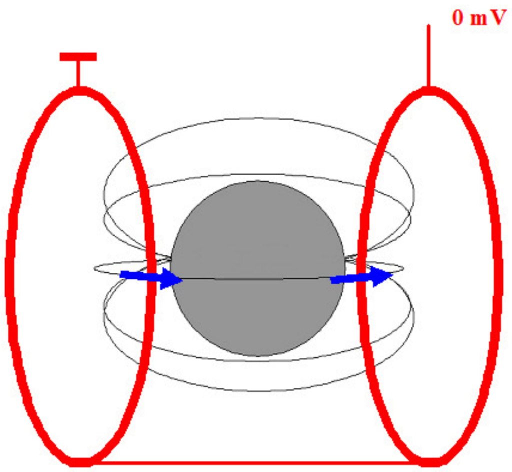
This phenomenon would result from the rotation of the electrons with the conductor like loops and as a result of small translations causing a magnetic field.

However, this explanation of the Rowland effect by translation of electrons is impossible. The field would be coaxial to the driver and could not be detected by the sensor.

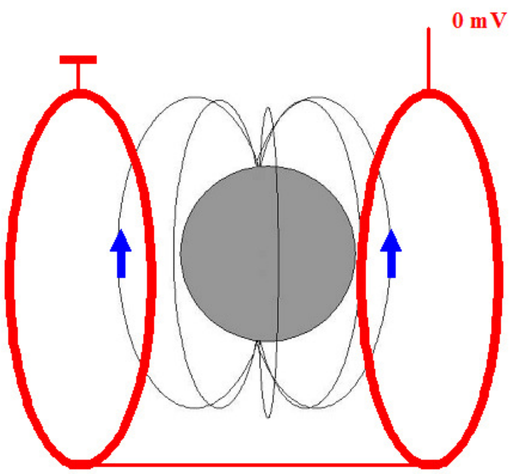
It is therefore a phenomenon of precession of the axis of rotation of the electrons. It results from the Coriolis' acceleration. A body rotating around an axis and set rotating around another axis has its own axis of rotation pushed toward the axis of the rotation imposed.

But in the context of current theories, the magnetic field of the electron has a dipole structure.

However, the position of the coils relative to the conductor does not allow detecting dipole fields. Depending on the orientation of the dipole, the field lines traverse the coils either in opposite directions and the induced currents cancel or they do not pass through at all.

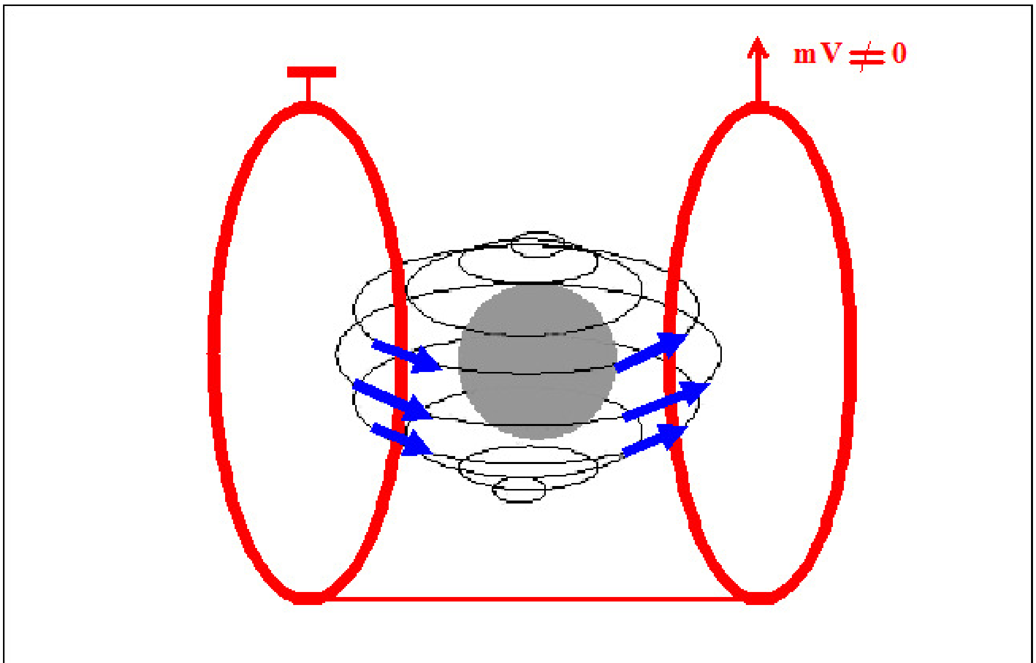


Dipole magnetic field induces opposite voltage in the coils



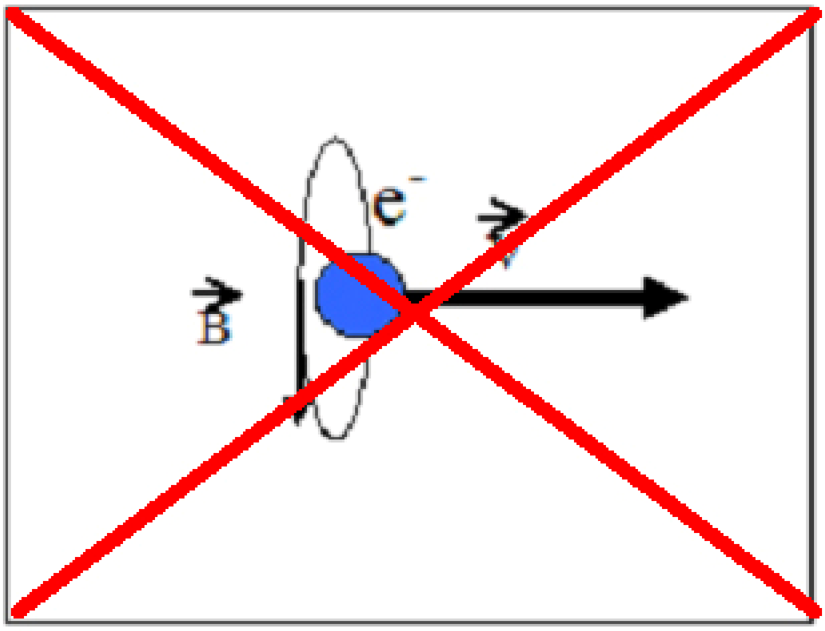
Dipole magnetic field cannot induce voltage in the coils

It is therefore necessary that the magnetic field of the electron has a rotational structure to be measured by the coils.

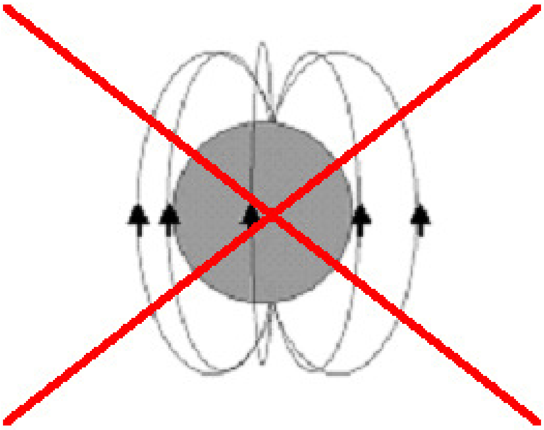


Rotational magnetic field induces voltage in the coils

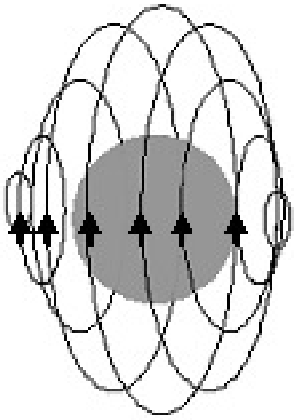
The Rowland effect can not result from the transition of electrons as we have seen. The translation of electrons can not be the cause of the magnetism of the electric currents



The magnetic field of electric current thus results directly from the intrinsic magnetic field of electrons. Their field is oriented in the conductors so that the conductor produces a resultant magnetic field.



Standard electron dipole field



Inverse electron field

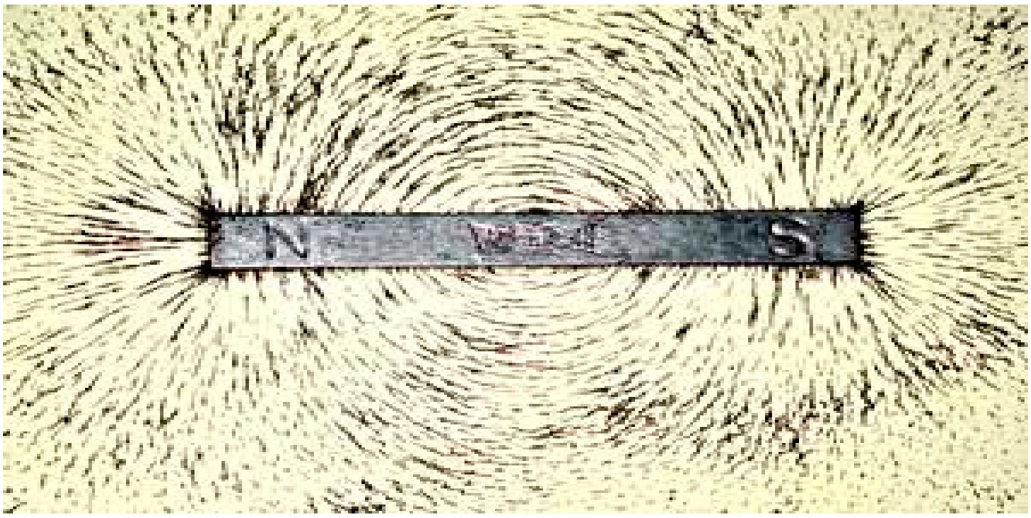
The old approach of electromagnetic theory, attempting to justify the Biot and Savart law by a formal analogy with Coulomb's law could not hide the lack of experimental evidence.

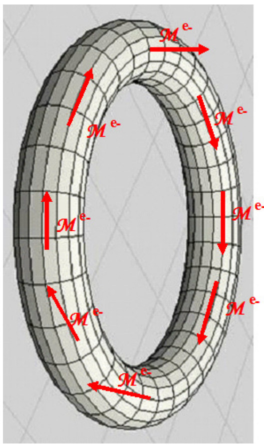
The axiomatic approach has been clarified. The most recent books took as its starting point the postulate of the magnetic force between two moving charges.

Unfortunately, not only this assumption obviously has no experimental justification, but it now seems completely contrary to experiment.

6 MAGNETS

As a consequence, the magnetic field of the electrons can not be directly the cause of the magnet fields.





The magnetic field of the paramagnetic, diamagnetic, ferromagnetic, anti-ferromagnetic and ferrimagnetic bodies has an overall topology orthogonal to the conductors field. The only structure allowing for constituting such a topology with the elementary magnetic moments is the Helmoltz torus. A similar structure is obtained with a loop or a solenoid in the case of conductors.

It must therefore be concluded that magnetism of magnets and of bodies mentioned above, results from the existence in matter of magnets of such structures whose orientation conditions can account for different types of magnetism.

It is necessary that the electrons are organized into rings structures in the matter of magnets.

Electrons of magnets include in such structures generate a magnetic field similar to that of the magnets.

7 MAXWELL

$$\text{Rot } \mathbf{B} = \mu_0 \mathbf{J} + \mu_0 \varepsilon_0 \ d\mathbf{E}/dt$$

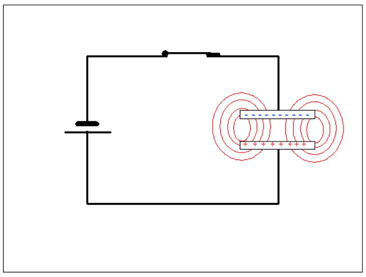
The Maxwell-Ampere equation is false. There is not any vector relationship between the magnetic field of the electrons in an electric field, so in translation, and the current vector J. There is only a formal coincidence. The magnetic field of the current is proportional to the average magnetic intrinsic magnetic field of electrons itself proportional to the electric field in the conductor.

However, the current is itself proportional to the same electric field. But the quantities have nothing to do with each other. And primarily, a Galilean reference frame change does affect neither the electron intrinsic magnetic field, nor the angular momentum.

If the charge must of course be conserved, even under varying conditions, the direct relationship between the magnetic field and the current vector is false as we have just seen. The magnetic field of electrical current is the geometric sum of the magnetic fields of electrons in the conductor. Without potential difference, so without an electric field in the conductor, the magnetic fields of electrons are distributed randomly and the conductor has no magnetic field.

An electric field in the conductor directs the rotational magnetic field of electrons so that the driver has himself a rotational magnetic field. Thereby by dissociating the direct link between the current vector and the magnetic field, we introduced the ability to show a magnetic field variation of the electric field without the conservation of charge is questioned. The problem of the Ampere equation in variable regime is therefore moot.

The displacement current Maxwell added to the Ampere equation to cancel the mathematical divergence of the current in variable regime and meet the conservation of charge, has now a very simple physical explanation. It is simply the magnetic field resulting from the magnetic field of electrons that do not enter into the current J. For example, in the case of electrons that move transversely in a sudden enlargement of a conductor. They produce a transverse electric field that orients accordingly their magnetic field. Moreover, the equations are very similar in the case of the sudden enlargement of a pipe in fluid mechanics.



This is also the case of magnetic fields which appear when you load capacitors. The electric field in the plates themselves is zero, and therefore produces no magnetic field. But during charging, electrons are accumulating in the plates and cause a momentary additional electric field which orients their magnetic field.

The magnetic field of the electric currents result directly from the rotational magnetic field of electrons. This field is totally invariant in a Galilean reference frame change.

The problem of relative motion does not exist in electromagnetism.

8. REFERENCES

Baigrie, B.	Electricity and Magnetism: A Historical Perspective. Greenwood Press. (2006).
Bernard Pr. M.Y.	Initiation à la mécanique quantique Editions Hachette (1960)
Hennequin Pr. J.	Electromagnétisme et relativité restreinte. Editions Dunod (1970)
Keithley, J.F.	The Story of Electrical and Magnetic Measurements: From 500 B.C. to the 1940s IEEE Press. (1999).
Landau Pr. L.	Théorie des champs Editions Mir, Moscou (1966)
Liboff Pr.R.L.	Introductory Quantum Mechanics Holden-Day Inc (1908)
Mach Pr. E.	De la connaissance et de l'erreur Editions Flammarion (1908)
Pérez Pr.J.P.& alt	Electromagnétisme Editions Masson (1997)
Tonnelat Pr. M.A.	Histoire du principe de relativité Editions Flammarion (1971)