IL NUOVO CIMENTO Vol. 124 B, N. 1 Gennaio 2009
DOI 10.1393/ncb/i2009-10742-6

Basic topics: Fundamental Physics

True explanation of operation of homopolar engine

A. Radović
Spasovdanksa 13a, 11030 Beograd, Serbia

(ricevuto il 4 Settembre 2008; revisionato il 17 Marzo 2009; approvato il 18 Marzo 2009; pubblicato online il 6 Maggio 2009)

Summary. — Operation of Faraday's homopolar engine had crucial aftermaths to contemporary science. Most of misunderstandings of the machine's operation caused wrong acceptance of N hypothesis instead of M one. Although there were plenty of authors suspecting that physical fields are moveable, this fact is finally duly proven by the experiment depicted in the text. There are also analyzed classical string theoretical concept with fields' equations and the induction formula.

PACS 84.50.+d – Electric motors.
PACS 03.50.De – Classical electromagnetism, Maxwell equations.
PACS 07.55.Db – Generation of magnetic fields; magnets.
PACS 13.40.-f – Electromagnetic processes and properties.

1. – Introduction

At the beginning of the 19th century there was great arguing between advocates of M hypothesis and of N hypothesis. M hypothesis denotes a concept of physical reality in which the physical fields have their own velocities and these velocities mainly match the velocities of the fields' sources. N hypothesis is a concept of physical reality in which the physical fields do not have their own velocities and therefore physical sources, *i.e.* poles just change the magnitude of the eternally existing fields without affecting their own velocities at all. This standpoint is based on the conviction that the concept of physical fields represents rather a mathematical generalization of force's action than a real thing. Therefore mathematical imagination or fiction cannot have a plausible velocity that reflects something real.

The N hypothesis won the M hypothesis after the famous Faraday's experiment with the homopolar generator was performed and that allegedly proved that N hypothesis is the only valid one. Furthermore, this generator was the first electric machine ever built and consequently it was a milestone for all subsequent physical theories. The aftermath of this experiment to the following development of theoretical electromagnetism was tremendous: Maxwell equations had to have total time derivatives instead of partial ones to prevent propagation of the time derivative to the coordinate which would transform the coordinate into the velocity and this is not possible within N hypothesis simply because

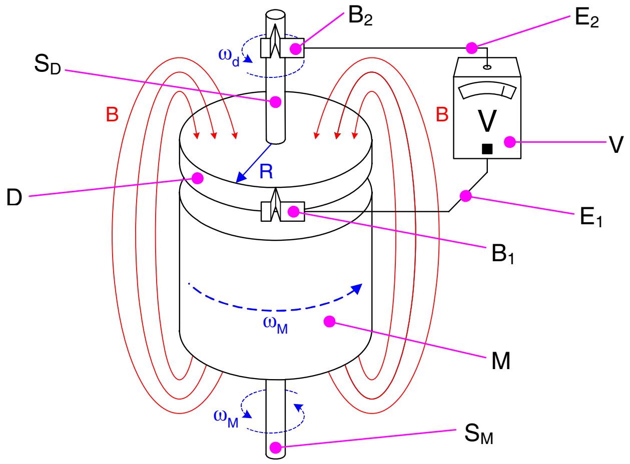

Fig. 1. – Original Faraday's homopolar generator.

a field does not have its own velocity at all. Due to that all a further obstacle that came from this concept is the absence of the referential point for velocity measurement. Therefore Lorentz had problems to define anchor for velocity measurement in his famous formula (2). The velocity is a time derivative of a coordinate vector and this vector should have both well-defined ends, while angular velocity could be absolutely defined via the centrifugal force produced by this particular angular velocity and has not been discussed in this treatise although it might not be duly correct according to eqs. (71) and (72). Then he introduced the observer as the term that denotes the referential point for velocity determination. Lorentz had to derive his famous transformations as an attempt to make the observer relative, *i.e.* to make his position irrelevant because the observer should not be able to affect reality and measurements by his observation only. His further attempt to fix this problem with the necessity of observer's existence was done by Einstein who did a true state-of-the-art computation in his famous theory *The Theory of Relativity* in which he introduced two postulates: the first one is the asymmetry of electromagnetic action which exists according to N hypothesis and the other one is the costant of light speed [1].

It seems that the origin of M hypothesis is settled in the third Newton law. All these subsequent theories are just an echo of the Aristotle([1]) physical concept.

2. – Operation of homopolar engine

The homopolar engine is shown in fig. 1.

This machine was invented by Faraday([2]) and published in his book in 1831 and his explanation of the device's operation had definitely changed the course of mankind history for almost two centuries [2].

The machine consists of a homopolar permanent magnet M whose top and bottom are magnetic poles and this magnet is also able to independently rotate on the shaft S_M.

([1]) Aristotle, 384 BC-322 BC.
([2]) Michael Faraday, 1791-1867.

Above the magnet there is a non-magnetic conductive disk D also able to freely rotate on shaft S_D with respect to laboratory. A voltmeter V is attached via external parts of the electric circuit E_1 and E_2 to brushes B_1 and B_2, respectively; brush B_2 creates contact to shaft S_D and another brush B_1 creates contact to the brim of the disk D too.

The main apparently amazing characteristic of this machine that astonished Faraday and his coevals was the fact that the angular velocity of the permanent magnet M measured on any way has no influence on the generated voltage output at all—only the angular velocity(3) of the disk D affects the induction measured on the voltmeter V which perfectly matches the following theoretical formula ($\vec{\omega}\perp\vec{r}$ and $\vec{\omega}\perp\vec{B}$ and $\vec{r}\perp\vec{B}$, detailed derivation in [3]):

$$V = \int_0^r (\vec{\omega} \times \vec{r}) \times \vec{B} \cdot \mathrm{d}\vec{r} = \frac{\omega_{\mathrm{disc}} \cdot B \cdot r^2}{2}\,. \tag{1}$$

This is based on the following equation:

$$\vec{E} = \vec{v} \times \vec{B}. \tag{2}$$

In the text below it will be shown that the proper form of the above equation should be

$$\vec{E}_1 = \vec{v}_{1,2} \times \vec{B}_1. \tag{3}$$

Faraday was claiming that the field is non-motional (*i.e.* that N hypothesis is valid) and he finally proved the concept experimentally with the above machine now known as Faraday's Homopolar Generator and then M hypothesis was abandoned. This proof was based on the fact that the rotation of the homopolar magnet does not have any influence on the induction itself and the consequential conclusion is that the magnetic field does not have its own velocity. Aftermath of the conclusion was the necessity of an involvement of observer's concept into classical electromagnetic theory, simply because velocity in eq. (83) could not be defined in regards to something that does not have its own velocity at all. Lorentz(4) tried to resolve this problem with the attempt of relativization of the observer's concept known as Lorentz transformations. A fully evolved theory of the observer's relativization was finally developed later by Einstein(5).

But, official Faraday's explanation seems to be incorrect, which is pretty obvious from the rearrangement of the above machinery (fully described in [3]).

The machinery shown in fig. 2 represents Faraday's machine which works as a motor. Whenever it works as a motor there is the question what is the prop of the rotor, *i.e.* which part is the rotor and which part is the stator in this DC electric machine. It is quite obvious that a permanent magnet cannot be a stator simply because its rotation affects neither induction nor torque at all.

What the stator of the machine exactly is becomes quite obvious when the conductive disk is overlapped with the permanent homopolar magnet. Then the above machinery is transformed into the device shown in fig. 3 (fully described in [3]).

---

(3) Angular velocity is measured with respect to an inertial frame.
(4) Hendrik Antoon Lorentz, 1853-1928.
(5) Albert Einstein, 1879-1955.

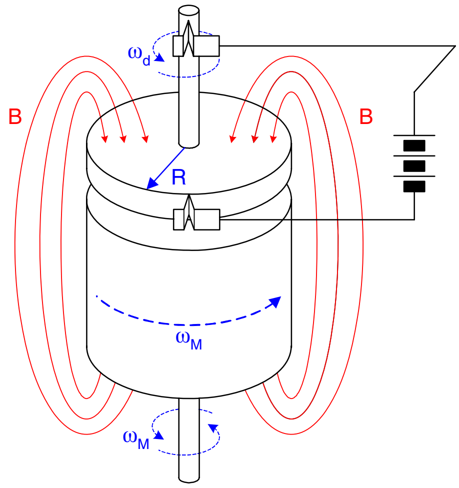

Fig. 2. – Faraday-like homopolar motor.

It is quite obvious that the stator can only be the outer part of the electric field simply because there is nothing else remained that could be used as prop—otherwise the device will seriously violate the very basic law of angular momentum's conservation by repelling on itself. This indisputably means that the magnetic field rotates altogether with the magnet which implies that magnetic field has its own velocity. We can test this hypothesis with the machinery shown in fig. 4 (fully described in [3]).

This machinery is composed of a freely rotating homopolar permanent magnet, a freely rotating disk and a freely rotating ring with brushes also carrying the outer part of electric field with attached voltage measuring device. The observed voltages are obeying

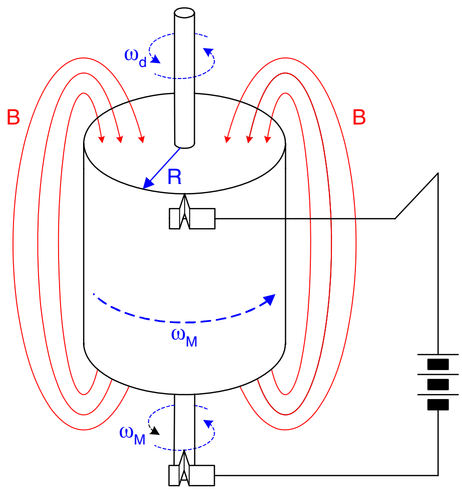

Fig. 3. – Compact Faraday's motor.

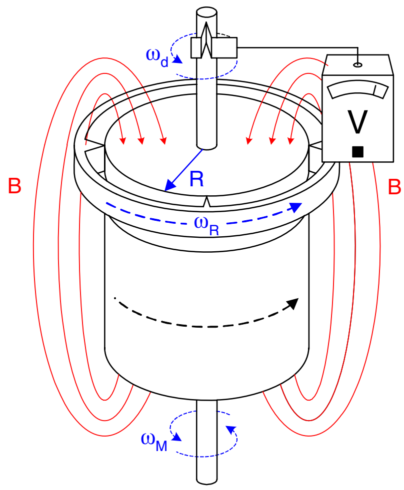

Fig. 4. – Faraday's generator with moveable conductors.

the following formula:

$$V = \int_0^r (\vec{\omega} \times \vec{r}) \times \vec{B} \cdot \mathrm{d}\vec{r} = \frac{(\omega_{\text{disk}} - \omega_{\text{ring}}) \cdot B \cdot r^2}{2} \,. \tag{4}$$

Induced voltage is proportional to the difference between the angular velocities of rotating ring and rotating disk, while the angular velocity of the permanent magnet still remains irrelevant. Whenever the outer part of the electric field is rotating together with the conductive disk with the same angular speed there is no induced voltage shown on the voltmeter.

This experimental set-up duly proves that the outer part of the electric circuit is also exposed to a rotating magnetic field which intersects both inner and outer parts of the electric circuit.

There is a simple experimental set-up able to confirm that the rotating permanent homopolar magnet has a motional magnetic field. The set-up consists of a homopolar magnet and a small ball charged with Van de Graaff([6]) generator and then hanged above the homopolar magnet as is shown in fig. 5.

The angle between charge's tether and vertical direction is strongly affected by the angular speed of the permanent magnet regardless the magnet's conductivity and capacity. Anyway, this possibility can be excluded simply by the calculation of the magnet's electrostatic capacity to exclude the hypothesis of invariance of electric and magnetic influence by homopolar magnet [4]. If this would not be the case, then it means that magnetic field is only a catalyst and that there is interaction with ether itself (whose existence was disproved by Michael-Morrison experiment) giving a new meaning to eq. (90).

Lorentz's force that acts to this charge is caused by the rotation of the magnetic field:

$$\vec{F}_{1,2} = Q_1 \cdot \vec{v}_{1,2} \times \vec{B}_2 = Q_1 \cdot (\vec{\omega}_M \times \vec{r}_{1,2}) \times \vec{B}_2. \tag{5}$$

([6]) Robert Jemison Van de Graaff, 1901-1967.

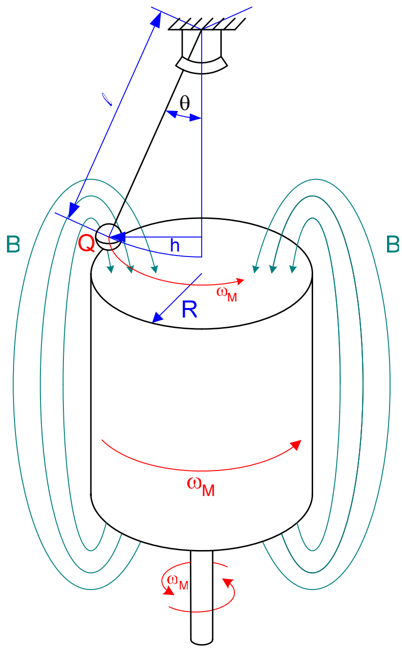

Fig. 5. – Homopolar magnet affects a charge.

Forces' composition acting to those charges is

$$\vec{F}_{\vec{E}} \pm \vec{F}_{\vec{B}} - \vec{F}_{\vec{G}} = 0. \tag{6}$$

The experimentally determined inclination angle of tether that carries charge almost perfectly matches the following theoretical formula derived from (5) and (6) only:

$$Q_1 \cdot \omega_M \cdot h \cdot B_2 = m_1 \cdot g \cdot \frac{h}{\ell} \cdot \sqrt{1 - \left(\frac{h}{\ell}\right)^2}. \tag{7}$$

The fact that the charge is strongly affected by the rotation of the homopolar magnet below is the ultimate proof that magnetic field rotates altogether with its source, just as Tesla(7) supposed in [5].

This practically means that the influence of the rotational magnetic field of the homopolar magnet is equal and opposite to the inner and to the outer parts of the electric circuit. This is so just because the magnetic force lines of the permanent magnet are all closed and the numbers of intersections per inner and per outer parts of the electric circuit are always equal, which is the geometrical property of 3D space.

(7) Nikola Tesla, 1856-1943.

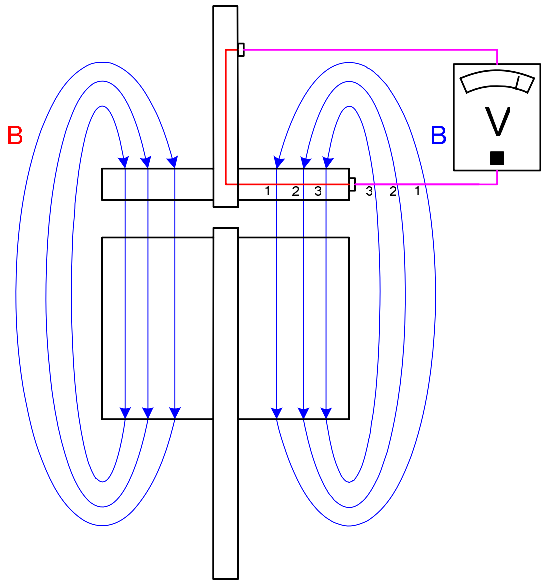

Fig. 6. – Influence of magnetic field to the parts of the machinery.

3. – Detail explanation of homopolar engine's operation

The 2D picture in fig. 6 depicts inner and outer parts of the electric circuit intersected by field's lines.

We can notice that numbers of intersections per inner and outer parts of the electric circuit are identical and directions of intersections are opposite which annuls the induction of the rotating magnet, *i.e.* it means that rotating magnet generates identical and opposite potentials in internal and external parts of the electric field. This is happening simply because field's lines are closed which implies that equal numbers of fields' lines exist inside and outside the magnet. This is based on the geometrical fact that any closed contour must intersect a square precisely even number of times with equal number of inner and outer intersections, which in total annuls the influence of homopolar permanent magnet's rotation.

The corresponding force momentums that act to inner and outer parts of the electric circuit are equal and opposite.

Field's lines could be also represented as strings. Strings are idealized field's lines within the classical concept of field's strings although quantum mechanics claims that these strings are quite real and their number is finite and defined through field's flux quantum.

The classical concept of field's strings is provoked by the experiment performed in the late 19th century and shown in fig. 7.

The picture shows that two magnets immersed in a superconductive fluid will have constant force of interaction regardless the distance till the potential energy of the string is reached and then string is cut off. This is very similar to Gauss([8]) field's formula which

([8]) Johann Carl Friedrich Gauss, 1777-1855.

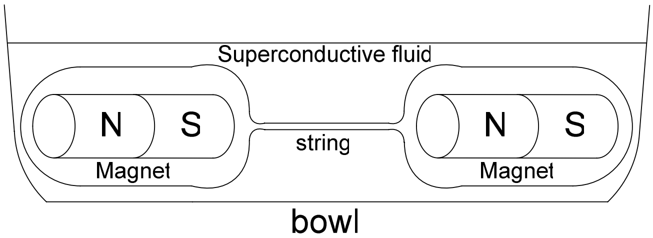

Fig. 7. – String in E^1 space.

is just the continuum equation of field's lines:

$$\rho = \varepsilon \cdot \vec{\nabla}\vec{E}. \tag{8}$$

In classical field's string theory we should define the potential as the number of strings that intersects a wire per time:

$$U = \frac{\mathrm{d}N_{\vec{B}}}{\mathrm{d}t}\,. \tag{9}$$

The magnetic field is defined as a concentration of strings penetrating the surface:

$$\vec{B} = \frac{\mathrm{d}N_{\vec{B}}}{\mathrm{d}\vec{S}}\,. \tag{10}$$

And also

$$\vec{E} = \frac{\mathrm{d}N_{\vec{E}}}{\mathrm{d}\vec{S}} = \frac{1}{\varepsilon} \cdot \frac{\mathrm{d}Q}{\mathrm{d}\vec{S}}\,. \tag{11}$$

Directly from Gauss law we have

$$N_{\vec{E}} = \oiint_S \vec{E} \cdot \mathrm{d}\vec{S} = \frac{Q}{\varepsilon}\,. \tag{12}$$

String's force between poles is then defined as

$$\vec{F}_{1,2} = Q_1 \cdot \frac{\mathrm{d}N_2}{\mathrm{d}\vec{S}_1}\,. \tag{13}$$

Also

$$\vec{F}_{2,1} = Q_2 \cdot \frac{\mathrm{d}N_1}{\mathrm{d}\vec{S}_2} = -\vec{F}_{1,2}. \tag{14}$$

This concept is depicted in fig. 8.

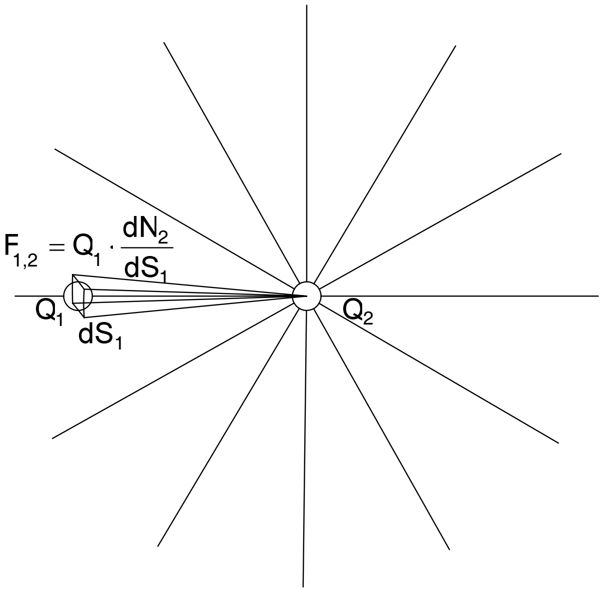

Fig. 8. – Force by strings.

If we accept M hypothesis as the valid one, then the increase of magnitude of the magnetic field is caused by the upturning of concentration of magnetic strings in the particular area. We should also assume that magnetic strings cannot appear nor vanish. Then the upturn of magnetic strings' concentration can be achieved only by migration of those strings which then by their motions intersect the electric contour inducing electric potential according to eq. (9):

$$N = N_0 + \int_0^t \oint_t \frac{\mathrm{d}N}{\mathrm{d}\vec{S}} \cdot (\mathrm{d}\vec{\ell} \times \vec{v}) \cdot \mathrm{d}t \tag{15}$$

⇒

$$\frac{\mathrm{d}N}{\mathrm{d}t} = \int_S \int \vec{\nabla} \times \left(\vec{v} \times \frac{\mathrm{d}N}{\mathrm{d}\vec{S}} \right) \cdot \mathrm{d}\vec{S} \tag{16}$$

⇒

$$\frac{\mathrm{d}^2 N}{\mathrm{d}t \cdot \mathrm{d}\vec{S}} = \vec{\nabla} \times \left(\vec{v} \times \frac{\mathrm{d}N}{\mathrm{d}\vec{S}} \right). \tag{17}$$

The above formula is the general field's string equation. This is also a general 2D continuity equation of strings penetrating the generalized surface. After we insert (10) into (17) we will obtain the following formula for the magnetic field acting on a plane $\hat{n}$ collinear with the field, so we have the following continuum equation:

$$\frac{\mathrm{d}\vec{B}}{\mathrm{d}t} = \vec{\nabla} \times \left(\vec{v} \times \vec{B} \right). \tag{18}$$

where $\vec{B}$ denotes the magnetic field and $\vec{v}$ denotes the velocity of magnetic field's lines' migration. We can generalize the above equation to all persistent physical fields originated in their non-decaying poles with uniform strings' distribution including gravity field too, so within M hypothesis the next equation of gravitational field is valid:

$$\frac{\mathrm{d}\vec{G}}{\mathrm{d}t} = \vec{\nabla} \times \left(\vec{v} \times \vec{G}\right). \tag{19}$$

Classical string theory's formula of electric field is

$$\frac{\mathrm{d}\vec{E}}{\mathrm{d}t} = \vec{\nabla} \times \left(\vec{v} \times \vec{E}\right). \tag{20}$$

After (10) is inserted into (9) we have

$$U = \frac{\mathrm{d}}{\mathrm{d}t} \oiint_S \vec{B} \cdot \mathrm{d}\vec{S} = \frac{\mathrm{d}\Phi}{\mathrm{d}t}, \tag{21}$$

where U is the electric potential, B is the magnetic field, S is the element of the area, t is the time and Φ is the flux of the magnetic field.

The above equation is a precise derivation of Gaussian induction's formula. It is directly derived by string idealization within M hypothesis of motional magnetic field.

After Stokes([9]) mathematical transformation is applied to the above equation and potential is replaced with its definition, it is derived:

$$\oiint_S \vec{\nabla} \times \vec{E} \cdot \mathrm{d}\vec{S} = \frac{\mathrm{d}}{\mathrm{d}t} \oiint_S \vec{B} \cdot \mathrm{d}\vec{S}. \tag{22}$$

The above equation can be differentiated on surface and then we obtain the first Maxwell([10]) equation:

$$\vec{\nabla} \times \vec{E} = \frac{\mathrm{d}\vec{B}}{\mathrm{d}t}. \tag{23}$$

It should be noticed that there are total time derivatives in the Maxwell equations within M hypothesis instead of partial ones.

We have just seen that the equation which corresponds to the first Maxwell equation is actually just a formula for migration of magnetic lines, but the second Maxwell-like equation cannot be derived with such elegance.

This second Maxwell-like equation could be derived directly from both empiric Biot([11])-Savart([12]) law and eq. (20):

$$\mathrm{d}\vec{B}_1 = -\frac{\mu}{4 \cdot \pi} \cdot \frac{I_1 \cdot \mathrm{d}\vec{\ell}_1 \times \hat{r}_{1,2}}{\vec{r}_{1,2}{}^2}, \tag{24}$$

([9]) George Gabriel Stokes, 1819-1903.
([10]) James C. Maxwell, 1831-1879.
([11]) Jean-Baptiste Biot, 1774-1862.
([12]) Felix Savart, 1791-1841.

where I is the electric current, $r_{1,2}$ is the distance between the current element and measuring position, $\mathrm{d}\ell$ is the infinitesimal current path and B_1 is the magnetic field on the test position.

The above equation can be modified in the following way:

$$\mathrm{d}\vec{B}_1 = -\frac{\mu}{4\cdot\pi}\cdot\frac{\frac{\mathrm{d}q}{\mathrm{d}t}\cdot\mathrm{d}\vec{r}_{1,2}\times\hat{r}_{1,2}}{\vec{r}_{1,2}^{\;2}} = \frac{\vec{v}_{1,2}}{c^2}\times\frac{1}{4\cdot\pi\cdot\varepsilon}\cdot\frac{\mathrm{d}q\cdot\hat{r}_{1,2}}{\vec{r}_{1,2}^{\;2}} = -\frac{\vec{v}_{1,2}}{c^2}\times\mathrm{d}\vec{E}. \tag{25}$$

After integration we have

$$\vec{B} = -\frac{\vec{v}\times\vec{E}}{c^2} = \frac{\vec{E}\times\vec{v}}{c^2}. \tag{26}$$

After Curl is applied on the above equation and with the help of (20) we have

$$\vec{\nabla}\times\vec{B} = \frac{\vec{\nabla}\times\left(\vec{v}\times\vec{E}\right)}{c^2} = -\frac{1}{c^2}\cdot\frac{\mathrm{d}\vec{E}}{\mathrm{d}t} \tag{27}$$

and

$$c^2\cdot\vec{\nabla}\times\vec{B} = -\frac{\mathrm{d}\vec{E}}{\mathrm{d}t}. \tag{28}$$

We have eqs. (23) and (28) that correspond to Maxwell ones. While there are total time derivatives in both (23) and (28) there is no need for missing DC term with current density which describes the appearance of the magnetic field near conductors with direct constant current only. This term was artificially added in official Maxwell equation just to keep its ability to handle appearance of constant magnetic field near DC conductors.

After eq. (28) is slightly rearranged and multiplied with imaginary unit i, we have

$$\mathrm{i}\cdot c\cdot\vec{\nabla}\times\vec{B} = -\frac{\mathrm{i}}{c}\cdot\frac{\mathrm{d}\vec{E}}{\mathrm{d}t}, \tag{29}$$

where i is the imaginary unit, c is the speed of light, E is the electric field and B is the magnetic field.

After (23) is added to the above equation we have

$$\vec{\nabla}\times\vec{E} + \mathrm{i}\cdot c\cdot\vec{\nabla}\times\vec{B} = \frac{\mathrm{d}\vec{B}}{\mathrm{d}t} - \frac{\mathrm{i}}{c}\cdot\frac{\mathrm{d}\vec{E}}{\mathrm{d}t}. \tag{30}$$

This equation is then rearranged into the following form:

$$\mathrm{i}\cdot c\cdot\vec{\nabla}\times\left(\vec{E}+\mathrm{i}\cdot c\cdot\vec{B}\right) = \frac{\mathrm{d}}{\mathrm{d}t}\left(\vec{E}+c\cdot\mathrm{i}\cdot\vec{B}\right). \tag{31}$$

Let us denote the complex electromagnetic field with K:

$$\vec{K} = \vec{E} + \mathrm{i}\cdot c\cdot\vec{B}. \tag{32}$$

Thus we have the following recursive relation of complex electromagnetic field $\vec{K}$:

$$\mathrm{i} \cdot c \cdot \vec{\nabla} \times \vec{K}_{j+1} = \frac{\mathrm{d}\vec{K}_j}{\mathrm{d}t} . \tag{33}$$

Equation (33) is a single equation containing only complex electromagnetic field $\vec{K}$ and that equation corresponds to Maxwell ones.

We also have the following non-recursive general formula of field's migration:

$$\frac{\mathrm{d}\vec{K}}{\mathrm{d}t} = \vec{\nabla} \times \left(\vec{v} \times \vec{K} \right) . \tag{34}$$

Directly from (33) and (34) we have a quite interesting relation:

$$\vec{K}_{n+1} = -\mathrm{i} \cdot \left(\frac{\vec{v}}{c} \right) \times \vec{K}_n \tag{35}$$

$\Rightarrow$

$$\vec{K}_{n+2} = \left(1 + \frac{\vec{v}^2}{c^2} \right) \cdot \vec{K}_n - \frac{\left(\vec{v} \cdot \vec{K}_n \right) \cdot \vec{v}}{c^2} . \tag{36}$$

The formula for energy density (*i.e.* pressure) of the complex electromagnetic field is

$$P_{\vec{K}} = \varepsilon \cdot \frac{\vec{K} \cdot \mathrm{conj}(\vec{K})}{2} . \tag{37}$$

The corresponding Poynting([13]) vector is

$$\vec{P}_{\vec{K}} = \varepsilon \cdot \frac{\vec{K} \times \mathrm{conj}(\vec{K})}{2} . \tag{38}$$

Proof of (37) is based on official fields' energy density equations that are

$$P_{\vec{E}} = \frac{\varepsilon \cdot \vec{E}^2}{2} \tag{39}$$

and

$$P_{\vec{B}} = \frac{\vec{B}^2}{2 \cdot \mu} . \tag{40}$$

Classical strings theory yields a slightly different result for energy density in the field. From (11) we have

$$\mathrm{d}Q = \varepsilon \cdot \left(\vec{E} \cdot \mathrm{d}\vec{S} \right) . \tag{41}$$

([13]) John Poynting, 1852-1914.

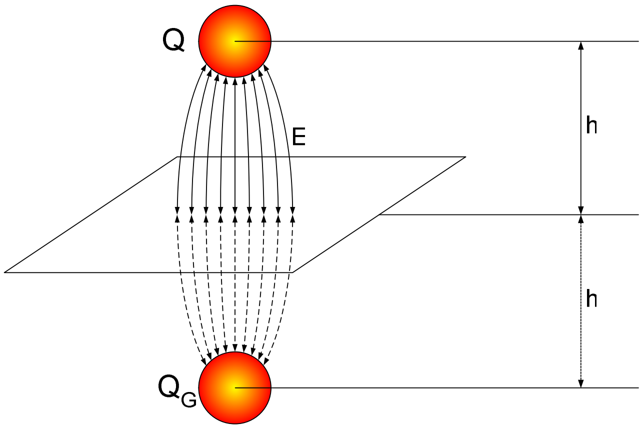

Fig. 9. – Charge over the superconductive mirror.

We also have

$$\mathrm{d}\vec{F} = \vec{E} \cdot \mathrm{d}Q = \vec{E} \cdot \varepsilon \cdot \left(\vec{E} \cdot \mathrm{d}\vec{S}\right). \tag{42}$$

In all cases where integrating surface encompasses charge, *i.e.* where the electric field is perpendicular to the integrating surface or $\vec{E} \perp \mathrm{d}\vec{S}$ we have

$$P_{\vec{E}} = \frac{\mathrm{d}\vec{F}}{\mathrm{d}\vec{S}} = \varepsilon \cdot \vec{E}^2. \tag{43}$$

The above equation could be proved in another way:

$$\mathrm{d}E = V \cdot \mathrm{d}Q. \tag{44}$$

According to (8) we have

$$\frac{\mathrm{d}E}{\mathrm{d}V} = V \cdot \frac{\mathrm{d}Q}{\mathrm{d}V} = V \cdot \rho = \varepsilon \cdot V \cdot \vec{\nabla}\vec{E}. \tag{45}$$

The formal formula for electrostatic field' energy density is

$$P_{\vec{E}} = \varepsilon \cdot V \cdot \Delta V. \tag{46}$$

The above formula is duly correct according to its completely clean derivation. While this formula corresponds to (43), it strongly supports the validity of formula (43). This formula could be also tested through Meissner([14]) force acting to a charge above the superconductive infinite surface (see fig. 9).

([14]) Walther Meissner, 1882-1974.

According to image theory we have that the force acting between real charge and ghost charge is

$$F_{Q,Q_G} = \frac{1}{4 \cdot \pi \cdot \varepsilon} \cdot \frac{Q^2}{(2 \cdot h)^2} = \frac{Q^2}{16 \cdot \pi \cdot h^2} \,. \tag{47}$$

Miessner force that corresponds to Archimedes([15]) force in liquids is

$$\vec{F}_{Q,Q_G} = \oiint_S P_{\vec{E}} \cdot \mathrm{d}\vec{S} = \oiint_S k \cdot \varepsilon \cdot \vec{E}^2 \cdot \mathrm{d}\vec{S}. \tag{48}$$

The coefficient k should be determined by equalization of eqs. (47) and (48):

$$k \cdot \varepsilon \cdot \frac{Q^2}{(4 \cdot \pi \cdot \varepsilon)^2} \cdot \int_{-\infty}^{\infty} \int_{-\infty}^{\infty} \frac{\mathrm{d}x \cdot \mathrm{d}y}{(h^2 + x^2 + y^2)^2} = \frac{Q^2}{16 \cdot \pi \cdot h^2} \tag{49}$$

$\Rightarrow$

$$k = 1. \tag{50}$$

By these three independent proofs we could accept that official energy density formula (39) should not be halved at all.

However, this halving does not affect the following formulas because it is canceling in those equations. Formula (39) clearly shows that energy source of the field is the pole itself and that without the pole there is no energy in the field.

Total energy density according to the official approach is

$$P = P_{\vec{E}} + P_{\vec{B}} = \frac{\varepsilon \cdot \vec{E}^2}{2} + \frac{\vec{B}^2}{2 \cdot \mu} \tag{51}$$

$\Rightarrow$

$$\frac{2 \cdot P}{\varepsilon} = \vec{E}^2 + (c \cdot \vec{B})^2. \tag{52}$$

Equation (52) clearly shows that both terms $\vec{E}$ and $c \cdot \vec{B}$ have equal units making formula (33) quite plausible. Force acting to a charge in a complex field is

$$\vec{F} = Q \cdot \vec{K}. \tag{53}$$

The proof of the above equation is clear:

$$\vec{F} = Q \cdot \vec{E} + Q \cdot \vec{v} \times \vec{B} = Q \cdot \frac{\vec{K} + \mathrm{conj}(\vec{K})}{2} + Q \cdot \vec{v} \times \frac{\vec{K} - \mathrm{conj}(\vec{K})}{2 \cdot \mathrm{i} \cdot c} \tag{54}$$

([15]) Archimedes of Syracuse, 287 BC-212 BC.

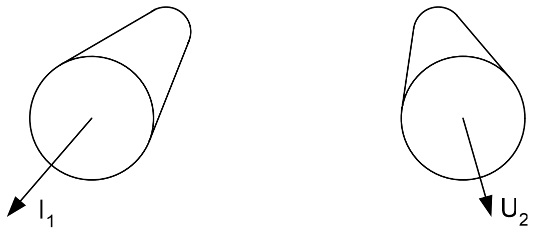

Fig. 10. – Conductors.

⇒

$$\vec{F} = Q \cdot \frac{\vec{K}}{2} + Q \cdot \frac{\mathrm{conj}(\vec{K})}{2} - \mathrm{i} \cdot Q \cdot \vec{v} \times \frac{\vec{K}}{2 \cdot c} + \mathrm{i} \cdot Q \cdot \vec{v} \times \frac{\mathrm{conj}(\vec{K})}{2 \cdot c}\,. \tag{55}$$

Equation (53) is obtained by applying (35) to (55). Charge density is

$$\rho_Q = \varepsilon \cdot \mathrm{conj}\left(\vec{\nabla}\vec{K}\right). \tag{56}$$

We can check eqs. (18) on the idealistic case of induction in two infinite parallel conductors with AC current (see fig. 10).

While there are two infinite conductors, there is no closed contour and classic Faraday's induction formula cannot be applied. From (24) we have the following equation of magnetic field in cylindrical coordinate system:

$$\vec{B} = -\frac{\mu \cdot I}{4 \cdot \pi} \cdot \oint_{\ell} \frac{\mathrm{d}\vec{\ell} \times \hat{r}}{\vec{r}^2} = -\frac{\mu \cdot I}{2 \cdot \pi \cdot r} \cdot \hat{\mathrm{i}}_{\phi}. \tag{57}$$

Composition of eqs. (18) and (57) is

$$\vec{\nabla} \times \left(\vec{v} \times \vec{B}\right) = -\frac{\mu}{2 \cdot \pi \cdot r} \cdot \frac{\mathrm{d}I}{\mathrm{d}t} \cdot \hat{\mathrm{i}}_{\phi}. \tag{58}$$

Fully converted the above equation from Cartesian to cylindrical coordinates is

$$-\frac{\partial}{\partial r}\left(\left(\left(v \cdot \hat{\mathrm{i}}_r\right) \times \left(-\frac{\mu \cdot I}{2 \cdot \pi \cdot r} \cdot \hat{\mathrm{i}}_{\phi}\right)\right) \cdot \hat{\mathrm{i}}_{\ell}\right) \cdot \hat{\mathrm{i}}_{\phi} = -\frac{\mu}{2 \cdot \pi \cdot r} \cdot \frac{\mathrm{d}I}{\mathrm{d}t} \cdot \hat{\mathrm{i}}_{\phi} \tag{59}$$

⇒

$$-\frac{\mu \cdot I \cdot v}{2 \cdot \pi \cdot r^2} \cdot \hat{\mathrm{i}}_{\phi} = -\frac{\mu}{2 \cdot \pi \cdot r} \cdot \frac{\mathrm{d}I}{\mathrm{d}t} \cdot \hat{\mathrm{i}}_{\phi} \tag{60}$$

⇒

$$\frac{I \cdot v}{r} = \frac{\mathrm{d}I}{\mathrm{d}t}\,. \tag{61}$$

We can find migration speed of magnetic field of a straight infinite conductor with AC current now:

$$\vec{v} = \frac{r}{I} \cdot \frac{\mathrm{d}I}{\mathrm{d}t} \cdot \hat{\mathrm{i}}_r. \tag{62}$$

It is interesting to notice that the migration velocity can be superluminal too.

We can insert the above formula into (2) and then we have

$$\vec{E} = \vec{v} \times \vec{B} = \left(\frac{r}{I} \cdot \frac{\mathrm{d}I}{\mathrm{d}t}\right) \cdot \left(-\frac{\mu \cdot I}{2 \cdot \pi \cdot r}\right) \cdot \left(\hat{\mathrm{i}}_r \times \hat{\mathrm{i}}_\phi\right) = \frac{\mu}{2 \cdot \pi} \cdot \frac{\mathrm{d}I}{\mathrm{d}t} \cdot \hat{\mathrm{i}}_\ell = \frac{\mu}{2 \cdot \pi} \cdot \frac{\mathrm{d}Q}{\mathrm{d}t} \cdot a \cdot \hat{\mathrm{i}}_\ell. \tag{63}$$

Induced electric field is collinear with the conductor just as is the case with transformer and the polarity matches the transformer's reality. Force acting to a charge nearby the infinite conductor is

$$\vec{F} = Q \cdot \left(\vec{v}_{\vec{B}} - \vec{v}_Q\right) \times \vec{B} = \frac{\mu \cdot Q}{2 \cdot \pi} \cdot \hat{\mathrm{i}}_\ell \cdot \left(\frac{\mathrm{d}I}{\mathrm{d}t} - \frac{I \cdot \left(\vec{v}_Q \cdot \hat{\mathrm{i}}_r\right)}{r}\right). \tag{64}$$

where $\vec{v}_{\vec{B}}$ is the velocity of the magnetic field itself and $\vec{v}_Q$ is the velocity of the charge with respect to the conductor. The above formula has excellent matching with real experiment and shows that the maximal speed of the charge is limited by the speed of the magnetic field itself.

If the conductors are long enough to be approximated with infinite parallel conductors, then we have that the potential is proportional to the length of the conductors:

$$V = \vec{E} \cdot \vec{\ell} = \frac{\mu \cdot \ell}{2 \cdot \pi} \cdot \frac{\mathrm{d}I}{\mathrm{d}t}. \tag{65}$$

This unique ability to yield correct induction's formula based on magnetic field's migration (62) is a clear proof of the correctness of the whole concept.

The above notification can be generalized in the following way. After time derivation, eq. (26) becomes

$$\frac{\mathrm{d}\vec{B}}{\mathrm{d}t} = \frac{\vec{E} \times \vec{a}}{c^2}. \tag{66}$$

According to appropriate Maxwell-like equation we have

$$\vec{\nabla} \times \vec{E}_{\mathrm{ind}} = \frac{\vec{E} \times \vec{a}}{c^2}. \tag{67}$$

There is also a general vector identity:

$$\vec{E} \times \vec{a} = \vec{\nabla} \times (V \cdot \vec{a}) - V \cdot \vec{\nabla} \times \vec{a}. \tag{68}$$

Therefore we have

$$\vec{\nabla} \times \vec{E} = \frac{\vec{\nabla} \times (V \cdot \vec{a})}{c^2} - \frac{V \cdot \vec{\nabla} \times \vec{a}}{c^2}. \tag{69}$$

The additional electric field induced by acceleration added to a particle in the electric potential V is

$$\vec{E}_{\text{ind}} \approx \frac{V \cdot \vec{a}}{c^2}\,. \tag{70}$$

The inertial phenomenon of electron becomes

$$\vec{F}_{\text{inertial}} = Q_1 \cdot \vec{E}_{\text{ind}} = \frac{Q_1 \cdot V_2 \cdot \vec{a}_{1,2}}{c^2} = \frac{\mu \cdot Q_1 \cdot Q_2 \cdot \ddot{\vec{r}}_{1,2}}{4 \cdot \pi \cdot |\vec{r}_{1,2}|}\,. \tag{71}$$

For mass we have

$$\vec{F}_{\text{ind}} = \frac{\gamma}{c^2} \cdot \frac{m_1 \cdot m_2 \cdot \vec{a}_{1,2}}{|\vec{r}|} = m_1 \cdot \vec{a}_{1,2} \cdot \frac{V_{\text{grav}_2}}{c^2}\,. \tag{72}$$

The above formula defines the connection between induced electric field in secondary conductor and acceleration of charges in primary conductor. According to this formula inertia of charged particle is caused by the external potential that pervades it.

Another very interesting formula can be obtained directly from (20):

$$\frac{\mathrm{d}\vec{E}}{\mathrm{d}t} = \vec{\nabla} \times \left(\frac{Q}{4 \cdot \pi \cdot \varepsilon \cdot \vec{r}^{\,2}} \cdot \vec{v} \times \hat{r} \right), \tag{73}$$

$\Rightarrow$

$$\frac{\mathrm{d}\vec{E}}{\mathrm{d}t} = \vec{\nabla} \times \left(\frac{Q}{4 \cdot \pi \cdot \varepsilon \cdot |\vec{r}|} \cdot \vec{\omega} \right), \tag{74}$$

$\Rightarrow$

$$\frac{\mathrm{d}\vec{E}}{\mathrm{d}t} = \vec{\nabla} \times (V \cdot \vec{\omega}). \tag{75}$$

With the help of (28) we have

$$\vec{B} \approx -\frac{V \cdot \vec{\omega}}{c^2}\,. \tag{76}$$

The above formula could be proved by independent line of equations. The formula for mutual angular velocity between two moving points is

$$\vec{\omega}_{1,2} = \frac{\dot{\vec{r}}_{1,2} \times \vec{r}_{1,2}}{\vec{r}_{1,2}^{\;2}} = \frac{\dot{\vec{r}}_{1,2} \times \hat{r}_{1,2}}{|\vec{r}_{1,2}|} = \frac{\vec{v}_{1,2} \times \hat{r}_{1,2}}{|\vec{r}_{1,2}|}\,. \tag{77}$$

According to (26) and (77) we have

$$\vec{B}_1 = \frac{\vec{v}_{1,2} \times \vec{E}_{1,2}}{c^2} = \frac{\vec{v}_{1,2}}{c^2} \times \frac{Q_1 \cdot \hat{r}_{1,2}}{4 \cdot \pi \cdot \varepsilon \cdot \vec{r}_{1,2}^{\;2}} = -\frac{V \cdot \vec{\omega}_{1,2}}{c^2}\,. \tag{78}$$

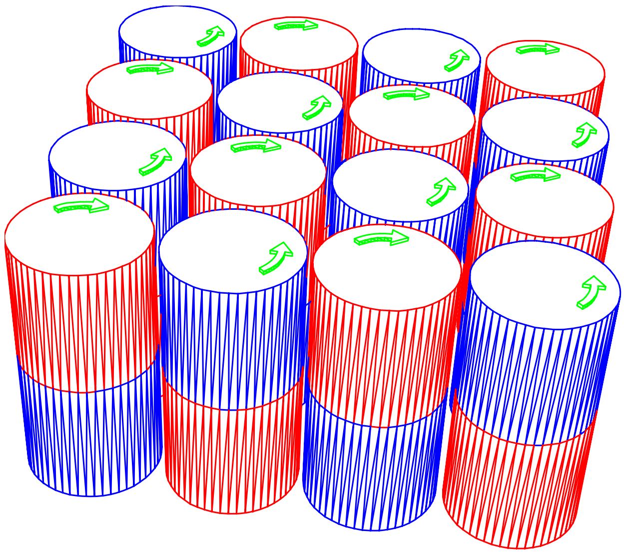

Fig. 11. – Magnetic domains.

Total induced electric field according to eqs. (2), (70) and (76) is

$$\vec{E}_{\text{ind}} = V \cdot \frac{\vec{a} + \vec{v} \times \vec{\omega}}{c^2}\,. \tag{79}$$

The above formula shows that the magnetic field of a rotating punctual charge is proportional to the scalar product of rotation and the electric potential of the particle. This clearly shows that the magnetic field is a torsion electric potential.

It is interesting to notice that

$$\frac{\mathrm{d}^2 \left|\vec{r}_{1,2}\right|}{\mathrm{d}t^2} = (\vec{a}_{1,2} + \vec{v}_{1,2} \times \vec{\omega}_{1,2}) \cdot \hat{r}_{1,2}. \tag{80}$$

The term in brackets denotes total acceleration, which clearly proves that electromagnetic induction is indisputably connected to the acceleration.

Magnetic domains created by elementary particles' rotation can be represented in the picture shown in fig. 11.

Formula (79) is very interesting because it proves that mutual acceleration in electric field cases induced an electric field able to make the operation of the electric transformer through AC induction possible, which is pure M hypothesis' phenomenon.

Almost all basic equations from the classical electromagnetic theory can be precisely derived by introduction of M hypothesis of moveable physical fields. Ability of all these electromagnetic correct derivations is the proof that exposed string's idealization of arbitrary physical field is physically plausible and mathematically correct. This idealization is the only available concept able to duly explain the operation of Faraday's homopolar engine. It is interesting that Mach([16]) principle could be proven within M hypothesis too because distribution of physical fields' string is not necessarily uniform.

([16]) Ernst Mach, 1838-1916.

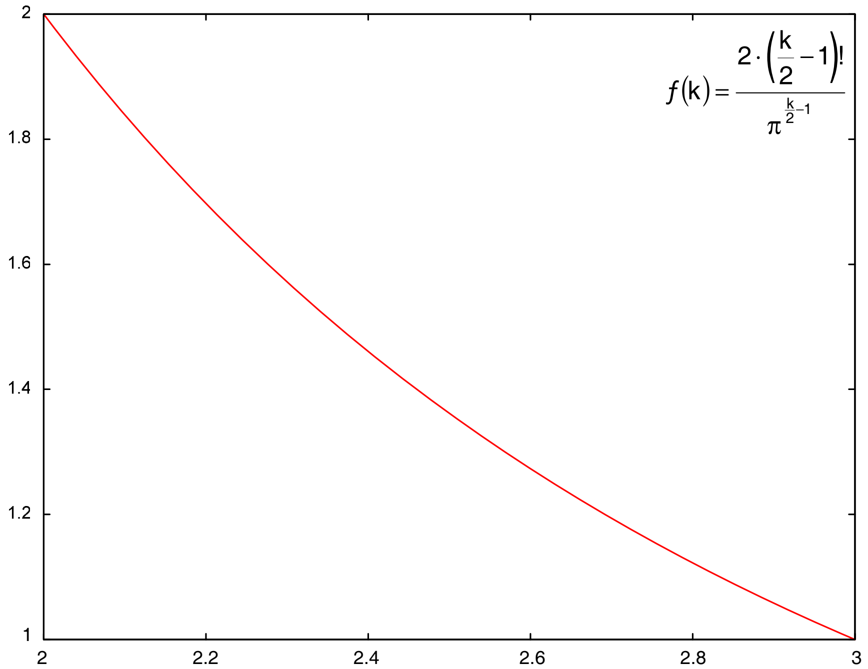

Fig. 12. – Power of gravitational force in rare space.

We can further speculate that distribution of gravitational field in our Galaxy is rather planar than spherical, which may explain the missing mass in our Galaxy:

$$\vec{G} = \gamma \cdot \frac{2 \cdot \Gamma\left(\frac{k}{2}\right)}{\pi^{\frac{k}{2}-1}} \cdot \frac{m \cdot \hat{r}}{|\vec{r}|^{k-1}} = \gamma \cdot \frac{2 \cdot \left(\frac{k}{2}-1\right)!}{\pi^{\frac{k}{2}-1}} \cdot \frac{m \cdot \hat{r}}{|\vec{r}|^{k-1}}\,, \tag{81}$$

where k is the number of dimensions of strings' distribution with k being $2 \leq k \leq 3$ regarding the distribution in the Galaxy and γ is Cavendish's([17]) constant.

Force between two masses in empty space without any other mass according to (81) is

$$\vec{F} = m_2 \cdot \vec{G}_1 = 2 \cdot \pi \cdot \gamma \cdot m_1 \cdot m_2 \cdot \hat{r}. \tag{82}$$

This is the force of attraction of two masses connected only with gravitational strings all in a sheaf which should be the case at an empty space without any other mass.

If other galaxies are too far, then a lesser number of strings are attached to those far ones, which implies that the number of dimension k is closer to 2, otherwise k is closer to 3 and strings' distribution is more isotropic and homogenous, as is shown in the graphic of fig. 12.

The graph of the mass in our Galaxy across the radius is shown in fig. 13.

The regions with negative masses should be noticed on the above graph, which were allegedly denoted as measuring errors.

([17]) Henry Cavendish, 1731-1810.

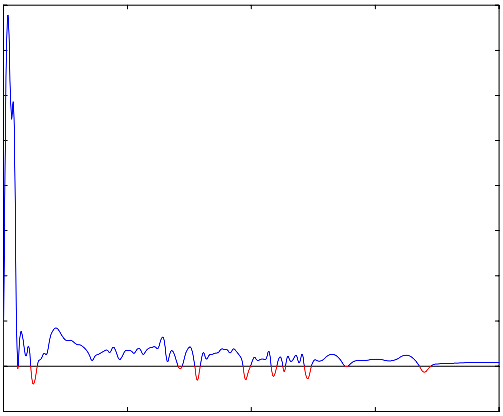

Fig. 13. – Density of mass in Galaxy.

It is interesting that lot of chemical reactions could be explained with saturation of strings bounding between atoms in molecules. Even more, we can calculate the exact angle between hydrogen atoms in water molecule, and it is ACOS(-1/4)=$104°25'39''$, which is the angle between atoms in couples of water molecules packed in the way in which hydrogen atoms are able to interact with saturated connection of oxygen atom of opposite water molecule. String interaction can also fully explain metallurgic connection between metallic atoms, which rested unclear for millenniums.

This means that whenever atoms are very distant from each other, then they establish strings' bounding with nearest atoms creating neutral molecules. But, in metals where atoms are better packed we have closer distance and such atoms can establish multiple connection with contiguous neighbor atoms. And it seems that it is the same case with van der Waals([18]) connection between water molecules. Such connections are much weaker than real covalent connections just because only a fraction of strings interacts with numerous surrounding atoms. This ability enables continuous mixing of different metals creating alloys with isotropic cohesive force. Cohesive force between atoms in metals is isotropic although all metals have crystalline internal structure.

Consequences

Figure 14 displays the well-known situation from nearly all textbooks of classical electromagnetism: a charge is passing between two magnets that affect it with relative Lorentz force.

The official Lorentz force formula is

$$\vec{F} = Q \cdot \vec{v} \times \vec{B}, \tag{83}$$

where $\vec{v}$ is the velocity measured with respect to the referential frame or the observer.

The correct Lorentz force formula within M hypothesis should be

$$\vec{F}_{1,2} = Q_1 \cdot \frac{\mathrm{d}\vec{r}_{1,2}}{\mathrm{d}t} \times \vec{B}_2 = Q_1 \cdot \vec{v}_{1,2} \times \vec{B}_2, \tag{84}$$

([18]) Johannes Diderik van der Waals, 1837-1923.

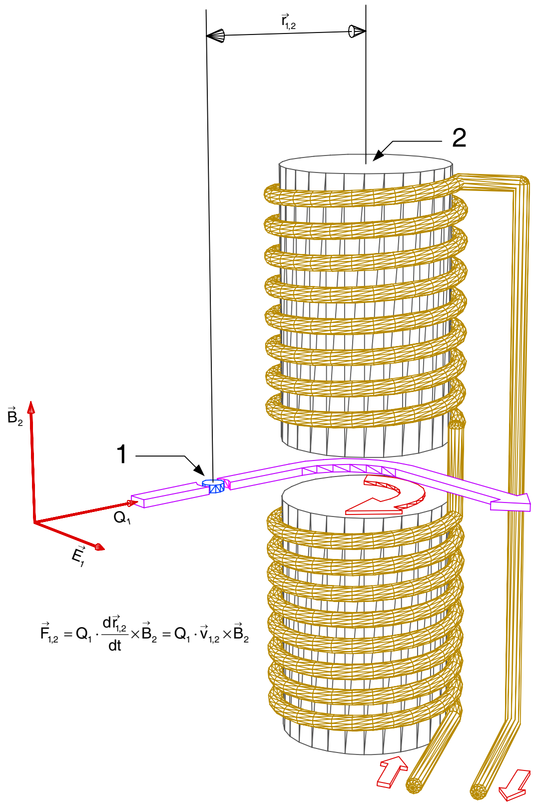

Fig. 14. – Lorentz force.

whereas $\vec{v}_{1,2}$ is the velocity measured with respect to time's derivative of distance between the charge and the magnets.

The above picture clearly shows that the velocity of the charge must be determined with regard to the source of the magnetic field as is shown in the above text, and not with regard to an arbitrary observer, which belongs to the concept that directly causes action-reaction paradox absurdity characteristic of the concept of N hypothesis. The velocity of the magnetic field is equal to the velocity of its source, *i.e.* to the velocity of the magnet.

This definition of physical fields' velocity makes Einstein first postulate [1] invalid and there is also no more necessity for the existence of Lorentz transformations at all.

Is Einstein's theory of relativity wrong? The answer was not so simple especially in those times when there was significant discrepancy between classical mechanics and classical electromagnetism due to existence of action-reaction paradox in classical electromagnetism. Einstein decided to fix classical mechanics instead of classical electromagnetism relying his teaching on Faraday's experimental heritage. So, not a whole theory is completely wrong. Theory of relativity is actually a very good approximation and its partial legacy can still be using in engineering calculations. What is the theory of relativity actually? Let us consider an electromagnetic analogy as a set of charges in motion that corresponds to a set of mechanical bodies in motion: in which way we should modify charges to be able to completely remove formulas of magnetic interaction's and to keep the correct results of forces in those mutual interactions like in the previous case when magnetic interaction still has been calculated? It can be easily shown that charges should be modified in the same way as Einstein did it with mass. Could it be a completely correct transformation? No, it is impossible to cancel magnetic field and to calculate interaction with respect to a unique observer instead of calculation of the sum of mutual electrostatic and magnetic interactions between particular participants in the interaction and still to keep results identical. Charge as scalar does not carry enough information in Coulomb's([19]) force formula and thus for better accuracy charge should be represented as tensor. The same improvement in mass description can be done with Newton([20]) gravity force formula too, which then resembles the major concept of special theory of relativity. So, the theories of relativity are able to yield pretty correct results for interaction of two mutual participants because observer's velocity is usually very close to velocity of the one participant. Finally, a special theory of relativity is able to yield a correct formula of Cherenkov's radiation and also to predict circumstances suitable for magnetons existence [6] implying that both of these theories require not so serious lifting.

Is there any experimental evidence proving that the theory of relativity is not completely true? Yes, there are plenty of evidences: stellar aberration, ability to be measured absolute velocity with respect to background radiation with Doppler's([21]) effect, Boomerang Project [7], etc. Simple proof against the theory of relativity is: if the one who is moving faster has slower passing of time, then there is the question who is the boss that should judge who is moving slower and who faster, which contradicts Galilean([22]) relativity of the velocity. Obviously, there must be an arbitrary observer to judge that otherwise Einstein's theory does not have sense at all. Another solid proof against the absolute consistency of the general theory of relativity is the discrepancy between the center of inertial and the center of gravitational masses of the same body. The center of gravitational mass is not generally identical to the center of the inertial mass of an arbitrary shaped body, as shown by the following formula:

$$\sqrt{m} \cdot \frac{\iiint_V \frac{\vec{r}}{|\vec{r}|^3} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V}{\left| \iiint_V \frac{\vec{r}}{|\vec{r}|^3} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V \right|^{3/2}} \neq \frac{\iiint_V \vec{r} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V}{m} . \tag{85}$$

This inequality vigorously challenges Einstein's identifications of inertial and gravitational masses in his general theory of relativity. Whereas the center of gravitational mass is defined by

$$\vec{r}_{\vec{G}} = \sqrt{m} \cdot \frac{\iiint_V \frac{\vec{r}}{|\vec{r}|^3} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V}{\left| \iiint_V \frac{\vec{r}}{|\vec{r}|^3} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V \right|^{3/2}} . \tag{86}$$

But the center of inertial mass is defined by

$$\vec{r}_m = \frac{\iiint_V \vec{r} \cdot \rho_m(\vec{r}) \cdot \mathrm{d}V}{m} . \tag{87}$$

([19]) Charles-Augustin de Coulomb, 1736-1806.
([20]) Isaac Newton, 1643-1727.
([21]) Johann Christian Andreas Doppler, 1803-1853.
([22]) Galileo Galilei, 1564-1642.

The theory of relativity is also a very well circular theory that seriously violates Gödel([23]) theorem. We can argue whether there are circumstances with fuzzy logic in which Gödel theorem is not correct, but the first postulate still remains a fact whose incorrectness is duly proven in the above text. Metrology divides all physical variables onto absolute and relative ones. Time and acceleration belong to absolute variables, but velocity and electric potential belong to relative ones and thus relativity of time can be related only to acceleration, not to velocity if there is any kind of relativity at all as we just suspect it has to be. So, Einstein's theory of relativity definitely requires improvement. At the moment we should accept Einstein legacy just as an excellent set of formulas for variation of mass on subluminal velocities and nothing more. It is a rather excellent interpolation made just as an attempt to fix another preceding also incomplete theory rather than a well-founded physical truth.

4. – Origin of the blunder

It seems that the origin of Faraday's flaw is settled in the third Newton law which was relying on Aristotle concept of physics. This law is commonly known in the following form:

$$\vec{F} = m \cdot \vec{a}, \tag{88}$$

where $\vec{F}$ is a force acting to the body that produces acceleration, m is the mass of the body, $\vec{a}$ is the acceleration of the body caused by the force $\vec{F}$. The official explanation is that the acceleration $\vec{a}$ is measured with regard to the inertial frame which is the synonym for the rocket's position in which accelerometer will show no acceleration. Such definition belongs to the class of logical errors called "Petitio Principi" or circular definition.

But, a basic definition of acceleration is given as the second time derivative of the radius vector whose ends should be well defined with points 1 and 2, respectively:

$$\vec{a}_{1,2} = \frac{\mathrm{d}^2\vec{r}_{1,2}}{\mathrm{d}t^2}\,. \tag{89}$$

According to the above formula (88) is going to have a more precise form:

$$\vec{F}_{1,2} = m_1 \cdot \frac{\mathrm{d}^2\vec{r}_{1,2}}{\mathrm{d}t^2}\,. \tag{90}$$

According to the above equation one end of the radius vector is pointed to the mass, while the position of another end of the vector remains undefined. Description of the above equation's ambiguity is depicted in the picture shown in fig. 15.

The above picture shows a rocket with an accelerometer: the accelerometer consists of a small mass attached to a spring. After the rocket's motor is started this accelerometer is going to measure some acceleration according to compression of the spring and we do not need to have another referential point available as is necessary in the case of velocity's measurement—furthermore, the accelerometer will remain unconfused even in open cosmos far away from any cosmic body. So, still there is a question where another

([23]) Kurt Gödel, 1906-1978.

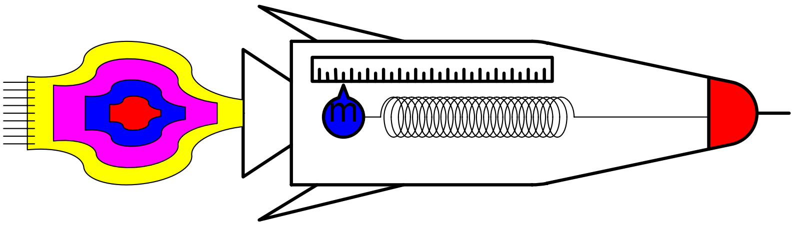

Fig. 15. – Rocket with an accelerometer.

end of the radius vector is settled in the third Newton law, but it is clear that inertia is caused precisely by something which another end of the radius vector in eq. (90) is pointed to: this could be a local gravitational field according to both eq. (72) and Mach([24]) principle, interaction with immovable ether, interaction with the center of all masses in the universe or relative velocity to the position of the elementary particles' creation. Last explanation requires existence of register or memory in every elementary particle able to store information of creation's position.

However, it seems that the cause of inertia could be technically utilized as prop for a new kind of propulsion which would not be a reactive one and which would repeal on this foreign cause of inertia, creating propulsion of a spacecraft without any jet or other reactive propulsion. We need only to clarify its origin and there is no doubt that we will instantly obtain a new kind of propulsion for spacecraft that will bring real revolution in space travel.

As we can see, the origin of the blunder is settled far away in the time at the very beginning of human civilization. Aristotle had a treatise with his teacher Plato([25]) about the essence of nature and the central theme of this treatise was a question whether all the bodies are falling down with the same speed or not. Aristotle proved that this is true by a simple and very effective proof: if the lighter body would fall down lower, then the lighter body bounded to the heavier one will slow down the heavier body. The only solution for the controversy is that all bodies fall down with the same speed.

However, we know today that this claiming is not quite true because the heavier body would displace the center of mass of the Earth a little more than the lighter body which will cause that the heavier body will fall down a bit faster.

The essence of this treatise has in its essence a question of validity of N or M hypothesis and therefore it had tremendous consequences to the following of scientific heritage.

5. – Conclusion

Contemporary science suffers from indetermination of velocity and acceleration measurement used in the major physical equations which are hidden behind the term of inertial frame creating *Petitio Principi* fallacy. Therefore M hypothesis should replace officially accepted N hypothesis as soon as possible and all affected corresponding scientific theories should be modified and harmonized with the M hypothesis as only valid and duly proven concept which obeys to both angular and linear momentums, and energy conservations laws.

([24]) Ernest Mach, 1836-1916.
([25]) Plato, 428/427 BC-348/347 BC.

Contemporary science should stop giving us fake hope that there are plenty of technical opportunities ready to be effortlessly discovered or invented and that these are not happening just because there is some economical conspiracy which suppresses them all. Actually, the cold reality is completely different: it is extremely difficult to make any breakthrough in science and technology simply because we are limited with only three dimensions and four kinds of available forces and furthermore our science is additionally ballasted with false knowledge. We are technically utilizing only two of four natural forces: just nuclear and electric ones. Gravitational and weak forces still remain technically unused. We should stop pretending that we are dealing with almight scientific knowledge and the real fact is that even a bigger rock will exterminate whole life on the planet and we will be completely hopeless to do anything. The strength of a science is rather related to the strength of technologies based on this science than to the strength of the scientific equations and the theories themselves!

So, we must be released of all our scientific blunders just to facilitate further progress and there is lot of stuffs that should be reconsidered, modified or rejected which requires from us to be honest enough to admit these all. Ballast is sometimes good, but not this time. Otherwise our civilization will continue to push pistons with hot gases (both steam and combustion engines do that) and shake magnets near wires (basic operation of nearly all electric machines) for centuries. If we reject ballast then we will find much refined way to do that all. Humankind deserves better and cleaner energetic solutions relied on accurate physical theories only able to offer these all. We must choose rather facts than fictions regardless how much these fictions are sweet especially in those times when global warming is freighting all us together with global shortage of energy and also because all these fictions will continue to promise miraculous illusions forever and solutions never! Dogma is not necessarily a science and if it is not science, then it is the best prevention against the science.

Resurrection of M hypothesis is a good way to arrange initial conditions for the beginning of a recovering process of the lost centuries wasted on blunder of N hypothesis.

Significant contribution to identifications of failures related to deduction of official electromagnetism is done in papers [8,4,9,10], and [11]. The contribution is mainly based on the intuitive and very simple experiments with current and permanent magnets.

REFERENCES

[1] EINSTEIN A., *On the Electrodynamics of Moving Bodies*, *Ann. Phys.*, **17** (1905) 891.

[2] FARADAY M., *Experimental Researches in Electricity*, Vol. **1** (1831).

[3] RADOVIĆ A., *Spacetime&Substance*, **5** (2004) 133, available on `http://spacetime.narod.ru/ 0023-ps.zip`.

[4] DJURIĆ J., *J. Appl. Phys.*, **46** (1975) 679.

[5] TESLA N., *Electrical Engineer (N.Y.)*, 1.IX (1891) A24.

[6] RADOVIĆ A., *J. Theor.*, **4** (2003), available on `http://d1002391.mydomainwebhost.com/JOT/Articles/4-4/AR.pdf`.

[7] "Boomerang Project", available on `http://cmb.phys.cwru.edu/boomerang/`, 2001.

[8] RADOVIĆ A., *Electric Space Craft Journal*, No. 42 (2007) 12.

[9] HOOPER W. J., *Equivalence of the Gravitational Field and a Motional Electric Field*, in *Proceedings of the Boulder Conference on High Energy Physics, Division of the American Physical Soc., Aug. 18-22, 1969*, p. 483; *Bull. Am. Phys. Soc.* (1970) 207.

[10] JONSON J. O., *Chin. J. Phys.*, **35** (1997) 139.

[11] LEEDSKALNIN E., *Magnetic Current* (Homestead, Florida) 1945.