MAGNETIC FIELD'S TRUTH UNLEASHED

Abstract

Magnetic field is composition of two electric fields with different velocities that exist in neutral conductors. Formula (5) comes from the Doppler modification of those two fields noticed by a moving observer. Consequently, it seems that electric and magnetic fields are consisted from strings that really exist (equations (14) to (30)). Main conclusion of the theory is that physical fields have their own velocities and that magnetic interaction cannot occur between two electron beams in vacuum. Magnetic interaction is possible only between electrons' beam and current running trough electrically neutral conductors, or electron beam and magnet.

Magnetic field string is consisted from two entangled opposite electric strings with different velocities and gravity field string is consisted of two entangled opposite strings with same velocities. Gravity field arises in annulment of two opposite electric fields.

Flux has real physical meaning and it does define concentration of fields' strings intersecting particular surface.

The electric strings that form gravitational field cannot be additionally used in an electric interaction. A conductor that generates magnetic field decrease its own gravity field because some gravity strings are changed to magnetic ones.

Consequently, gravitational field exits outside the atom, but at the level of the atom itself only electric field is observable.

ELECTORMAGNETIC DERIVATIONS

Let we assume that magnetic field is proportional to number of imagined vertical shafts (strings), i.e. field's lines that are perpendicular to exposed area:

$$\vec{B} = \frac{dN}{d\vec{S}} \tag{1}$$

Where **N** is number of **B** field lines that penetrate **S** surface.

We can also assume that potential available on the ends of a conductor is proportional to number of field's lines smashed by the conductor.

$$U = \frac{dN}{dt} \tag{2}$$

This assumption does not explain how passing of strings trough a conductor pushes electrons in a specific direction, but it does explain nature of equations (5) and (7). Explanation of those intersections will be described later in the text (equations (14) to (30)).

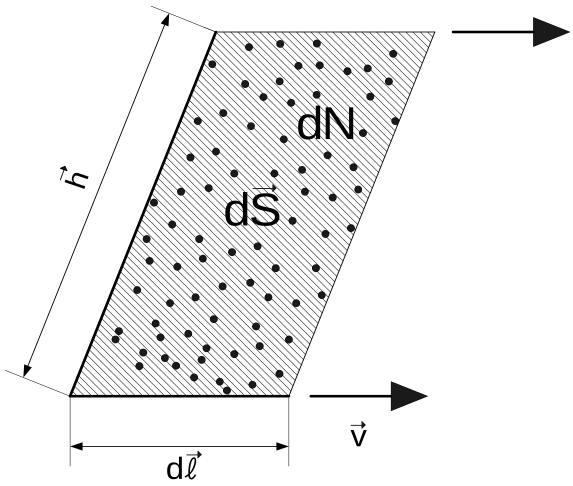
MOVEING WIRE

Now, we are able to derive equation of potential generated by a wire moving in magnetic field with velocity $\vec{v}$:

$$U = \frac{dN}{dt} = \frac{dN}{dt} \cdot \frac{\vec{h} \times d\vec{\ell}}{\vec{h} \times d\vec{\ell}} = \frac{dN}{\vec{h} \times d\vec{\ell}} \cdot \frac{\vec{h} \times d\vec{\ell}}{dt} = \frac{dN}{d\vec{S}} \cdot \left(\vec{h} \times \vec{v}\right) \tag{3}$$

Above equation is described on the following picture:

Fig. 1



Regarding (1) we have:

$$U = \vec{B} \cdot \left(\vec{h} \times \vec{v}\right) = \vec{h} \cdot \left(\vec{v} \times \vec{B}\right) = \vec{h} \cdot \vec{E} \tag{4}$$

$\Rightarrow$

$$\vec{E} = \vec{v} \times \vec{B} \tag{5}$$

This is well known Lorentz equation derived from equations (1) and (2) only. From (1) we have:

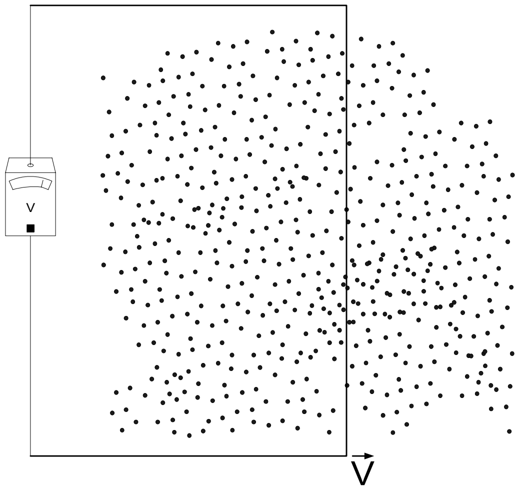
$$dN = \vec{B} \cdot d\vec{S} \tag{6}$$

When we put (6) in (2), we obtain:

$$U = \frac{\vec{B} \cdot d\vec{S}}{dt} = \frac{d\Phi}{dt} \tag{7}$$

Following picture shows magnetic fields' strings as immovable dots:

Fig. 2



INFLUENCE OF VARIABLE MAGNETIC FIELD TO CONTOUR

If we assume that increasing and decreasing of magnetic field at the some contour's plane cause entering and exiting of field's lines, i.e. strings into and out of the contour region, we can conclude that the situation is same as one when the contour is opened and moving, smashing the strings. In the case wire is static and field's lines are moving to increase or decrease their concentration. It is important to be noticed that in the best case of field's lines concentration increase almost all lines pass contour's wire in the same direction. We have also to assume that field's line cannot appear and disappear and that they came from somewhere and than go back to the came place – they cannot appear in the surface of contour neither disappear. All increase of field is caused by field's lines arrived to the region of contour only by passing the wire that bounds the contour.
Regarding equation (1) we have:

$$\frac{d\vec{B}}{dt} = \frac{d^2N}{d\vec{S} \cdot dt} \tag{8}$$

We have to find number of smashed lines per time because this ratio determines magnitude of electrical potential between ends of the contour:

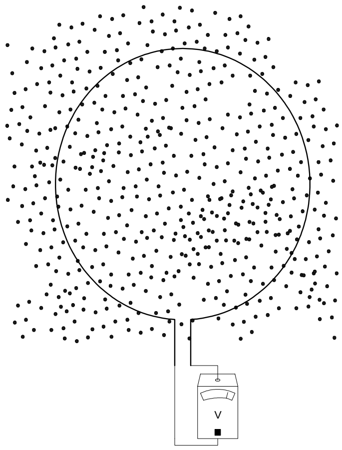
$$\int_S \frac{d^2N}{d\vec{S} \cdot dt} \cdot d\vec{S} = \frac{dN}{dt} = U \tag{9}$$

Consequently we have:

$$U = \int_{\vec{S}} \frac{d\vec{B}}{dt} \cdot d\vec{S} = \frac{d}{dt} \int_{\vec{S}} \vec{B} \cdot d\vec{S} = \frac{d\Phi}{dt} \tag{10}$$

Thus Faraday's law of induction is derived from equations (1) and (2) only.
The picture below shows situation in which contour is immovable and strings of magnetic fields are movable simultaneously intersecting the contour:

Fig. 3



DERIVATION OF THE FIRST MAXWELL EQUATION

From the definition of potential, we have:

$$U = \oint_{\ell} \vec{E} \cdot d\vec{\ell} = \int_{S} \vec{\nabla} \times \vec{E} \cdot d\vec{S} \tag{11}$$

Combining (10) and (11) we have:

$$\int_{S} \vec{\nabla} \times \vec{E} \cdot d\vec{S} = \frac{d}{dt} \int_{S} \vec{B} \cdot d\vec{S} \tag{12}$$

Thus we come to the first Maxwell equation:

$$\vec{\nabla} \times \vec{E} = \frac{d\vec{B}}{dt} \tag{13}$$

It is important to be noticed that there is no partial time derivation, just the ordinary one. Equation (13) is derived from equations (1) and (2) only.

NATURE OF $\vec{E} = \vec{B} \times \vec{v}$

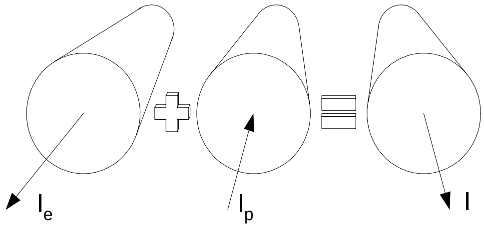
Passing of strings trough conductors produce potential and this is described by equation (5). The equation is very strange because B and E are perpendicular fields. This indicates that Doppler effect is involved because it emphasis one direction.
Derivation of equation (5) needs a few presumptions to be initially accepted:

1. There is no magnetic field; it is just a vortex component of electric field generated electrons' flow in electrically neutral conductors. This means that magnetic field is composition of two equal and opposite electric fields from which one is static and the other one is moving with speed of v, or there are two electric fields with slightly various speeds.

2. Doppler effect can be applied to fields too, not only on photons and phonons.

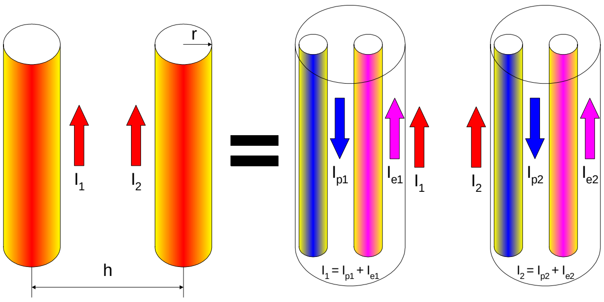
It will be shown in the text below that equation (5) and formula for conductors magnetic interaction (28) are results of Doppler effect applied to composition of moving electric field and static contra-field. During flow of electric current some electrons are free and some cores are without electrons. These electrons produce electric field as well as the cores. Regarding Hooper coils' effect we know that these two fields cannot be mutually annulled.
Single conductor can be represented as superposition of two pipes, one with electrons and additional one with holes:

Fig. 4



Following picture shows interaction between two parallel electrical conductors decomposed into four pipes with electrons and positive holes:

Fig. 5



Let we compute the force formula between two infinitely long conductors. Each conductor is consisted of two electric fields, one of protons in cores and other of electrons that float:

$$E_{e^-} = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{-Q'}{r} = \frac{1}{2\cdot\pi\cdot\varepsilon\cdot r}\cdot\frac{-I}{v} \tag{14}$$

And

$$E_{p^-} = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{Q'}{r} \tag{15}$$

Doppler formula is:

$$f = f_0\cdot\left(1-\frac{v}{c}\right) \tag{16}$$

Thus we have following fields seen by holes in other conductor:

$$E_{tot} = E_{p^+} + E_{e^-}\cdot\left(1-\frac{v}{c}\right) \tag{17}$$

Regarding (14), (15) and (17) resulting field is:

$$E_{tot} = \frac{I}{2 \cdot \pi \cdot \varepsilon \cdot c \cdot r} \tag{18}$$

I.e.

$$\vec{E}_{tot} = \frac{I \cdot \vec{r}}{2 \cdot \pi \cdot \varepsilon \cdot c \cdot \vec{r}^{\,2}} = \frac{I \cdot \hat{r}}{2 \cdot \pi \cdot \varepsilon \cdot c \cdot |\vec{r}|} \tag{19}$$

It is obvious that magnetic field is just virtual electric field generated in neutral conductor that attracts or repulse other current conductors to it. Magnetic field idealization is normal to $\mathbf{E_{tot}}$ field described by (18) and **c** times less.
Virtual $\mathbf{Q_M'}$ is given by combining of (18) and (14):

$$\frac{1}{2 \cdot \pi \cdot \varepsilon} \cdot \frac{Q'_M}{r} = \frac{I}{2 \cdot \pi \cdot \varepsilon \cdot c \cdot r} \tag{20}$$

$\Rightarrow$

$$Q'_M = \frac{I}{c} \tag{21}$$

From above formula we also have:

$$dQ_M = \frac{I}{c} \cdot d\ell = \frac{1}{c} \cdot \frac{dQ}{dt} \cdot d\ell \tag{22}$$

$\Rightarrow$

$$Q_M = Q \cdot \frac{v}{c} \tag{23}$$

Where Q_M is fictive charge that makes magnetic force.
Formula (21) is very important for derivation of general equation of magnetic field. Above equation defines effective charge length density seen by other conductor.
Force per length unit acting to other conductor is:

$$F' = Q' \cdot E \tag{24}$$

Regarding (18), (21) and (24) we have:

$$F' = \frac{I_1}{c} \cdot \frac{I_2}{2 \cdot \pi \cdot \varepsilon \cdot c \cdot r} \tag{25}$$

$\Rightarrow$

$$F' = \frac{I_1 \cdot I_2}{2 \cdot \pi \cdot \varepsilon \cdot c^2 \cdot r} \tag{26}$$

There is following relation too:

$$\frac{1}{\varepsilon \cdot \mu} = c^2 \tag{27}$$

Regarding (27) equation (26) is transformed into formula of magnetic interaction between two conductors:

$$F' = \frac{\mu \cdot I_1 \cdot I_2}{2 \cdot \pi \cdot r} \tag{28}$$

This is well-known formula for magnetic force between two parallel conductors.
From (28) we have:

$$dF = \frac{\mu \cdot I_2}{2 \cdot \pi \cdot r} \cdot I_1 \cdot d\ell_1 = \frac{\mu \cdot I_2}{2 \cdot \pi \cdot r} \cdot \frac{dQ_1}{dt} \cdot d\ell_1 = dQ_1 \cdot v_1 \cdot \frac{\mu \cdot I_2}{2 \cdot \pi \cdot r} \tag{29}$$

For punctual charges only:

$$F = Q_1 \cdot v_1 \cdot \frac{\mu \cdot I_2}{2 \cdot \pi \cdot r} = Q \cdot v \cdot B \tag{30}$$

Magnetic field is actually a dipole like field observable by an observer that is moving near the neutral conductor that induces the field. Thus magnetic field is manifesting near <u>neutral conductors</u> or permanent magnets only. It is just composition of two electric fields with different speeds that exist in neutrally conductors with current. The observed magnetic field is actually an electric field that always acts to or from conductor. But, conveniently, for magnetic field is chosen a mathematical idealization that is normal to the effective electric field produced by Doppler effect only. The effect pushes electrons exposed to magnetic field in particular direction regarding inequality of influences between these two opposite electric fields to the electrons. For immovable observer these two magnetic fields are annulled.

GENERAL FORMULA FOR MAGNETIC FIELD

Magnetic field can be described by following equation:

$$\vec{F} = I \cdot \vec{\ell} \times \vec{B} \tag{31}$$

Regarding (24) and (31) we have:

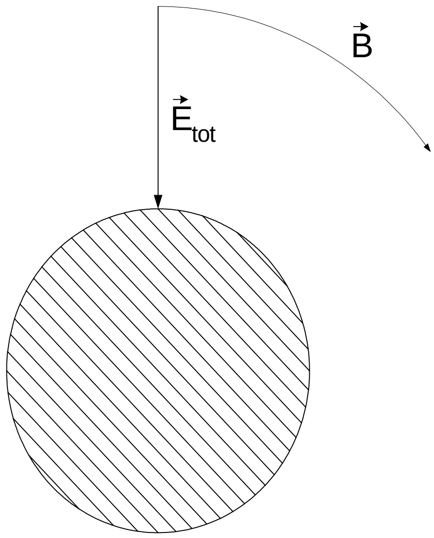
$$Q' \cdot \left|\vec{E}_{tot}\right| = I \cdot \left|\vec{B}\right| \tag{32}$$

Regarding (21), (32), geometry and because magnetic field is especially chosen to be perpendicular to Doppler's **E** field, i.e. to $\mathbf{E_{tot}}$, we have:

$$\vec{B} = \hat{\ell} \times \frac{\vec{E}_{tot}}{c} \tag{33}$$

Once again it is obvious that magnetic field is electric field that acts to or from a conductor with current:

Fig. 6



That is in agreement with fields' energy density formula and energy conservation's law. If we combine formulas (18) and (33), we obtain:

$$\vec{B} = \frac{\hat{\ell} \times \vec{E}_{tot}}{c} = \frac{I \cdot \hat{\ell} \times \hat{r}}{2 \cdot \pi \cdot \varepsilon \cdot c^2 \cdot |\vec{r}|} \tag{34}$$

Differential form for curve is:

$$d\vec{B} = \frac{d\vec{\ell} \times \vec{E}_{tot}}{c} = \frac{I \cdot d\vec{\ell} \times \hat{r}}{2 \cdot \pi \cdot \varepsilon \cdot c^2 \cdot |\vec{r}|} \tag{35}$$

For short wire we have spherical geometry and using a mathematical generalization we have finally:

$$d\vec{B} = \frac{I \cdot d\vec{\ell} \times \hat{r}}{4 \cdot \pi \cdot \varepsilon \cdot c^2 \cdot \vec{r}^{\,2}} \tag{36}$$

Due to geometry we have now:

$$\vec{E}_{eff} = \frac{\vec{v} \times \vec{E}_{tot}}{c} = \vec{v} \times \vec{B} \tag{37}$$

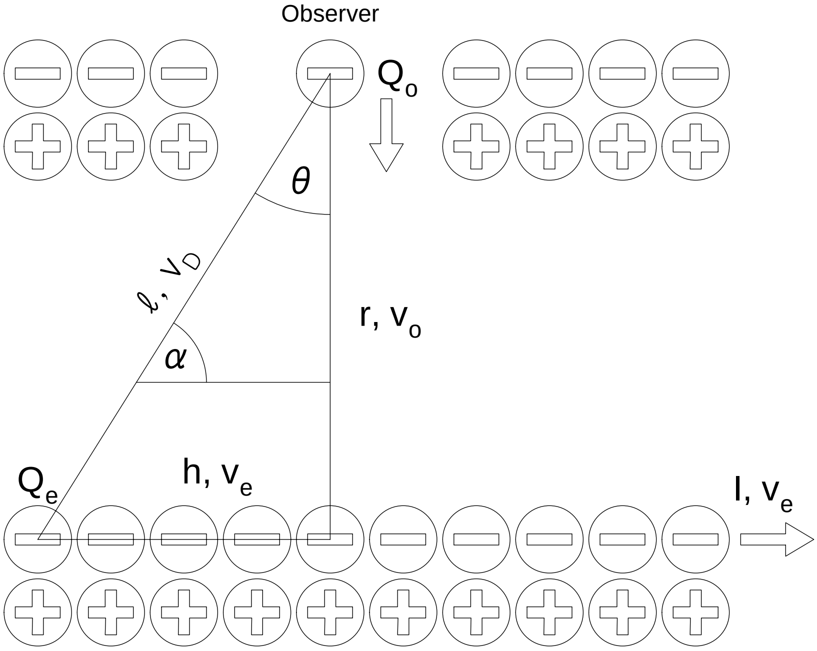
True nature of magnetic field has been hidden so long due to ordinary usage of electrically neutral conductors.

INDUCTION

Induction is special case of momentum translation when a charge are approaching to the conductor. Let we imagine two infinitely long parallel conductors, one without current approaching one to another one with current, or a test charge approaching

infinitely long conductor. It is obvious that in the situation Doppler effect take parts again.
The situation is shown on the following picture:

Fig. 7



If we suppose that there is variation in distance between $\mathbf{Q_e}$ and $\mathbf{Q_o}$ then we can recognize situation in which Doppler effect has significant role.
Distance is defined with:

$$\ell^2 = h^2 + r^2 \tag{38}$$

From above equation Doppler velocity is:

$$v_D = \frac{h \cdot v_e + r \cdot v_o}{\sqrt{h^2 + r^2}} \tag{39}$$

From above picture we have:

$$\frac{h}{r} = TAN(\theta) \tag{40}$$

Thus we have:

$$v_d = \frac{v_e \cdot TAN(\theta) + v_o}{\sqrt{1 + TAN(\theta)^2}} \tag{41}$$

$\Rightarrow$

$$v_d = v_e \cdot SIN(\theta) + v_o \cdot COS(\theta) \tag{42}$$

Differencial force is:

$$d\vec{F} = \frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{dQ_e\cdot Q_o}{\ell^2}\cdot\hat{\ell}\cdot\left(1-\frac{v_d}{c}\right)+\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{dQ_p\cdot Q_o}{\ell^2}\cdot\hat{\ell} \tag{43}$$

⇒

$$d\vec{F} = -\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{dQ_e\cdot Q_o}{\ell^2}\cdot\frac{v_d}{c}\cdot\hat{\ell} \tag{44}$$

We have also:

$$\frac{r}{\ell} = COS(\theta) \tag{45}$$

Regarding (42) and (45) we have:

$$d\vec{F} = -\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{dQ_e\cdot Q_o}{r^2}\cdot\frac{(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta))}{c}\cdot COS(\theta)^2\cdot\hat{\ell} \tag{46}$$

Tangential **h** component is:

$$dF_h = -\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{dQ_e\cdot Q_o}{r^2}\cdot\frac{(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta))}{c}\cdot COS(\theta)^2\cdot\left|COS(\alpha)\right| \tag{47}$$

⇒

$$dF_h = -\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{Q'_e\cdot Q_o}{r^2}\cdot\frac{(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta))}{c}\cdot COS(\theta)^2\cdot\left|SIN(\theta)\right|\cdot dh \tag{48}$$

And

$$\frac{h}{r} = TAN(\theta) \tag{49}$$

⇒

$$dF_h = -\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{Q'_e\cdot Q_o}{r^2}\cdot\frac{(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta))}{c}\cdot COS(\theta)^2\cdot\left|SIN(\theta)\right|\cdot\frac{r\cdot d\theta}{COS(\theta)^2} \tag{50}$$

⇒

$$F_h = -\frac{1}{4\cdot\pi\cdot\varepsilon\cdot c}\cdot\frac{Q'_e\cdot Q_o}{r}\cdot\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta))\cdot\left|SIN(\theta)\right|\cdot d\theta \tag{51}$$

⇒

$$F_h = -\frac{1}{4\cdot\pi\cdot\varepsilon\cdot c}\cdot\frac{Q'_e\cdot Q_o}{r}\cdot v_o \tag{52}$$

Regarding (21) we have:

$$E_h = \frac{F_h}{Q_0} = -\frac{1}{4\cdot\pi\cdot\varepsilon\cdot c^2}\cdot\frac{I\cdot v_0}{r} \tag{53}$$

Regarding (27) we have:

$$\vec{E}_h = -\frac{\mu}{4\cdot\pi}\cdot\frac{I\cdot v_o}{r}\cdot\hat{h} \tag{54}$$

Perpendicular component is defined with:

$$F_r = -\frac{1}{4\cdot\pi\cdot\varepsilon\cdot c}\cdot\frac{Q'_e\cdot Q_o}{r}\cdot\int_{-\frac{\pi}{2}}^{\frac{\pi}{2}}\left(v_e\cdot SIN(\theta)+v_o\cdot COS(\theta)\right)\cdot\left|COS(\theta)\right|\cdot d\theta \qquad (55)$$

Thus we came to formula for skin effect:

$$E_r = \frac{F_r}{Q_o} = -\frac{1}{4\cdot\pi\cdot\varepsilon\cdot c}\cdot\frac{Q'_e}{r}\cdot\frac{v_o}{2}\cdot\pi \qquad (56)$$

⇒

$$\vec{E}_r = -\frac{\mu}{8}\cdot\frac{I\cdot v_o}{r}\cdot\hat{r} \qquad (57)$$

Finally:

$$\vec{E}_{ind} = \vec{E}_r + \vec{E}_h = -\frac{\mu}{4\cdot\pi}\cdot\frac{I\cdot v_o}{r}\cdot\hat{h} - \frac{\mu}{8}\cdot\frac{I\cdot v_o}{r}\cdot\hat{r} \qquad (58)$$

⇒

$$\vec{E}_{ind} = -\frac{\mu}{4}\cdot\frac{I\cdot v_o}{r}\cdot\left(\frac{\hat{h}}{\pi}+\frac{\hat{r}}{2}\right) \qquad (59)$$

This is formula for induced electric field that is parallel with the conductor with current **I** seen by an observer approaching with velocity $\mathbf{v_o}$ to the conductor. This field produces current in the approaching conductor. However, only tangential component pushes electrons in moveable conductor.
The effect is known as electromagnetic induction.
The derivation has shown that Doppler effect is sufficient for derivation formula for magnetic field arising and also formula for electromagnetic induction. These two cases cover whole electromagnetic described by Maxwell equation and thus show that entire electromagnetism is a Doppler effect applied to fields that exist in neutral conductor with current.
Most general formula for variable part of Doppler effect applied to general physical field is:

$$\vec{\Psi}_{tot} = \frac{1}{\xi}\cdot\vec{D}\left(\xi\cdot\vec{\Psi}_0,\vec{v}\right)-\vec{\Psi}_0 \qquad (60)$$

Whereas $\boldsymbol{\xi}$ is coupling constant that should be equal to one, **v** is velocity, $\mathbf{\Psi_0}$ is originating field, and **D** is Doppler function.
Non-linear operator’s Doppler Formula is:

$$\frac{1}{f_0} = \frac{1}{f_1}\cdot\left(\frac{e^{\left(\frac{d}{f_1\cdot dt}\right)}-1}{\left(\frac{d}{f_1\cdot dt}\right)}\right)\cdot\left(1-\frac{v(t)}{c}\right) \qquad (61)$$

Approximation of the second order of above Doppler formula applied to electric field is:

$$\vec{E}_{tot} \approx \frac{\vec{E}_0}{2} \cdot \left(\sqrt{\left(1 - \frac{v}{c}\right)^2 - \frac{2 \cdot a}{c \cdot \left|\vec{E}_0\right|}} - \left(1 + \frac{v}{c}\right) \right) \tag{62}$$

⇒

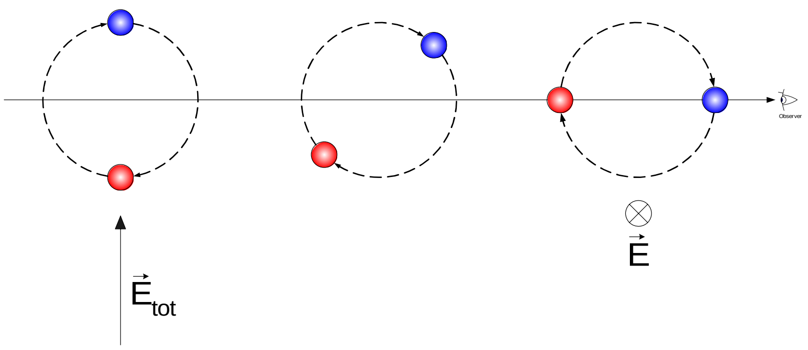
$$\vec{E}_{tot} \approx -\left(\vec{E}_0 \cdot \frac{\vec{v}}{c}\right) \cdot \hat{E}_0 - \frac{\vec{a}}{2 \cdot c \cdot \xi} \tag{63}$$

Whereas $\vec{E}_{tot} \cdot \vec{B} = 0$ and $\left|\vec{E}_{tot}\right| = c \cdot \left|\vec{B}\right|$. If $\xi = 1$, then $Q = 2 \cdot m_{inertial} \cdot c$, and that isn't true.

ELECTROMAGNETIC WAVE

Regarding to the presented theory, electromagnetic wave quant is just a rotating dipole that is moving in an arbitrary direction.
It means that the field is radiating spherically whenever it can do that otherwise it is radiating in allowed geometry, even like strings. When we put electric charges or magnets in superconductive fluid, connections between two opposite poles would be obtained trough string like area when intensity does not depend on length. It seems that is the case with homopolar generator:

Fig. 8



Gravitational wave is frontal polarized rotating dipole which axe of rotation is perpendicular to observer.

EXPERIMENTAL VERIFICATION

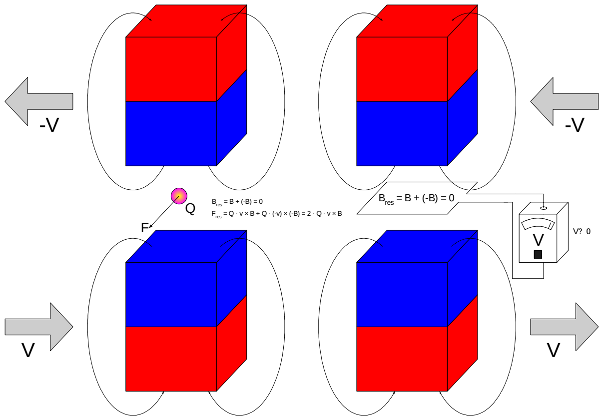
There are three devices that could be used for verification of the theory: Hooper coils (W. J. Hooper, U.S. Pat 3610971 & U.S. Pat 3656013, patented in 1972), Hall sensor (based on E. H. Hall's Effect discovered in 1879) and Homopolar generator.

HOOPER'S COILS

The coils altogether with electromagnetic induction show that physical fields cannot be canceled. Only resulting force can be eliminated but fields still remain and certainly there are methods for their detection.

Following picture shows basic principle of Hooper coils:

Fig. 9



Upper and lover equal magnets are moving in opposite directions. Between them an immovable coil or wire is placed. In the coil or wire will be induced electric potential because magnetic fields of upper and lower magnets intersect coil's wires.

$$U = \vec{\ell} \cdot (\vec{v} \times \vec{B}) + \vec{\ell} \cdot ((-\vec{v}) \times (-\vec{B})) = 2 \cdot \vec{\ell} \cdot (\vec{v} \times \vec{B}) \neq 0 \quad (64)$$

Although:

$$\vec{B} + (-\vec{B}) = 0 \quad (65)$$

Effect of electromagnetic induction exists on the level of coil although there should not exist magnetic field due to mutual annulment of opposite magnets.

HOMOPOLAR GENRATOR

The special case of homopolar motor is consisted of permanent magnet only. It is presented on the left side of following pictures, showing exactly that there exists an interaction between rotor and an only possible prop, i.e. between inner and outer part of electric circuit:

Fig. 10

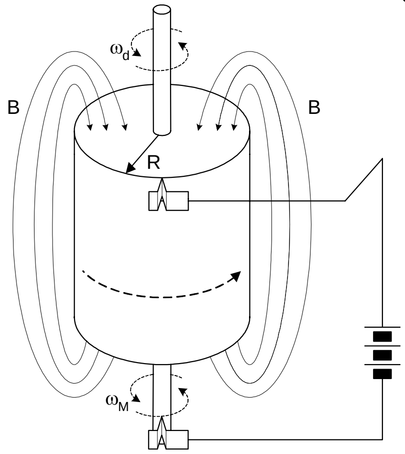
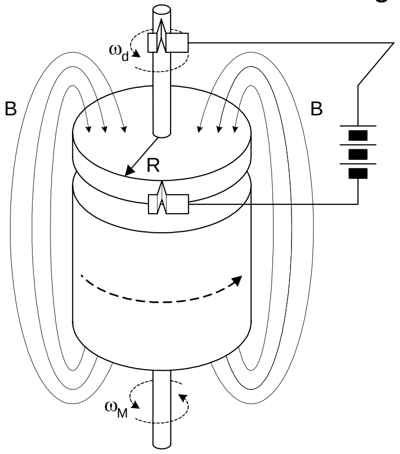


Fig. 11



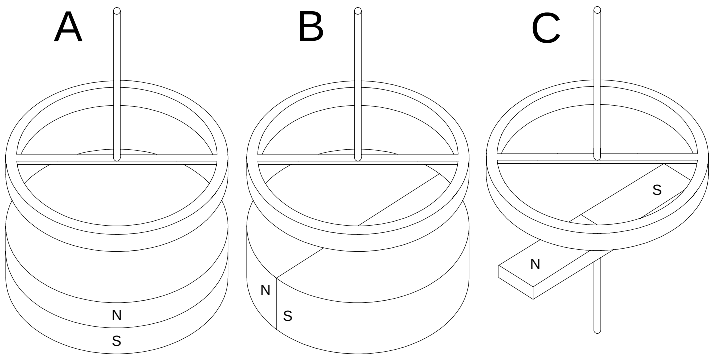
BRIEF ANALYZIS OF THE DEVICE OPERATION

Machine A shown on the picture below is simplified Faraday's homopolar generator. The ring will not start to rotate when the permanent magnetic disk rotates.

Machine C is Tesla's rotating field engine. Nikola Tesla discovered the effect and patented electric motor based on it in 1887 (US Pat. 381969). It is important to be noticed that magnetic field components that are not annulled by symmetry are collinear to the ring, i.e. to the conductor. It is obvious that interaction force that pushes ring to rotate cannot be Lorentz one because Lorentz force requires for external magnetic field to be perpendicular to conductor.

We can shape the permanent magnet in machine C to be same one as in machine A and thus we came to machine B.

Fig. 12

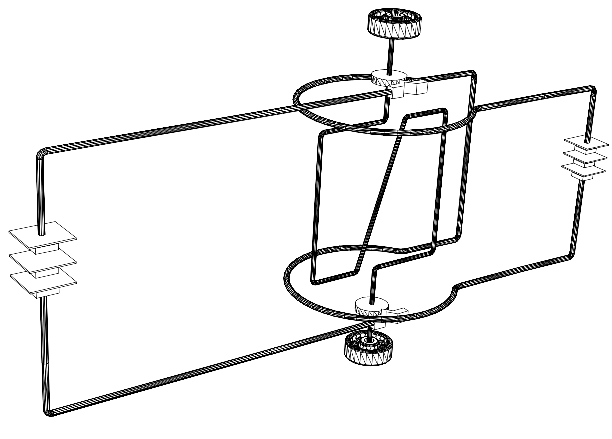


Machine B transfers momentum to ring and machine A does not. The only difference between these two machines is in polarizations of permanent magnets.

Now, it is obvious that polarization of magnet has great influence to transfer of force momentum with magnetic field. Permanent magnet on the picture A can be replaced with a single contour.

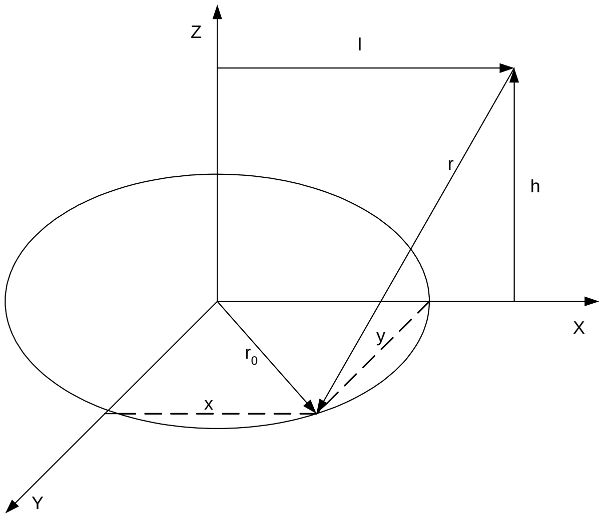
Following device is modification of the above right device:

Fig. 13



Let we imagine a single loop settled on the Y0X plane with radius of **R** with current **I**. We have to derive equation of magnet field at a point O on altitude **h** with declination **ℓ** from center of a loop's contour that is shown on the picture below:

Fig. 14



Let we assume that following equation is correct, thus magnetic field at the point of observations is:

$$d\vec{B} = \frac{\mu \cdot I}{4 \cdot \pi} \cdot \frac{d\vec{\ell} \times \hat{r}}{\vec{r}^{\,2}} \tag{66}$$

Let we also define:

$$x = R \cdot COS(\theta) \tag{67}$$

And

$$y = R \cdot SIN(\theta) \tag{68}$$

And

$$\hat{r} = \frac{\vec{r}}{|\vec{r}|} \tag{69}$$

And

$$\vec{r}_0 = \overrightarrow{[x \quad y \quad 0]} = \overrightarrow{[R \cdot COS(\theta) \quad R \cdot SIN(\theta) \quad 0]} \tag{70}$$

$\Rightarrow$

$$d\vec{\ell} = d\vec{r}_0 = \overrightarrow{[-R \cdot SIN(\theta) \quad R \cdot COS(\theta) \quad 0]} \cdot d\theta \tag{71}$$

Observer's coordinates are defined by the following vector:

$$\vec{o} = \overrightarrow{[\ell \quad 0 \quad h]} \tag{72}$$

And:

$$\vec{r} = \vec{r}_0 - \vec{o} = \overrightarrow{[x - \ell \quad y \quad h]} = \overrightarrow{[R \cdot COS(\theta) - \ell \quad R \cdot SIN(\theta) \quad -h]} \tag{73}$$

Magnetic field of a single current loop is defined by the following formulas:

$$B_x = \frac{\mu \cdot I}{4 \cdot \pi} \cdot \int_0^{2\cdot\pi} \frac{-h \cdot R \cdot COS(\theta)}{\left(h^2 + \ell^2 + R^2 - 2 \cdot \ell \cdot R \cdot COS(\theta)\right)^{\frac{3}{2}}} \cdot d\theta \tag{74}$$

And

$$B_z = \frac{\mu \cdot I}{4 \cdot \pi} \cdot \int_0^{2\cdot\pi} \frac{r \cdot \left(\ell \cdot COS(\theta) - r\right)}{\left(h^2 + \ell^2 + r^2 - 2 \cdot \ell \cdot r \cdot COS(\theta)\right)^{\frac{3}{2}}} \cdot d\theta \tag{75}$$

Solutions of above integrals are:

$$B_x = -\frac{\mu \cdot I}{2 \cdot \pi} \cdot \frac{h \cdot \left(\mathrm{EllipticE}\left(2 \cdot \sqrt{\frac{\ell \cdot R}{(R+\ell)^2 + h^2}}\right) \cdot \left(\ell^2 + h^2 + R^2\right) - \mathrm{EllipticK}\left(2 \cdot \sqrt{\frac{\ell \cdot R}{(R+\ell)^2 + h^2}}\right) \cdot \left((R-\ell)^2 + h^2\right)\right)}{\ell \cdot \left((R-\ell)^2 + h^2\right) \cdot \sqrt{(R+\ell)^2 + h^2}} \tag{76}$$

And

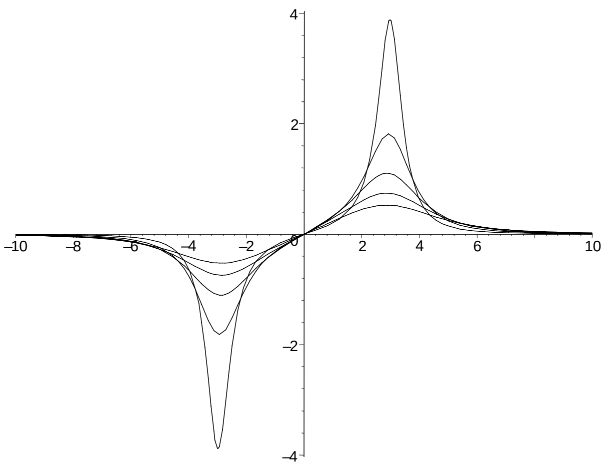
$$B_z = \frac{\mu \cdot I}{2 \cdot \pi} \cdot \frac{\mathrm{EllipticE}\left(2 \cdot \sqrt{\frac{\ell \cdot R}{(R+\ell)^2 + h^2}}\right) \cdot \left(\ell^2 + h^2 - R^2\right) - \mathrm{EllipticK}\left(2 \cdot \sqrt{\frac{\ell \cdot R}{(R+\ell)^2 + h^2}}\right) \cdot \left((R-\ell)^2 + h^2\right)}{\left((R-\ell)^2 + h^2\right) \cdot \sqrt{(R+\ell)^2 + h^2}} \tag{77}$$

Whereas:

- R = radius of stator coil's loop of left motor on fig. 1,
- I = electric current trough loop,
- h = altitude over the loop's plane,
- ℓ = distance from the axe of symmetry, i.e. from the center of a stator coil,
- d = distance between two stator coils.

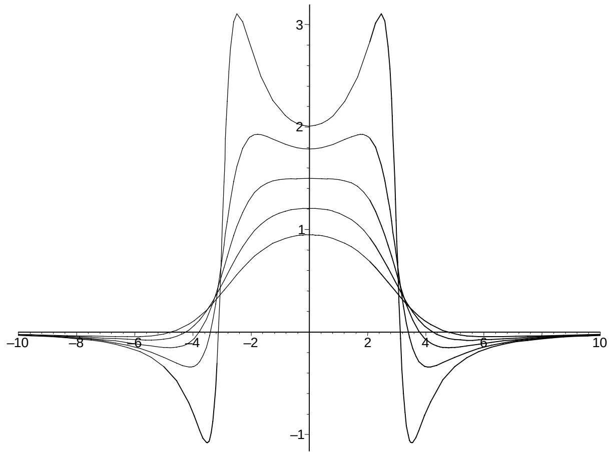
Graphic of B_x of a single loop (r = 3, h $\in$ [0.5, 1, 1.5, 2, 2.5]):

Fig. 15



Graphic of B_z of the loop ($r = 3$, $h \in [0.5, 1, 1.5, 2, 2.5]$):

Fig. 16



Necessary Condition for the motor to work is existence of following angular force momentum:

$$M = \int_0^R \ell \cdot \left(B_z(R,\ell,h=h_0) - B_z(R,\ell,h=d-h_0)\right)\cdot d\ell - R\cdot \int_{h_0}^{d-h_0}\left(B_x(R,\ell=R,h) + B_x(R,\ell=R,d-h)\right)\cdot dh \quad (78)$$

Parts of above equation represent momentums from horizontal parts of above device, and momentums from vertical parts of the device. These two momentums are in contra directions. If they are unequal, than rotor will start to rotate and the concept is correct.
<u>Unhappy, it is not case and M is always equal to zero – consequently the motor cannot work</u> without magnetic shields on vertical parts. However, the device has given us following equation:

$$\oint_\ell \vec{B}\times d\vec{\ell} = 0 \Rightarrow \oint_\ell \vec{\ell}\times\left(\vec{B}\times d\vec{\ell}\right) = 0 \quad (79)$$

This equation can be modified:

$$\left|\frac{dB_x}{dx}\right| + \left|\frac{dB_y}{dy}\right| + \left|\frac{dB_z}{dz}\right| = 0 \Rightarrow \oint_\ell \vec{\ell}\times\left(\vec{B}\times d\vec{\ell}\right) = 0 \quad (80)$$

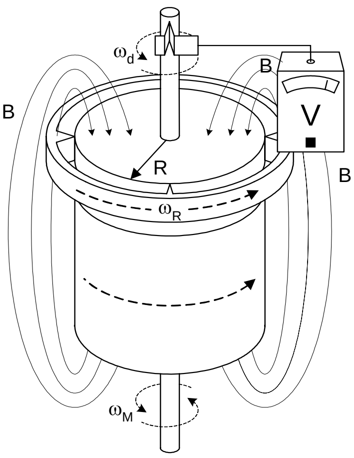
In the particular case of homogenous magnetic field it only amplifies mutual interaction of current elements in exposed contour ℓ without transfer of any momentum.
Furthermore the interaction that produces momentum in homopolar generator is not determined by the shape and size of outer circuit because it is defined by the magnitudes of electric current and magnetic field that act in inner part of contour only. It is obvious that in the special case strings must take a part, and than electric field in such particular case is decayed to originating string's field. In the case all strings are protracted between inner and outer part of electric field and thus the distance and size of outer part of circuit does not matter at all.

Second part of the text have clearly exposed true nature of magnetism and it showed that magnetic field lines is nothing more than electric field's lines generated by the charged particles in motion.
Electric field is consisted of string lines that produce force between electric poles. The force of a string does not depend on lengths, and consequently only the number of these strings defines magnitude of the force.
Final consequence is that physical fields cannot be annulled. Their energy exists and it can be detected – annulled field must be transmuted into something else to preserve law of energy conservation.
The most interesting consequence is that annulled electric field transmutes in gravitational field or magnetic field due to law of energy conservation. Inertial mass is not identical to gravitational mass.

RELATIVE HOMOPOLAR GENERATOR

The additional experiment should be consisted of rotating conductive disk, measuring device and wires of outer electric circuit fixed to the disk or the measuring device with wires should be fixed on the ring supplied with the brushes spinning with its own angular velocity that is independent to angular velocity of disk and velocity of magnet:

Fig. 17



In case that M hypothesis proposed by the theory is valid one, voltage shown on the voltmeter should show:

$$V = \frac{B \cdot r^2 \cdot (\omega_d - \omega_R)}{2} \tag{81}$$

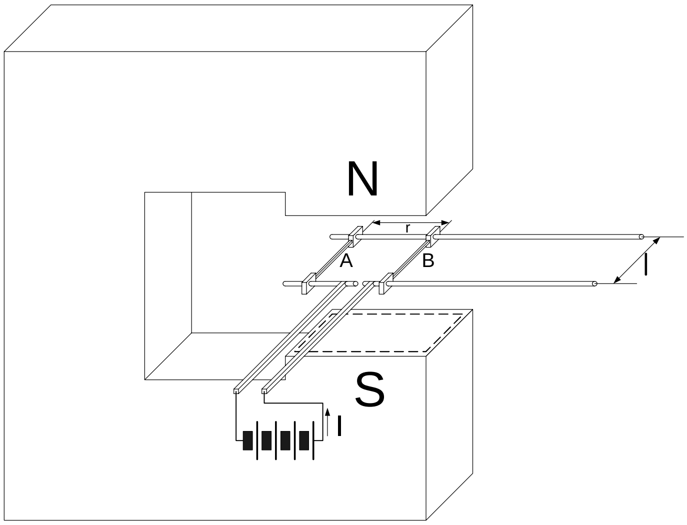
Otherwise, in case that generally accepted N hypothesis is correct voltage is:

$$V = \frac{B \cdot r^2 \cdot \omega_d}{2} \tag{82}$$

FINAL EXPLANATION OF HOMOPOLAR GENERATOR'S EFFECT AS DIRECT STRINGS' INTERACTIONS

Let we analyze following demonstration of the influence of external magnetic field to mutual interaction between conductors exposed to it:

Fig. 18



Above picture shows a specific current contour exposed to a homogenous magnetic field. The situation is identical to a rotor’s shaft in homopolar generator, although here almost whole circuit is exposed to the field. Here we have sliding bars **A** and **B** that conduct current **I** closing electric circuit.
In situation without permanent magnet nearly negligible force between bars will be:

$$F = \frac{\mu}{2 \cdot \pi} \cdot \frac{I^2 \cdot \ell}{r} \qquad (83)$$

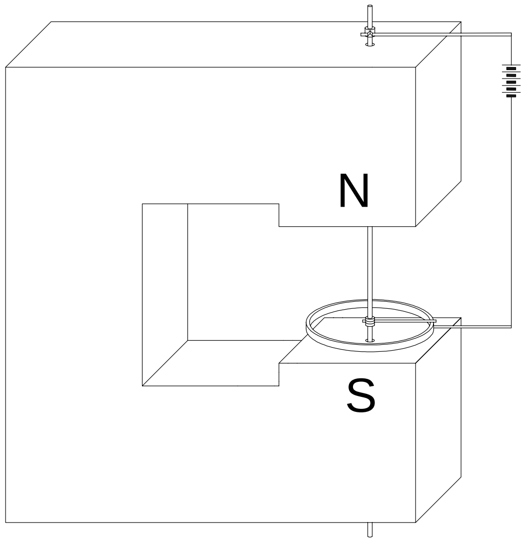
But, in case of existence of external homogenous magnetic field we have:

$$F = I \cdot B \cdot \ell \qquad (84)$$

Conveniently, for closed contour force that acts to a part of contour is equal to a force that acts to rest of the contour in both cases defined with equations (83) and (84). It is obvious that in case of equation (84) distance between bars does not take a role indicating that string interaction is involved. At the point we do not know whether external magnetic field is used as medium for interaction in which various part of the electric circuit generate force that interacts with internal magnet which is annulled in total or we have real string interaction enabled by external magnetic field. In case of mutual interaction with external magnetic field, which is conveniently annulled thus there is no resulting force that acts to source of external magnetic field, mutual interaction should not exist if bar B is moved outside the area affected by the magnet. Without a prop force that acts to bar A should vanish. If the force that acts to bar A still exists, than we could say that real string interaction took place in the interaction, or permanent magnet becomes a prop as Tesla predicted. It could happen because electric current in bars’ contour disturbs homogenous magnetic field making it inhomogeneous that enables interaction between bars and magnet. In that case homopolar paradox is a spurious effect that ruined two century of technical progress.

Following device would help us to resolve this dilemma:

Fig. 19



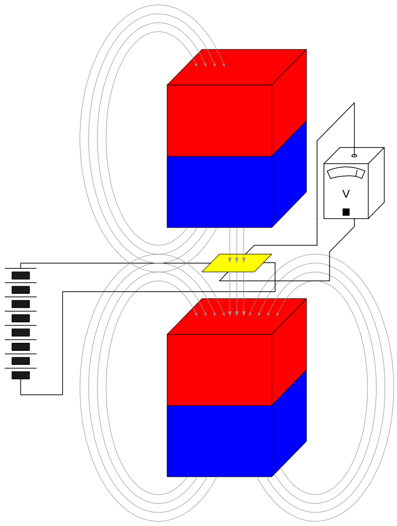
Outer part of electric circuit is not exposed to magnetic field and thus it cannot be involved in mutual interaction with rotating bar. Thus we have either real string interaction or interaction between bar and permanent magnet. Finally, it is question whether Tesla was right or it is string theory.

Somehow, it seems that external homogenous magnetic field brings a new quality to a mutual interactions between electric circuit's parts exposed to it.

HALL SENSOR

Hall sensor is a good device suitable for testing of the magnetic field theory. Regarding the theory speed of charges should have influence to specimen in hall sensor:

Fig. 20



Hall sensor's coefficients have different signs for different metals although electrons are equal in all metals. Regarding the theory difference between speed of charge carriers in core and in specimen defines appropriate constant and consequently Hall coefficient's sign. Let we arrange equations (14) to (17) for case of interaction between two wires' made from different metals:

$$E_{e^-} = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{-Q'}{r} = \frac{1}{2\cdot\pi\cdot\varepsilon\cdot r}\cdot\frac{-I}{v_{e^-}} \tag{85}$$

And

$$E_{p^-} = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{Q'}{r} \tag{86}$$

Doppler formula is:

$$f = f_0\cdot\left(1-\frac{v_{obs}-v_{e^-}}{c}\right) \tag{87}$$

Thus we have following fields seeing by observer:

$$E_{tot} = E_{p^+}\cdot\left(1-\frac{v_{obs}}{c}\right) + E_{e^-}\cdot\left(1-\frac{v_{obs}-v_{e^-}}{c}\right) \tag{88}$$

⇒

$$E_{tot} = E_{p^+} + E_{e^-} - E_{p^+}\cdot\frac{v_{obs}}{c} - E_{e^-}\cdot\frac{v_{obs}-v_{e^-}}{c} \tag{89}$$

⇒

$$E_{tot} = E_{e^-}\cdot\frac{v_{obs}}{c} - E_{e^-}\cdot\frac{v_{obs}-v_{e^-}}{c} \tag{90}$$

⇒

$$E_{tot} = E_{e^-}\cdot\frac{v_{e^-}}{c} = \frac{1}{2\cdot\pi\cdot\varepsilon\cdot r}\cdot\frac{-I}{v_{e^-}}\cdot\frac{v_{e^-}}{c} = -\frac{1}{2\cdot\pi\cdot\varepsilon\cdot r}\cdot\frac{I}{c} \tag{91}$$

⇒

$$Q' = \frac{I}{c} \tag{92}$$

We have the same formula as for identical conductors. But internal speeds in particular mediums are different and thus electrons in every medium will notice different Doppler influence regarding speed of light in their environment.
Formula for interaction between two charged strings are:

$$F' = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{Q'_1\cdot Q'_2}{r} = \frac{1}{2\cdot\pi\cdot\varepsilon}\cdot\frac{\frac{I_1}{c_1}\cdot\frac{I_2}{c_2}}{r} \tag{93}$$

⇒

$$F' = \frac{\sqrt{\mu_1\cdot\mu_2}}{2\cdot\pi}\cdot\frac{I_1\cdot I_2}{r} \tag{94}$$

This is modified formula for force between two conductors made from different metals. Last formula shows that speed of electrons in metals can play role in mutual current interactions between two conductors.
From equation (37) we have:

$$\vec{E}_{eff} = \frac{\vec{v}_1 \times \vec{E}_{tot}}{c_1} \tag{95}$$

We also have:

$$\frac{c_1}{c_2} = \sqrt{\frac{\varepsilon \cdot \mu_2}{\varepsilon \cdot \mu_1}} = \sqrt{\frac{\mu_2}{\mu_1}} \tag{96}$$

$\Rightarrow$

$$\vec{E}_1 = \frac{\vec{v}_1 \times \vec{E}_{tot}}{c_1} = \sqrt{\frac{\mu_1}{\mu_2}} \cdot \vec{v}_1 \times \frac{\vec{E}_{tot}}{c_2} = \sqrt{\frac{\mu_1}{\mu_2}} \cdot \vec{v}_1 \times \vec{B}_2 = \sqrt{\frac{\mu_1}{\mu_2}} \cdot \rho_1 \cdot \vec{J}_1 \times \vec{B}_2 \tag{97}$$

$\Rightarrow$

$$V_1 = \sqrt{\frac{\mu_1}{\mu_2}} \cdot \rho_1 \cdot \frac{I_1}{h_1 \cdot d_1} \cdot d_1 \cdot B_2 = \sqrt{\frac{\mu_1}{\mu_2}} \cdot \rho_1 \cdot \frac{I_1}{h_1} \cdot B_2 \tag{98}$$

$\Rightarrow$

$$V_{specimen} = \frac{\rho_{specimen} \cdot I_{specimen} \cdot \sqrt{\mu_{specimen}}}{h_{specimen}} \cdot \frac{B_{magnet}}{\sqrt{\mu_{magnet}}} \tag{99}$$

Above equation is formula for Hall potential in a specimen. Regarding above formula Hall's potential is not only function of current and specimen characteristic, but it is also a function of characteristic of an external magnet's core. For correct estimation of Hall effect, the specimen and the core should be made from same materials.

HALL ANTENNA

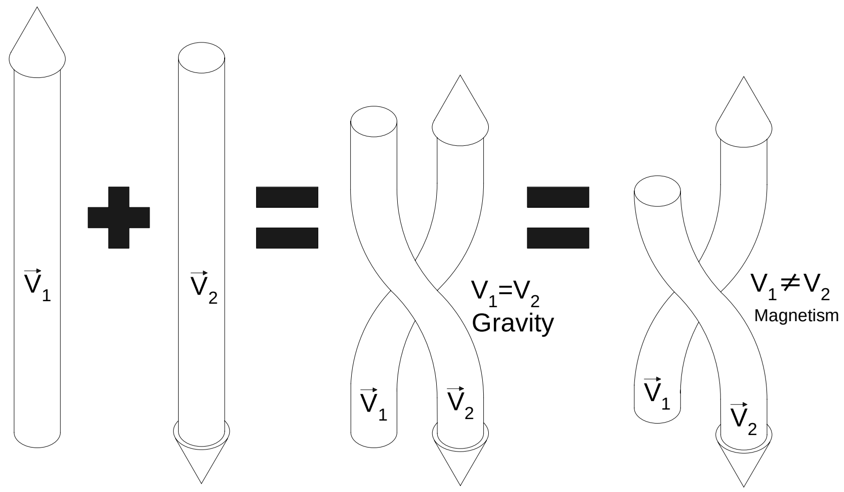
This new view to a magnetic field brings us ability to build a new class antennas based on Hall effect. Amount of charges moved in thin film Hall sensor is much bigger than one in the best designed Hertz dipoles. In Hertz dipoles we help us with dialectic charge displacement to achieve maximally possible amount of charge movement because this directly defines efficiency of an antenna.
Virtual dipole formed in hall thin film sensor is completely settled in metal and thus speed of the antenna should be much higher than best ones available today.

GRAVIATION, ELECTRICITY AND MAGNETISM AS ENTANGLED STRINGS OF THE SAME FIELD

Now it is perfectly clear that gravitation is made from composition of two electric strings in contra directions, i.e. it is entangled composition of two electric strings in contra directions. As it is already mentioned, the main presumption is that gravitational field appears in annulment of opposite electric fields. In the case, composition of two electric strings in their contra direction produces gravitational

string. But, when these two strings have different mutual velocities, we have magnetic string.
As it is already presumed that number of strings is finite and it determines magnitude of an interaction. Consequently, increasing of magnetic field must lead to decreasing of strength of gravitational field of the neutral conductor.
Following picture shows arising of magnetic and gravity fields:

Fig. 21



So, gravitational particles gravitons can be produced by photons annulment. Regarding impossibility that energy of two annulled light beams can be lost, they apparently must be transferred into gravitational energy beam. Annulment of two magnets under adequate circumstances must produce gravitational force. We can consider gravitons as kind of photons with zero spin projection.
This theory predicts difference between gravitational and inertial masses. The equality between these two kinds of masses has origin in conveniently chosen unit for masses in both cases.
If we sort fields regarding their bends to empty space we can divide fields to two major groups: one that attract empty space like electric field and the other ones that repeal empty space like magnetic and gravitational fields. Thus general formula for field can be defined with:

$$\left|\vec{F}\right| = k \cdot \frac{\left(p_1 \cdot \left(1 + (i-1) \cdot \delta_{1,t_{p1}}\right)\right) \cdot \left(p_2 \cdot \left(1 + (i-1) \cdot \delta_{1,t_{p2}}\right)\right)}{\vec{r}^{\,2}} \qquad (100)$$

Whereas:

p = quantity value of the pole charge,
k = constant of the field,
t_p = type of field, it is 0 or 1: the 0 is value for electrical, and the 1 is value for the magnetic and gravitational field.

Archimedes or Eisner formula of force acting to a globe without the field from a field's source, i.e. pole is:

$$\left|\vec{F}\right| = \oint_S P \cdot d\vec{S} = \int_V \vec{\nabla} P \cdot d\vec{S} = \int_V \vec{\nabla}\left(\frac{dU}{dV}\right) \cdot dV = \int_V \vec{\nabla}\left(\frac{\left(k \cdot \frac{p \cdot \left(1 + (i-1) \cdot \delta_{1,t_p}\right)}{r^2}\right)^2}{8 \cdot \pi \cdot k}\right) \cdot dV \quad (101)$$

Solution of above integral is:

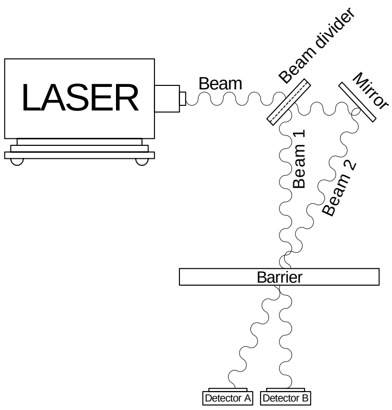
$$F = k \cdot \frac{p^2 \cdot (-1)^{t_p}}{4} \cdot \left(\frac{r \cdot (d^2 + r^2)}{d \cdot (d^2 - r^2)^2} - \frac{Ln\left(\frac{d+r}{d-r}\right)}{2 \cdot d^2}\right) \quad (102)$$

One $1m^3$ of vacuum at earth level produces gravitational upward force of nearly 36000N.

WAY OF G WAVES PRODUCTIONS

The device that produce gravitational beam from two annulled light beams are shown on the following picture:

Fig. 22



In volume of light beams' annulment, both electromagnetic beams transmute into gravitational one that is able to pass trough barrier because barrier is transparent for the new beam, i.e. for this new kind of radiation.
The passed light beams are attenuated and also <u>completely equal</u>. Their unequal parts are thermally absorbed or reflected by barrier.
This device can be used as AND logic gate in optical computers and also like analog optic mirror of two light or microwave beams on thin opaque barrier as it is case with Widlerr current mirror.
Formula for gravity waves is:

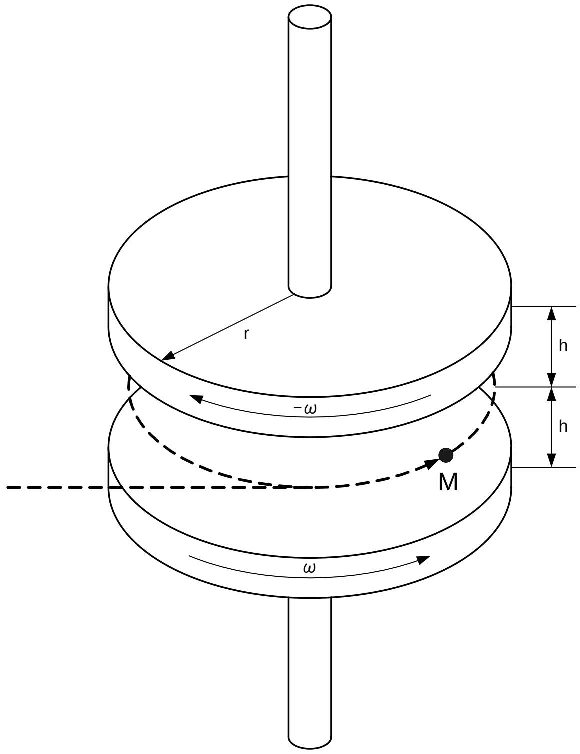
$$i \cdot c \cdot \vec{\nabla} \times \vec{G} = \frac{\partial \vec{G}^*}{\partial t} \quad (103)$$

Whereas $\vec{G}^* = \mathrm{CONJ}(\vec{G})$.

We can conceive Gravitons as entangled photons. These particles consisted of annulled entangled photons' couples do not have spin just as we expecting, thus they are right candidates for gravitons.

Static magnetic G field can be produced mechanically in the plane between two parallel disks that rotate in contra direction because we do not have anti-matter to flow near matter, as it is shown on the following picture:

Fig. 23



Mass M would feel force gravo-magnetic force to upper or lower disk regarding following formula:

$$G_{tot} = G \cdot \left(1 - \frac{v + \omega \cdot R}{c}\right) + G \cdot \left(1 - \frac{v - \omega \cdot R}{c}\right) = -\frac{2 \cdot G \cdot v}{c} \qquad (104)$$

The force will always acts to a disk that rotates towards to mass movement. It is clear that due to opposite behavior between magnetic and electric fields main electromagnetic equation would have different sign:

$$G_M = -\vec{v} \times \vec{G} \qquad (105)$$

Thus a charge would be kept between two charged disks that rotate in contra direction and that is opposite to situation with masses where a mass would be more attracted by one of disks depending the direction of its movement.

CONCLUSION

Regarding all above it is obvious that physical field has its own velocity and thus M hypothesis is valid instead of officially accepted N hypothesis (M – moveable, N – non-moveable). It means that electric field has its own velocity. Otherwise manifestation of magnetic field as special case of electric field would never exist in nature. Electric fields with physical charges as sources cannot be annulled and only resulting force can be eliminated. If it is not so, the Hooper effect and magnetic induction would not be possible, i.e. electromagnets could not exist because outside of the neutral conductor of electromagnets' coils are not electric field, but certainly there is magnetic field.

All electromagnetism effects are caused by a composition of two opposite fields (arising from the cores and electrons) slightly modified by Doppler effect.

Furthermore, Maxwell equation is a special case of modified general form of Doppler effect for fields only with variable part in resulting field because cores' field annuls constant part.

The device from fig. 10 keeps a solution for a dilemma: whether Tesla was right or there is pure string interaction in action. In case of string interaction, inner part of the electric circuit that is moving above permanent magnet interacts with outer parts containing battery. The shape of outer circuit does not affect intensity of force that tries to spine the magnet because it is defined by the intensity of the magnetic field and length of bar exposed.

We could say that it is just a case of strings' interaction in which strings distribution is not uniform over the globe surrounding a source, and thus Coulomb force does not decrease with distance with $\mathbf{r^2}$ or does not decrease with distance at all as it is happening in proposed case. Explanation of electric's transformer operation and its very high efficiency can be easily explained with sheaf of strings in closed magnetic circuit existing in the device. Consequently "Acts on distance" interaction is possible. It is interesting that the possibility is predicted by Newton in Principia proposing that **r** in formula for gravitational interaction can be raised to the power different than two.

In case that Tesla was right, whenever stronger current start running trough disk above magnet (fig. 11), it makes its own magnetic field that breaks symmetry of permanent magnet below. Then the magnet itself is used as prop for a force that try to spine the disk. And, in the case, machine proposed on fig. 10 could not work at all because absence of possible prop, neither it would be able to produce a potential when it works like generator even on the Giga ohm multi-meter.

Thus the simple device from fig. 10 keeps secret of the world and it should be tested anyway due to simplicity of the experiment.

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1. "Frequency Shift that is Caused By Observer Movement", Journal of Theoretics, Volume 5-4, Aug-Sept 2003

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