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The electromagnetic phenomena in the representations of the theory of dark matter

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Introduction

The laws and electromagnetic phenomena around a conductor with electric current analyzes in the article in the representations of the theory of dark matter. Following Einstein, we believe that all fundamental interactions (the gravitational forces, the inertial forces, the nuclear forces, the electromagnetism and the electroweak forces) are derived from a single unified field. We believe that it is the dark matter of the cosmos that is the One Field that unites all of the listed fundamental interactions. The theory of the dark matter of the cosmos developed by us is based on the assumption that there are two types of matter in the universe. One of them is ordinary baryonic matter, and the other, the so-called dark matter, is the primary matter. We assume that the dark matter between the stars, planets and other objects of the universe is in a gaseous state and actively interacts with baryonic matter. The atoms of baryonic matter continuously absorb dark matter, increasing their mass. As a result, near all baryonic bodies, including the stars and massive planets, the radial currents are directed toward their centers. In addition, near the stars and planets, there are the vortices of a dark matter. The streams of dark matter have a force impact on the baryonic bodies of the universe.

We propose our model of such a single field, which has made it possible at the present moment to reveal the physical nature of a gravitational forces, a inertial forces, a nuclear forces and the energy, made it possible to understand better many mysterious astronomical phenomena. From these positions, we have offered a deeper understanding of the laws of the propagation of light in the cosmic space between the stars for billions of years. This made it possible to show that Hubble's law does not have to be connected with Doppler's law and the idea of expanding the universe, as well as with the Big Bang (articles are placed in ResearchGate, in General Science Journals and on the site www.buragosg.narod.ru).

The Ampere's law.

The Ampere's law is the law of interaction of electric currents. It was first established by Andre Marie Ampere in 1820 for direct current. It follows from Ampere's law that parallel conductors with electric currents flowing in one direction are attracted, while in opposite directions they repel. The law of Ampere is also the law that determines the force with which a magnetic field acts on a small section of a conductor with a current

$$d F = I \cdot B \cdot dl \cdot \sin \alpha,$$

where B is the magnetic induction. After integration, we have a force (attraction-repulsion), divided to a length of conductor l

$$\frac{F}{l} = J \cdot B \cdot \sin\alpha , \qquad (1)$$

where J - the current strength in the conductor, $B=\mu_0\mu\frac{J}{2\pi r}$ - the magnetic induction, r - the distance measured along the normal from the axis of the conductor, α - the angle between the vector of magnetic induction and the direction along which the current flows. l – is the length of a conductor with current.

In [16, 21] it is shown that in the representations of the theory of dark matter, the electric current is a phenomenon associated with the slow motion of vortexelectrons along elementary vortex filaments within a conductor with a velocity of $\bar{V}$ =8·10^{-4} m/s, accompanied by a high-speed flow of dark matter with velocity speed V=0,32·10^{6} m/s. The elementary vortex filaments inside the conductor with a current constitute a vortex bundle. The total voltage of the vortex bundle is equal to the total velocity circulation and can be expressed in terms of the current strength by the formula

$$I_{V\text{-}\Sigma}=\Gamma_{V\text{-}\Sigma}=\frac{\varsigma\cdot S_a/S_{el}}{0,01\cdot r_{o-el}\cdot\sqrt{\varepsilon_o\varepsilon\rho_e}\cdot nVS_1}\cdot J \qquad (2)$$

The walls of the conductor are not an obstacle to dark matter. Therefore, a vortex bundle inside the conductor induces a circular flow of gaseous dark matter around itself and therefore around the conductor at a speed of

$$U_V=\frac{\Gamma_{V-\Sigma}}{2\pi\cdot r}=\frac{I_{V-\Sigma}}{2\pi\cdot r} \qquad (3)$$

The neighboring conductor is in this stream. Due to the fact that the vortex bundle also passes through it, the circulation of velocity along its perimeter is not equal to zero. As a result, the Magnus force will act on it in the direction of the first conductor. The same force will act on the first conductor. The force (attraction-repulsion) acting on each conductor and related to a conductor length l was found [20,21] with the help of Zhukovsky's theorem on the normal force. This force arises on bodies in the flow of a liquid or gaseous medium with a nonzero value of the circulation of the velocity calculated on the outer contour of this body

$$\frac{F}{l}=\rho_e U_{V2}\Gamma_{\Sigma 1}=\rho_e\frac{I_{V-\Sigma 1}I_{V-\Sigma 2}}{2\pi\cdot r}=\frac{(\varsigma\frac{S_a}{S_{el}})^2}{(0,01\cdot r_{o-el})^2\cdot\varepsilon_o\varepsilon\cdot(nVS_1)^2}\cdot\frac{J_1J_2}{2\pi\cdot r} \qquad (4)$$

In this formula

$$\mu_o\mu=\frac{(\varsigma\frac{S_a}{S_{el}})^2}{(0,01\cdot r_{o-el})^2\cdot\varepsilon_o\varepsilon\cdot(nVS_1)^2} \qquad (5)$$

This formula linked the magnetic constants μ_o and μ with the electrostatic constants ε_o and ε, as well as with the parameters of the annular vortexelectron of dark matter $r_{el}=0,01\cdot r_{o-el}$ and the velocity of the vortexelectrons of electric current in the conductor $\bar{V}$ =8·10^{-4} m /s. The same formula includes the cross-sectional areas of the atom S_a and the vortex electron S_{el}. Such a combination of such diverse quantities turned out to be possible only thanks to the notions of the notion of "the field of dark matter". Substitution of the values of the quantities included in expression (4) made it possible to determine the number of vortex filaments by formula $i=\varsigma\cdot(S/S_1)\cdot\frac{S_a}{S_{el}}$. The number of vortex lines in a copper conductor with a radius of cross section $R=3\text{мм}=3\cdot10^{-3}\,\text{м}$

$(\vec{S} = \frac{S}{S_1} = 0{,}28 \cdot 10^{-4} м^2)$ turned out to be equal to $i = 4{,}2 \cdot 10^2$ =420. The calculated value μ_o coincides with the experimental value. Here:

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n is the number of electrical charges (conduction vortex electrons) per unit volume.

For copper wire, n=8.5·10^{28} m^{-3}, $\bar{V}$=8·10^{-4} m/s, μ=1, ε=1 (for vacuum), ε_o=8,854·10^{-12} F/m, $S_1 = 1$m, $S_a = 3{,}14 \cdot 10^{-20}$ m^2, $S_{el} = 3{,}14 \cdot (1{,}7 \cdot 10^{-12})^2 = 9{,}075$ m^2, $r_{o-el} = 1{,}7 \cdot 10^{-12}$ m, $\mu = 1$, μ_o= 4π·10^{-7} H/m = 1,26·10^{-6} H/m, the coefficient, that corrections the number of elementary vortex filaments in the vortex bundle ς=0,43·10^4.

If the conductors with current are at an angle α (Fig. 1), then the velocity U induced in the field of a dark gaseous matter by an infinite horizontal conductor with current J_1 should be decompose taking into account ((2) and (3)) on the direction of the normal to the inclined conductor

$$U_{n1} = U_{v1} \cdot \sin\alpha = \frac{I_{V-\Sigma 1}}{2\pi \cdot r}\sin\alpha = \frac{\varsigma \cdot S_a / S_{el}}{0{,}01 \cdot r_{0-el} \cdot \sqrt{\varepsilon_o \varepsilon \rho_e} \cdot nVS_1} \cdot \frac{J_1 \cdot \sin\alpha}{2\pi \cdot r} \qquad (6)$$

and on the direction parallel to this conductor $U_\tau = U_{v1}\cos\alpha$. It is clear that the flow of a dark matter along an inclined conductor is not reflected in the pressure distribution diagram in the cross section of this conductor.

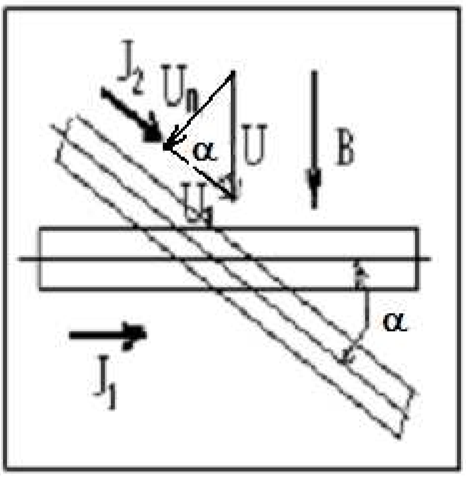

Fig.1

The pressure distribution depends only on the speed U_{n1}. Therefore, the formula for determining the modulus of the transverse Zhukovskii force should be rewritten in view of formulas (2), (5) and (6) to the form

$$\frac{F}{l} = \rho_e U_n \Gamma_{\Sigma 2} = \mu_o \mu \frac{J_1 J_2}{2\pi \cdot r} Sin\,\alpha = J_2 \cdot B \cdot Sin\,\alpha \qquad (7)$$

We recall that the force modulus determined by Zhukovskii's theorem is equal to the product of the density ρ_e and velocity of the incoming flow U_{n1} on the circulation of the velocity $\Gamma_{\Sigma 2}$, which is equal to the voltage of the vortex bundle inside $I_{\Sigma 2}$ the inclined conductor. We will take into account that the speed U_{n1} is induced by a vortex bundle inside the horizontal conductor J_1. Therefore, the angle α is the angle between the magnetic induction vector B and the line segment of the inclined conductor l_2 with current J_2.

Thus, formula (7) is the known Ampere law, which determines the force whith which the magnetic field with induction B acts on the segment of the inclined conductor l_2 with current J_2 placed in it.

The power of Lorentz

The force of Lorentz is the force with which the electromagnetic field acts according to classical (non-quantum) electrodynamics on a point charged particle. Sometimes the force of Lorentz is the force acting on a charge q moving at a rate V, only from the side of the magnetic field.

F=q·V·B·Sinα

Often the total force acting from the side of the electric field with the voltage E and of the magnetic field with the magnetic induction B is represented as:

F = q (E + [v × B])

This force is named after the Dutch physicist Hendrik Lorentz, who derived an expression for this force in 1892. Three years before Lorentz, the correct expression was found by O. Heaviside.

We consider the case of the force action of a magnetic field on a charge q moving with velocity V. In the representations of the theory of dark matter, the elementary electric charge (negative or positive) is either an electron or a positron $q = e$. A magnetic field is a field of velocities of gaseous dark matter induced by a conductor with an electric current [16 ... 21].

If an elementary electric charge q moves in at a magnetic field (the velocity field of gaseous dark matter) at an angle α to the magnetic induction vector B with velocity V, then its motion can be regarded as an elementary electric current with the current strength J_2=q/1s in a conditional conductor with a length l_2=V·1 s. We substitute these values in the Ampere formula (1). We obtain the Lorentz force

$$F = \rho_e U_n \Gamma_{\Sigma 2} l_2 = \mu_o \mu \frac{J_1 J_2}{2\pi \cdot R} l_2 \cdot Sin\,\alpha = J_2 \cdot B \cdot l_2 \cdot Sin\,\alpha = q \cdot V \cdot B \cdot Sin\alpha \quad (8)$$

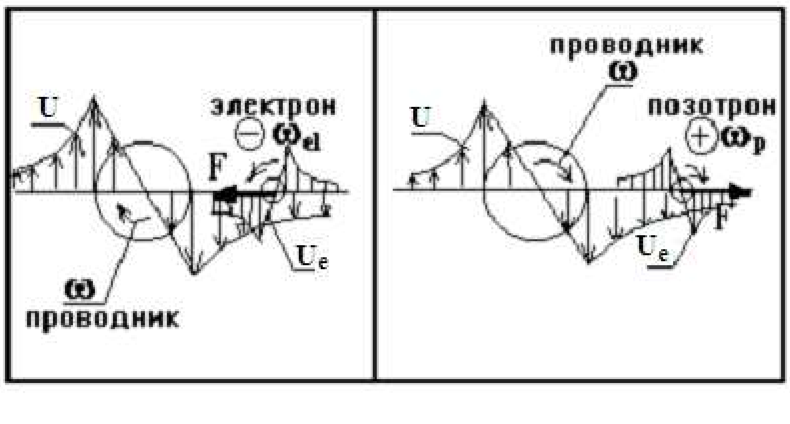

Fig.2 Fig.3

On the figures 2 and 3 show the velocity diagrams and , induced in gaseous dark matter by a current conductor (a vortex bundle of dark matter passing inside the conductor [16 ... 21]) and by an elementary charge q moving with velocity V. On the same diagrams show the schemes of forces obtained in accordance with Zhukovskii's theorem. The this forces is acting on electric positive and negative charges,which is flying along a conductor with a current flowing in our direction.The direction of the Lorentz forces acting on the positive and negative charges can be determined by the rule of the left hand.

The frame with electric current in a magnetic field of the rectilinear conductor with a current

Figure 4 shows a frame representing a closed flat contour with current J_2. The frame axis is parallel to an infinite straight conductor with current J_1. We already know that this is equivalent to the fact that a vortex cord of a gaseous dark matter with a voltage I_1 passes inside the conductor. The strength of the electric current and the voltage of the vortex cord are interconnected by the formula (2). A rectilinear vortex is induces around itself a field of the circumferential velocities. The frame has the small dimensions in comparison with the distance between the frame and the rectilinear vortex. Therefore, we assume that it is completely flowed by a uniform flow of a gaseous dark matter with the same circumferential velocity $U=I_1/2\pi\cdot R$. Here R is the distance between the infinite conductor and the axis of the frame. The length of the sides of the frame parallel to the axis is Δl_2, and the perpendicular is - h. The area inside the contour of the frame is $S_p=\Delta l_2 h$.

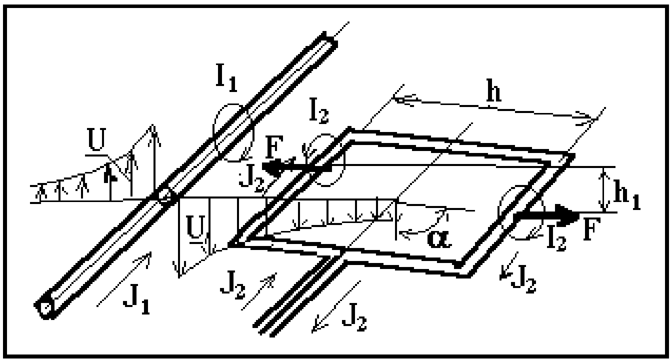

Fig.4

When a flow of a gaseous dark matter, induced by a vortex cord of an infinite conductor, flows around the frame, on the sides of the frame parallel to its axis normal forces arise, determined by the Zhukovsky theorem. This is because in the conductor forming the frame, an electric current flows and passes its vortex cord of gaseous dark matter with a voltage of I_2. This voltage is related to the current strength J_2 by the formula (2). В соответствии с первой теоремой Гельмгольца о вихрях напряжение I2 постоянное по всей длине кадра, несмотря на его сложную форму. In this case, the direction of rotation of the vortex bundle into parallel frames is counterpropagating. The forces of Zhukovsky arising on these conductors will be parallel to each other, but directed in different directions. The forces of Zhukovsky are perpendicular to the axis of the rectilinear vortex and the velocity of the oncoming flow. Just as in the analysis of the force interaction of two infinite rectilinear conductors with a current, the forces bring together the conductors of finite length, if the directions of currents coincide and repel, if the currents flow in different directions. The values of these forces acting on each side are given by

$$F = \rho_e U_1 \cdot \Gamma_{\Sigma 1} \Delta l_2 = \rho_e \frac{I_1 I_2 \cdot \Delta l}{2\pi \cdot R} \qquad (9)$$

The moment of the pair of forces, located at a distance h_1 from each other, will be

$$P_m = Fh_1 = \rho_e \frac{I_1 I_2 \Delta l_2}{2\pi R} h_1 \qquad (10)$$

If the voltages I_1 and I_2 of the vortex bundles of a gaseous dark matter are replaced by (2) through the currents J_1 and J_2 and take into account the expression (5) for the coefficients $\mu_o\mu$ and the expression for an induction $B = \mu_0 \mu \frac{J}{2\pi r}$, we obtain the following formula

$P_m = BJ_2 \Delta l_2 h_1$. (11)

It can be seen from Fig. (4) that shoulder of the forces h_1 is related to the distance between the sides of frame h through Cosα

$h_1 = h\text{Cos}\alpha$. (12)

We substitute this value in formula (11). Finally we get

$P_m = BJ_2 l_2 h\text{Cos}\alpha = BJ_2 S_p \text{Cos}\alpha$. (13)

Here α is the angle between the direction of the velocity U in the center of the frame (the induction vector) and the plane of the frame. The obtained formula completely corresponds to the experimental data. The biggest moment acting on the frame will be, when Cosα=1. When the frame is located in a plane passing through an infinite conductor, Cosα=0 and the moment P_m turns to is zero. In this case, the forces applied to the opposite sides of the frame also lie in one plane and, although they are still directed in the different directions, the arm $h_1=0$ and therefore the moment $P_m=0$.

The orientation of the frame depends on the direction of the current in the frame. When the direction of the current changes in the frame, the sign of the voltage (circulation) of the vortex of gaseous dark matter changes. As a result, the forces and the moment from them also change their direction and the frame rotates by 180^o. The closer the frame is to the wire, through which the current flows, the greater the moment from the forces, acting on the frame. The quantity ΔΦ [14], which enters into the formula (13), is called the flux of magnetic induction (the magnetic flux).

$\Delta\Phi = B \cdot S \cdot \text{Cos}\alpha$ (14)

The positive sign of the magnetic flux corresponds to the acute angle α.

About the permanent magnets

The experience accumulated in the previous chapters of the studying the nature of the electromagnetic field makes it possible to express the some considerations about the physical nature of the permanent magnets. We have seen that the magnetic field near a conductor with current is caused by an uneven field of velocities and pressures in the surrounding field of a gaseous dark matter. The magnetic forces are the result of the effects of the gaseous dark matter flows, caused by a vortex bundle inside the conductor to the elementary electric charges or other conductors with an electric current within which their vortex bundles pass. When an electric current passes through the conductors, vortex bundles form from a very slow flow of the vortexelectrons and high-speed the axial flows of gaseous dark matter arise in the direction of motion of the vortexelectrons.

Unlike from the electric conductors, the electric current inside the permanent magnets there is no and, consequently, the bundles of the vortex filaments consisting of the conduction electrons moving along them there are no. It is known that the permanent magnets are created by the magnetizing them. For example, the cores of the solenoids made of the ferromagnetic materials are magnetized. This can be explained by the fact that during the operation of the solenoid in its internal channel, the flow of gaseous dark matter is induced in the axial direction. Namely, this flux, interacting with the vortex electrons of the metal core, unfolds them in one direction and carries them along. They begin to move in the axial direction along the vortex filaments, forming vortex bundles. After the core is removed from the solenoid, the vortex electrons retain the same orientation. However, they stop their movement along the core, which has become a permanent magnet and no longer form continuous vortex filaments and vortex bundles around which the vortices could be realized in field of the dark matter. Consequently, the nature of the magnetic field of the permanent magnets differs from the nature of the magnetic field near the conductors with current.

The atoms of the ferromagnetic materials should be by the vortex rings - dipoles. They have a large circumferential velocity Uu () on the surface of the vortex ring U_u ($\varpi_{u-el} \neq 0$). To better understand what is happening around the vortex ring of an elementary particle of a baryonic matter, we consider the velocity field of a gaseous dark matter near an isolated vortex ring [15]. The flow of gaseous dark matter along the rings U_V we will not be considered. We will accept $U_V = 0$. We suppose, that we have a vortex ring with a radius R lying in the 0xy plane, centered at the origin (Fig. 5).

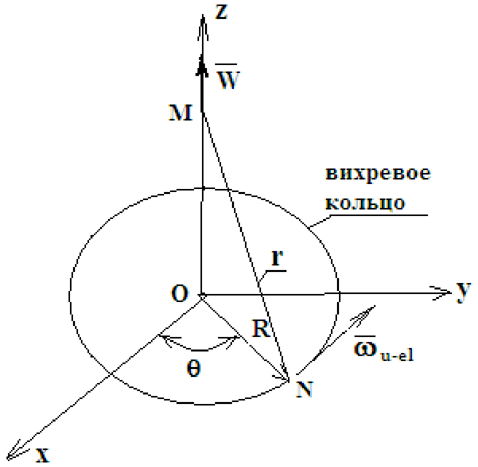

Fig.5

It is required to determine the velocities induced by this ring on the axis z. According to the Bio-Savart formula, we have

$$U_{el} = \frac{\Gamma_{el}}{4\pi}\oint\frac{z\cdot d\eta}{r^3}, \qquad V_{el} = -\frac{\Gamma_{el}}{4\pi}\oint\frac{z\cdot d\xi}{r^3}, \qquad W_{el} = \frac{\Gamma_{el}}{4\pi}\oint\frac{\xi\cdot d\eta - \eta\cdot d\xi}{r^3}$$

It is seen from Fig. 5 that the coordinates of the points of the vortex ring are written in the form

$$\xi = R\cos\theta, \qquad \eta = R\sin\theta \qquad r^2 = \xi^2 + \eta^2 + z^2 = R^2 + z^2$$

The coordinates of the point M in these formulas are x, y, z.

Therefore $$U_{el} = \frac{\Gamma_{el}}{4\pi}\int\frac{zR\cos\theta\cdot d\theta}{(R^2+z^2)^{3/2}} = 0$$

Similarly $V_{el} = 0$.

For speed W_{el}, we have

$$W_{el} = \frac{\Gamma_{el}}{4\pi}\int\frac{(R^2\cos^2\theta + R^2\sin^2\theta)d\theta}{(R^2+z^2)^{3/2}} = \frac{\Gamma_{el}\cdot R^2}{2(R^2+z^2)^{3/2}}$$

Thus, in the absence of the flow velocity of a gaseous dark matter along the ring, the vortex ring induces only a velocity W_{el} directed along its axis of symmetry Z. However, in the case under consideration, the jets stream of dark matter along the magnet does not arise because the vortex elementary particles of the permanent magnet material themselves are fixed in the axial direction. In addition, they are at considerable distances from each other. Consequently, the nature of the magnetic field of permanent magnets needs a different explanation.

The current lines of gaseous dark matter, emerging from the body of the vortex ring in the axial direction, are closed at the other end, forming a characteristic picture of the gas flow near the dipole (Fig.7).

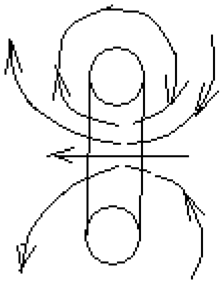

Fig.7

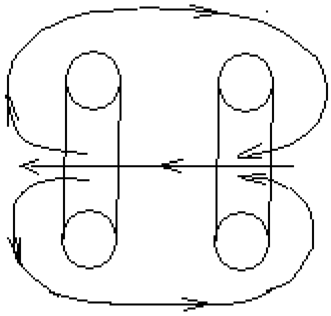

Fig.8

The combinations of such vortex rings can also take place (Fig. 8). The more complex formations can be formed than those, which shown in Fig. 8. As a result, the permanent magnet itself becomes a dipole with pronounced poles. In this case, the free electrons does not move in the permanent magnet in the axial direction. As a result, an electric current and an electromagnetic field accompanying it do not appear in the permanent magnet.

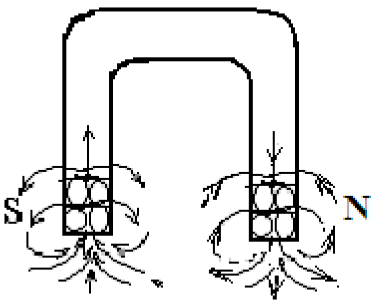

Fig.9

If the magnets are turned to each other by opposite poles, then they become like a continuation of each other. At the junction points, the velocities of a gaseous dark matter are added up and the pressure decreases. As a result, the magnets are attracted (Fig. 10). If the magnets are directed to each other by the like poles, the velocities of a gaseous dark matter induced by the magnets in the gap between them are subtracted and the pressure increases. The magnets begin to repel (Fig.11). The forces of attraction and repulsion are proportional to the pressures of gaseous dark matter in the gaps between the magnets, by cross-sectional area of the magnets, by gaps between them, and also are determined by the structure of the crystal lattice of the ferromagnetic material from which the magnets are made. As the gap between magnets increases, the magnetic forces decrease in inverse proportion to the cube of the gap.

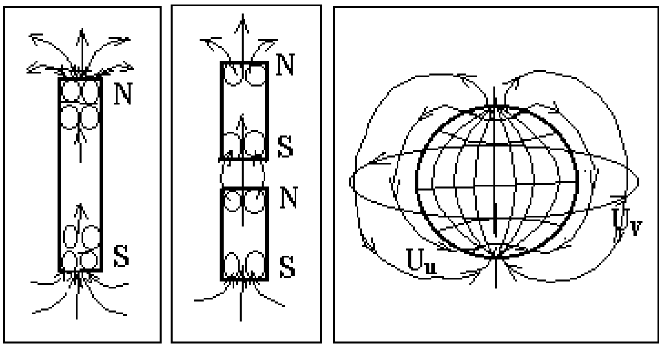

Fig.10 Fig.11 Fig.12

It is known that the Earth has a magnetic field. It is formed by a cosmic vortex of a gaseous dark matter around the Earth [1]. The cosmic vortex of the dark matter of the Earth is a giant vortex ring of a gaseous dark matter - a dipole (Fig.12). In this ring, there is an annular flow of jets of dark matter along the body of the magnet with a velocity U_v and a circumferential flow around the body of the magnet with a velocity U_u. Inside the ring along its axis there is an axial flow of a gaseous dark matter. It permeates the Earth. This current guides the vortexes of the Earth's metal core by blowing from out of their central holes towards the north pole.

We assume that the core of the Earth itself is a vortex ring made of the molten metal without a central hole. The angular rotation speeds in the Earth's core are very small. Nevertheless, it is the circumferential rotation of the melt of metal-bearing rocks that may eventually lead to the drift of the Earth's magnetic poles. Indeed, for half the revolution of the cross sections of the vortex ring of the core of the Earth, all the magnetized vortexomes of the ferromagnetic materials of the nucleus will change their orientation to the opposite one. This can cause a change in the rotation of a gaseous dark matter also in the outer cosmic circular vortex of a dark matter.

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