

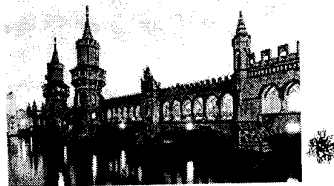
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Materials of the conference "EDUCATION AND SCIENCE WITHOUT BORDERS"

## THE EMPIRICAL TYPES PHYSICS AND GEOMETRY OF MATERIAL WORLDS FURTHER INTERACTIONS

Vertinsky P.A.

 PDF (361 K) |

### I. THE STEREOCHRONODYNAMICAL INTRODUCTION

In the author's papers [1, 2], having devoted to the STEREOCHRONODYNAMICAL AXIOMATICS filling [3, 4] by the specific physical content, it has been possible, essentially, to the first from the FIVE axioms [3, 4] to be formulated the following CONCLUSIONS:

I. The interpretation on the basis of the empirically established dependencies of the STEREOCHRONODYNAMICAL basic position, that all the material objects of our world, in the form of the fields or the material bodies, are practically presented themselves the common continuous medium or the continuum – the physical ether, in which and all the material objects (e.g. the bodies and the fields) are being localized and located, having interacted with each other, according to the established laws, unambiguously, it is resulted in us to the conclusion on the FIVE-FOLD HIERARCHIES OF THE DEFORMATIONS WORLDS SUBSTANCE, that is, the worlds, which are contained the DEFONES:

$$M = M_1 + M_2 + M_3 + M_4 + M_5 \quad (1);$$

II. Having considered the n PARTICLES dimension, in dependence of the specific physical properties of the DEFONES, CLUSTERES, NUCLEI, ATOMS AND MOLECULES WORLD, that is, as the DIMENSIONS of the corresponding DEFONES COHESIONS WORLDS, it can be imagined oneself the DEFONES WORLDS, in the form of the empirically already established presentations on the following: 1) the elementary particles; 2) the clusters; 3) the atomic nuclei; 4) the chemical elements atoms, and 5) the chemical compounds molecules.

III. The SPHEROID WITH THE TOROID and THE TOROIDS BETWEEN EACH OTHER COHESIONS is the pair cohesions peculiarity of the DEFONES BETWEEN EACH OTHER, due to the central – axial symmetry of THE DEFONES interactions, that particular case of which is the stable one's position of the defones inside the other, in the so-called potential well.

The above – mentioned, DEFONES COHESIONS WORLDS matching, empirically entrenched notions and the long – held beliefs of the material worlds hierarchy has been presented in the following form: 1) the elementary particles; 2) the clusters; 3) the atomic nuclei; 4) the chemical elements atoms, and 5) the chemical compounds molecules, now, it is allowed us to subjected to the careful consideration of one more of the FIVE axioms of the STEREOCHRONODYNAMICS:

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In the deformations world, the DEFONES interactions between them is carried out, by means of the stress fields of the related deformations in the vicinity of the DEFONES, the comparison of which with the empirically well – known interactions is allowed us to be classified them, accordingly to the symmetry well – known types [3, 4].

### II. THE PHYSICAL CHARACTERISTICS GEOMETRY OF ELEMENTARY PARTICLES

Our intension to be found out the EMPIRICAL INTERACTIONS OF THE MATERIAL WORLDS is suggested to be used THE EMPIRICALLY reliable information on the studied WORLDS' properties, having fixed the hierarchy by us: 1) the elementary particles; 2) the clusters; 3) the atomic nuclei; 4) the chemical elements atoms, and 5) the chemical compounds molecules, now, it is allowed us to be proceeded to the first species discussion in the already established hierarchy by us: 1) the elementary particles, as the main types of which have to be taken the neutrino, the neutron, the electron, the positron, and the photon, the stable existence of which have already been reliably established empirically [5]. Since, by its definition the dimension – is the category attribute essence, its inalienable property [3], then on a par with the category itself, the dimension is subjected to all the laws of the evolution, including the evolution, according to the S – shaped law. Having based on the universal nature of the S – shaped law of the systems' evolution (e.g. the FIVE steps), it is necessary to be distributed it to these categories themselves, that is, to be recognized the fair intermediate stages of each of the main categories, as they themselves are the next step in the HIERARCHY of the categories. Since, in the conclusion of his fundamental review, the author [5], with the need is come to the conclusion, that: «...the results of a number of the non – accelerating experiments (e.g. in particular, neutrinos oscillations) and the astrophysical observations, which cannot be explained in the framework of the Standard Model (SM), are definitely indicated the SM incompleteness...», then, having compared this list with the Table No.1 to [1, 2] THE ELEMENTARY (e.g. SIMPLIFIED) DEFONES one can be seen the listed particles prototypes, except the photon, which in correspondence with our conclusion on THE FIVE-FOLD HIERARCHY OF THE DEFORMATIONS WORLDS SUBSTANCE [1]  $M = M_1 + M_2 + M_3 + M_4 + M_5$  (1), and the axiom, that the fluctuations spread in the surrounding DEFORMATIONS WORLD (e.g. the ETHER, having contained the DEFONES) is subjected to the laws of RADIATION, it can be added and completed in the Table No.1 by the no dimension radiation quantum [1, 2].

The Table No. 1.

Nº№ p.p.	n	VISUAL IMAGE	SIMPLIFIED IMAGE	SYMBOL	NAME
1	$n_1$				DEFONE- SPHEROID
2	$n_2$				DEFONE-TOROID
3	$n_3$				LEFT-TWISTED DEFONE-TOROID
4	$n_4$				RIGHT-TWISTED DEFONE-TOROID
5	no				photon

Since in the above – mentioned fundamental review [5] in Figure 2 (e.g. see page 79) has been given the «Elementary Particles» Table, having described by the Standard Model (SM), which in the expanded form, has been presented, in the Table No.2 form.

Consistently, having pursued our intention to be found out THE EMPIRICAL INTERACTIONS OF THE MATERIAL WORLDS, should be used from the given Table No.2 only the EMPIRICALLY reliable information on the above – listed elementary particles' properties. Therefore, we will take the information into consideration in the numerous sources [6] and the other of the so-called resonance particles: «...In the early sixties, one more class of the elementary particles, which were called the resonance or the resonant particles, had been opened. The lifetime of their order was equal to 10-22 sec...». Without any discussing until the physical phenomenon essence of the resonance in the material worlds interaction, we have to be admitted, that of all the above – mentioned ones «THE ELEMENTARY PARTICLES» in the Table No.2 it is possible to be used the information only the FIVE ONES for our Table No.1-A: neutrino, neutron, electron, positron, and photon.

The Table No.2

Наименование частиц		Символ		Масса в элек- тронных массах	Элек- триче- ский заряд	Время жизни, с		
		час- тнца	анти- час- тнца					
Фотон		$\gamma$	$\gamma$	0	0	Стабилен		
Лептоны	Нейтрино электрон- ное	$\nu_e$	$\bar{\nu}_e$	0	0	Стабильно		
	Нейтрино мюонное	$\nu_\mu$	$\bar{\nu}_\mu$	0	0	Стабильно		
	Тау-нейтрино	$\nu_\tau$	$\bar{\nu}_\tau$	0	0	Стабильно		
	Электрон	$e^-$	$e^+$	1	-1	Стабилен		
	Мюон	$\mu^-$	$\mu^+$	207	-1	$2,2 \cdot 10^{-6}$		
	Тау-лептон	$\tau^-$	$\tau^+$	3492	-1	$1,46 \cdot 10^{-12}$		
Мезоны	Пи-мезоны (пионы)	$\pi^0$	$\pi^0$	264,1	0	$1,83 \cdot 10^{-16}$		
		$\pi^+$	$\pi^-$	273,1	1	$2,6 \cdot 10^{-8}$		
	Ка-мезоны (каоны)	$K^+$	$K^-$	966,4	1	$1,2 \cdot 10^{-8}$		
		$K^0$	$K^0$	974,1	0	$K_S^0 \dots 8,9 \cdot 10^{-11}$ $K_L^0 \dots 5,2 \cdot 10^{-8}$		
	Эта-нуль-мезон	$\eta^0$	$\eta^0$	1074	0	$2,4 \cdot 10^{-10}$		
Адроны	Нукло- ны	Протон	$p$	$\bar{p}$	1836,1	1	Стабилен (?)	
		Нейтрон	$n$	$\bar{n}$	1838,6	0	$10^3$	
	Барыоны	Гипероны	Гиперонлямбда	$\Lambda^0$	$\bar{\Lambda}^0$	2183,1	0	$2,63 \cdot 10^{-10}$
			Гиперонсигма	$\Sigma^+$	$\bar{\Sigma}^+$	2327,6	1	$8 \cdot 10^{-11}$
				$\Sigma^0$	$\bar{\Sigma}^0$	2333,6	0	$5,8 \cdot 10^{-30}$
				$\Sigma^-$	$\bar{\Sigma}^-$	2343,1	-1	$1,48 \cdot 10^{-10}$
		Гиперонкси		$\Xi^0$	$\bar{\Xi}^0$	2572,8	0	$2,9 \cdot 10^{-10}$
				$\Xi^-$	$\bar{\Xi}^-$	2586,6	-1	$1,64 \cdot 10^{-10}$
			Омегаминус- гиперон	$\Omega$	$\bar{\Omega}$	3273	-1	$8,2 \cdot 10^{-11}$



As it is known, all the well – known and the hypothetical properties of the elementary particles have already been systematized and have always been published in the numerous scientific literature, for example, in the «Particle Data Group» review [7] and etc., from which it can be added and supplemented our Table No.1, by the essential information for our consideration:

1. The photon has not any rest mass and its electric charge; it is stable, and it is the truly neutral particle; it is involved in the electromagnetic and the gravitational interactions; it has its zero rest mass, and it has no its electric charge; and it, moreover, does not decay, spontaneously, in the vacuum. The photons are emitted in many natural processes, for example, at the electric charge motion with its acceleration, when the atom or the nucleus are being transferred from their excited state to a lower energy one, or at the electron–positron pair’s annihilation. Thus, the photons’ absorption is taken its place at the reverse processes (e.g. the nucleus excitation, the electron – positron pairs’ production).
2. The neutrino — is the neutral fundamental particle, having participated only in the weak and the gravitational interaction. The low – energy neutrinos are extremely weakly interacted with the substance. It is also known, that about  $6 \cdot 10^{10}$  neutrinos are being passed, having emitted by the Sun, every second, through the area on the Earth in  $1 \text{ cm}^2$ . However, there is no influence, for example, such as upon the human body, they do not have it, at all.
3. The neutron – is the electrically neutral elementary particle, having entered, along with the protons, in the structure, practically, of all the atomic nuclei. The common name of the neutrons and the protons in the atomic – is the nuclei. The neutron’s rest of the mass is slightly larger, than the mass of p, and it is equal to  $1,6749543(86) \cdot 10^{-24} \text{ g}$ , that is  $1,008665012(37)$  atomic mass units (AMU). The Q neutron electric charge is accepted to be equal 0. So, the neutrons are stable only in the stable atomic nuclei’s structure. The free neutrons are unstable.
4. The electron charge is indivisible, and it is equal to  $-1,602176565(35) \cdot 10^{-19} \text{ Cl}$ . The relativistic invariance is its fundamental property of the electric charge. This property is in the broad sense, that the full electric charge is being conserved in any inertial reference system. Or in a more narrow sense, that the observers, who are located at the different inertial reference systems, having measured the electric charge, they are produced it’s the same value of it. Thus, the total electric charge does not depend on, whether the body is being moved or at its rest at all.
5. The positron — is the electron antiparticle; it has its electric charge +1 and its weight, which is equal to the electron weight. Their weight is being converted into the energy, in the form of the two gamma – quanta, at the positron annihilation with the positron. The positrons are being appeared in one of the radioactive decay types (e.g. the positron emission), and also at the photons interaction with the energy, which is more than  $1,022 \text{ MeV}$  with the substance. So, the last process is called «the pairs’ production», because at its implementation, the photon, having interacted with the nuclear electromagnetic field, is forming, simultaneously, the electron and the positron.

From the Table No.2, we, in the further discussion, will be used the empirically established particles denote symbols, we will be accepted, while, without any discussion, their main characteristics: the weight (e.g. in m e) and the electric charge (e in ee), the stability will be denoted by us by the  $\infty$  symbol, all the information, having reduced in the Table No.1-A: - 5 -

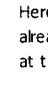
The Table No. 1-A:

№№	Defone Dimension	Defone name & its	Weight (in me)	Simbol	Life- time	Particle Name
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pp		conditional image	/Charge (в ee)		(Sec.)	
0	ny	Emission pulse	0/0	y	$\infty$	Photon
1	nv	Spheroid •	0/0	v	$\infty$	Neutrino
2	nn	Toroid o	1838,6/0	n	$\infty$	Neutron
3	ne-	 Left toroid	1/-1	e-	$\infty$	Electron
4	ne+	 Right toroid	1/+1	e+	$\infty$	Positron

From the Table No.1-A and the Table No.1 comparison, having taken account the comments on p.p.4 and 5 above (e.g. see, page 4), it is immediately revealed the electric charge geometric nature, which is consisted in the strain direction of the defones – toroid torsion: the LEFT-TWISTED DEFONE-TOROID and the RIGHT-TWISTED DEFONE-TOROID, that is:



and , which in the Table No.1-A have been denoted by the signs, correspondingly. Such geometric electron and

positron content is made it explained and clear the process of the positron annihilation with the electron, in the process of which their weight is being converted into the energy of the two gamma - quanta.

Here, again the Niels Bohr's principle is appropriated to be quoted [3], who in 1935 in his work on the quantum physics has already been come to the epistemological conclusion, that: «... in the microcosm, the phenomena have been presented clear at the mechanical level...».

In particular, his «planetary» model, had been based and built on the mechanical equilibrium of the electrical forces between the electrons in the orbits and the protons in the nucleus atom's core and the inertia centrifugal forces of the electrons motion by the orbits, which was supplemented by the quantum principle, was appeared not only understandable even for the non-specialists and the laymen, but also for the productive one in the atomic physics. Indeed, we can be easily imagine and even make the mechanical experiment, when two springs, having twisted in the opposite directions at the hard (e.g. by the welding, for example) mechanical joining are mutually unwind, having released, for all this, its elastic energy to the mechanical work!

Simply and visually, it is explained its fundamental property of the electric charge – its relativistic invariance, in the light of our geometric presentation of the electron. Indeed, there are no any reasons to be changed the turns number of the torsion deformation, having closed over DEFONE – TOROID themselves at the coordinates conversion, that is, the observers are located at the different inertial reference systems, having measured the electric charge, they are produced it's the same value of it.

Also, from the Table No.1-A and the Table No.1 comparison, taking into account the comments by the paragraphs 1 and 2 (e.g. see, page 4), the PHOTON and the NEUTRINO have to be admitted the radiation impulses at the changes of the electromagnetic and the gravitational interactions between the articles, which are, inevitably, happened at the weight or the charge values changes, and the distance between them. Indeed, all the natural processes, in which the electric charge motion with its acceleration is being flown, when the atom or the nucleus are transferred from the excited state into a low energy state, or at the electron-positron pair annihilation, we observe the weight and the electric charges changes, that, inevitably, is resulted in the interaction energy change, which is expressed by the corresponding photons energy! Similarly, at the gravitational interaction changes between the particles, which is, inevitably, accompanied by the weights and the distances changes between the particles, that is inevitably, resulted in the interaction energy change, which is expressed by the corresponding neutrino energy! In this light, it is not random the Sun's role is and the other stars, which are the neutrino fluxes continuous generators!

Finally, from the Table No.1-A and the Table No.1 comparison, having taken into account the comments on the paragraph 3 above (e.g. see, page 4), we have to be admitted our DEFONE – TOROID in the NEUTRINO, which is electrically neutral, that is, it has not the torsion strain, but the well-known its decay in the free state into the proton, the electron, and the neutrino, we will be assigned to one of the radioactivity types, which is associated with the particles motion in the ether. Indeed, according to the axiom III CXD [3], that: «... In the velocities space of our world, the local deformations – DEFONES are being constantly formed, they are being interacted between each other, according to the established laws, and, gradually, as the Universe expansion, they are being broken. For all this, the material bodies, being such DEFONES complex: – the local deformations, are presented themselves the medium local compactions, that is, at the interaction between each other they are formed the wave processes in the continuous environment of the physical ether...». In other words, the particles motion in the expanding ether is presented itself the wave process, which is associated with the masses and distances changes, that in accordance with our findings and the conclusions above, is caused the new deformations, that is, it is resulted in the new particles formation, in the full compliance with the conservation laws.

## III. THE DEFONES INTERACTION GEOMETRY

Our intention is to be found out the EMPIRICAL INTERACTION of the MATERIAL WORLDS, by the EMPIRICALLY reliable information using on the studied WORLDS properties, has been resulted in the Table No.1-A, and the Table No.1 establishment by us, the comparison of which with the account of the comments above (e.g. see, page 4), has been permitted to be revealed us the geometric essence of the electric charge, having consisted in the direction of the Defones – Toroids torsional strain, to be recognized the PHOTON and the NEUTRINO, as the radiation impulses at the electromagnetic and the gravitational interactions changes between the particles, which are, inevitably, happened at the mass or the charge values changes and the distance between them. Finally, also from the Table No.1-A and the Table No.1 comparison, having taken into account on the paragraph 3 above (e.g. see, page 4), we have already recognized our DEFONE – TOROID in the NEUTRON. Now, for the careful consideration of one from the FIVE axioms of the STEREOCHRONODYNAMICS:

«...In the world of deformation, the DEFONES interactions between each other are carried out, by means of the stress fields related deformations, in the DEFONES vicinity, the comparison of which with the empirically – known interactions is allowed to be classified them, according to the known types of the symmetry...» [3, 4] we will be subjected, with due regard for the conclusions, on the basis of the Table No.1-A and the Table No.1, the careful consideration set by us [3, 4] the classification of the empirically known their interactions, by the known types of the symmetry:

## III – 1. THE CENTRAL CYMMETRICAL INTERACTIONS – GRAVITY OVER THE LONG DISTANCES.

As only the neutron, the electron, and the positron have their rest mass in the Table No.1–A, then we will talk on the gravity, concerning above – mentioned elementary particles, which are the DEFONES – TOROIDS, having reproduced in Fig. 1 and Fig. 2:

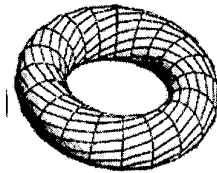


Fig. 1

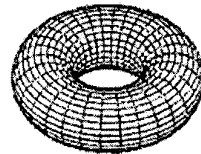


Fig. 2

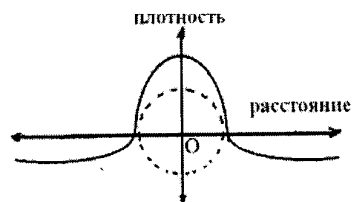
Regarding to the DEFONES – TOROIDS, we have already previously established [1, 2], that «...From one and the same fact, that unlike the simply one-connected spheroid, the toroid is the bi-connected one, it is immediately followed the conclusion

of the central symmetry absence of the vector field of the normal  $\sigma_i$  stress components, inherent in the spheroid,

having acquired in the polar plane, orthogonal to the toroid equatorial plane, the axial symmetry, having allowed to be

presented the vector field change of the normal  $\sigma_i$  stress components. Again, from the above – noted circumstances,

it should be followed the conclusion on the need to be brought approaching of the two neighboring such DEFONES – TOROIDS compression, which is the equivalent to the attraction, like the DEFONES – SPHEROIDS attraction, but the magnitude of such DEFONES – TOROIDS gravitation is depending not only on the distance between them, but and on the relative spatial orientation of each other: in the equatorial planes, their interaction is obeyed the central symmetry, like the DEFONES – SPHEROIDS interaction, but in the polar plane, the compression DEFONES – TOROIDS interaction is obeyed the axial symmetry.



For all this, here, it is significant to be noted the marked effect of the DEFONES – the TOROIDS interaction peculiarity, unlike the DEFONES – the SPHEROIDS interaction, only at the distances between the DEFONES – TOROIDS, which are comparable to their own sizes...». This observation is allowed us, at the distances between the DEFONES – the TOROIDS, to be applied the conclusion, that

the substance  $\rho_d$  density in such DEFONE compression is greater, than the substance  $\rho_p$  density in its surroundings, that can be graphically presented by some dependence  $\rho = f(r)$  (2), where  $r$  – расстояние from the O point, as it has been shown in Fig. 3. Fig. 3. Плотность – density; расстояние – distance.

As it has been noted by P. Ehrenfest in his famous report [8], that «...For the attraction, under whose influence the planet is orbited in the space,  $R_n$ , we suppose:  $\gamma \frac{Mm}{r^{n-2}}$  at  $n > 2$ , if this is corresponded to the potential

$$\text{energy: } V(r) = - \frac{Mm}{(n-2)r^{n-2}} \quad (3).$$

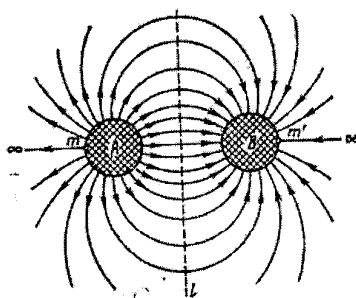


Fig. 4

As it is known from the mechanics textbooks, the first derivative of this expression, with respect to the distance, is resulted in the strength expression:  $F = \gamma \cdot \frac{m_1 \cdot m_2}{R^2}$  (4) of the attraction between the A and B particles, as it has already been shown in Fig. 4, which is known, as the law of Newton universal gravitation, which is stated, that the gravitational attraction force between the particles is proportional to both the masses and adversely proportional to the square of the distance between them. Here,  $\gamma$  – the gravitational constant, which is equal to approximately  $6,6725 \times 10^{-11} \text{m}^3/(\text{kg} \cdot \text{s}^2)$ . The graphical representation of this dependence (3) from the textbooks, as in Fig.5, is clearly demonstrated to us this interaction truth between the particles at the large distances.

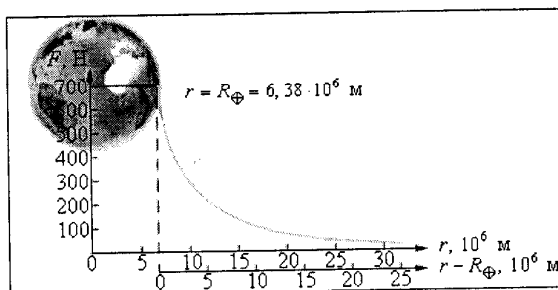


Fig. 5

Thus, the central symmetrical interaction at the large distances – the gravitational attraction of the elementary particles, with the rest mass, is carried out by means of the accompanying deformation, that is, with the help of the gravitational field, in the vicinity of the respective DEFONES!

### III – 2. THE CENTRAL AXIAL INTERACTION SYMMETRY

As we saw above [1, 2], the torsional strain is being accompanied all the other types of the deformation: and the compression, and the tension, and the shear, and the

bending. Hence, the particular practical interest is presented to us the dependence  $\rho = f(r)$  (2) density of the distance inside the DEFONE–TWISTED TOROID itself and in its surroundings. In accordance with «THE JOINT DEFORMATIONS TERMS» by Saint-Venant [1, 2], it is quite clear, that its surface layer is tested the tension, at the DEFONE – TOROID torsion. This circumstance is led to the necessity of the tensile strain in the short – TWISTED DEFONE – TOROID as in Fig. 6.

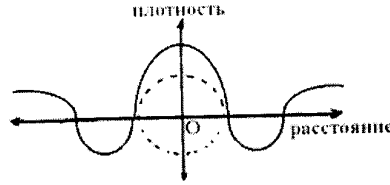


Fig. 6

Further – more, the twisted DEFONE – TOROID surfaces will be certainly led, due the statistic reaction, to this TWISTED DEFONE – TOROID withdrawal, having presented the real view, as in Fig. 7 (e.g. in plan) and Fig. 8 (e.g. in the side).

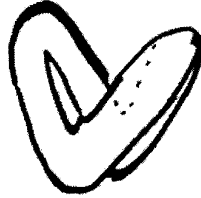


Fig. 7

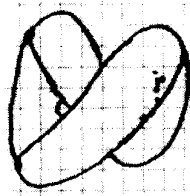



Fig. 8

In the other words, the TWISTED DEFONE – TOROID is formed the peculiar asymmetrical BRACKET, in the vicinity of which the relative deformations are also formed the asymmetrical region, within which the values and the directions of the normal

$\sigma_i$  and the tangential  $\tau_{ik}$  components of the tension are reflected this neighborhood asymmetry with the

different sides, regarding the BRACKET OF THE TWISTED DEFONE – TOROID. Again, from the marked circumstances, the conclusion is followed on the asymmetry of the interaction of the BRACKETS OF THE TWISTED DEFONE – TOROID between each other and also with the other DEFONES, depending not only on the distances, but also on the relative special orientation of each other. Moreover, having taken into consideration the above – noted circumstance, that the DIRECTION notion in the GEOMETRY is defined by the ANGLE magnitude and the sign, it should be acknowledged by us the decisive influence on the interaction magnitude and the direction and also the TWISTED DEFONES – TOROIDS TWISTING

DIRECTIONS, which may be two: the RIGHT one and the LEFT one. Above,  (e.g. see, page. 5), w

have already found the electric charge geometric nature, which is consisted in the direction of the DEFONES – TOROIDS torsional strain: the LEFT – TWISTED DEFONE – TOROID and the RIGHT – TWISTED DEFONE – TOROID, having denoted their respective signs (e.g. see. The Table No. 1-A).

Having set and fixed, thus, the electric charge geometric nature, which is explained to us, the fundamental properties of the electric charge – its relativistic invariance and the positron with the electron annihilation, now, it is allowed us to be attract the empirical information on the electric charges interaction from the MAGNETODYNAMICS [9]. As it is well – known, after the intensive experimental researches, in the early of the XIX-th century, the results of the Sh. Coulomb, H. Oersted, A. Ampere, M. Faraday and the others researches' experiments have been used by J. Maxwell, as the axiomatic foundations at its bases of the electrostatics, in the form of the well – known Maxwell's equations:

$$\text{rot } \vec{E} = -\frac{d\vec{B}}{dt} \quad (5), \quad \text{rot } \vec{H} = \frac{d\vec{D}}{dt} + \vec{j} \quad (6), \quad \text{div } \vec{D} = \rho \quad (7) \quad \text{and} \quad \text{div } \vec{B} = 0 \quad (8).$$

Since the creation period of the classical electrostatics the magnetism nature had not been known, before the theory creation of the atomic and molecular structure of the matter, on the basis of which the ferromagnetism theory was developed in the early of the XX-th century, the magnetism phenomenon was perceived, independently, then the magnetic needle direction near the current – carrying wire was seen by H. Oersted, directly, as the magnetic forces orientation. Exactly, it is due to this inadequacy of the one of the axioms in the foundations and its bases of the classical electrostatics so-called «the electromagnetic paradox» has immediately been raised, which is consisted in the wrong direction of the electromagnetic interaction of the electric currents for the third law of the I. Newton's dynamics. The numerous attempt to be explained or to be removed this «paradox» in the whole history of the electrostatics, have been confused the challenge essence, and they have been led the quite new contradictions in it. At the same time, since the two elements

the current are being interacted in the straight line, similarly, to the electric charges, then their interaction can be characterized by the magnitude magnetic stain:  $\vec{T} = -gradH(x, y, z)$  (9). In other words, it is quite natural, to be based the power characteristics determination of the magnetic field magnitude and the magnetic force direction between the currents, correspondingly, the Ampere's law:

$$f = \mu_0 \frac{I_1 I_2}{2\pi r} \Delta l^{(10)}, \text{ that is, } T = \mu_0 \frac{I}{2\pi r} = \frac{f}{I\Delta l} \quad (11).$$

In essence of such suggestion in the electrodynamics' foundations and its bases, the author had, repeatedly, been reported at the «Sibresource – 2001 – 2008» conferences, later all these reports were collected in the thematic collection [9], therefore, here, I will only, briefly, mention some conclusions of these researches.

We will expand the definition (5): 
$$\vec{T} = -\left(\frac{dH}{dx} \vec{i} + \frac{dH}{dy} \vec{j} + \frac{dH}{dz} \vec{k}\right) \quad (12)$$

and for the calculations simplification, we will transfer the I current on the direct line along the Z axis, then:

$$\vec{T} = -\left(\frac{dH}{dx} \vec{i} + \frac{dH}{dy} \vec{j}\right) \quad (13).$$

It is clear, that having two wires with the currents with the opposite direction, we will obtain the geometric picture for their magnetic field by the tension  $\vec{T}$ , as in Fig. 9.

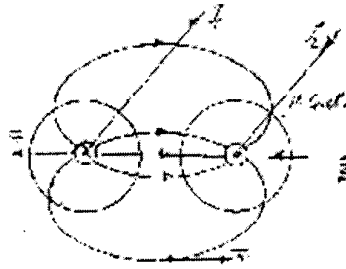


Fig. 9

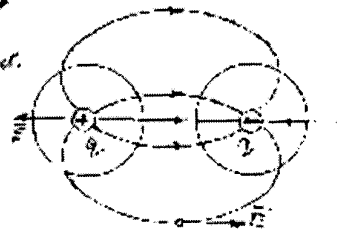


Fig. 10

Here, clearly, it is shown, that the magnetic «monopole» role is actually performed by the electric current, having created the given magnetic field. Certainly, the new vector function  $\vec{T}$  introduction of the magnetic field, having based on the magnetic forces real direction, together with the adequate representation of the field geometry is resulted in the corresponding changes in the form of the Maxwell's equations. Having determined the value of the magnetic flux  $\vec{T}$

around the wire tension through the closed surface around this wire, we will present the elementary  $dN = \vec{T} dS$

(14), where  $dS$  – the surface element around the current – carrying wire, as in Fig. 11: Since,  $dS = dl \cdot dl$  and  $dl = r d\alpha$ , then the calculation will be given:

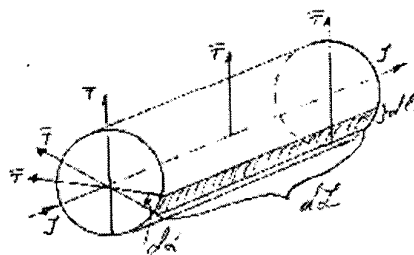


Fig. 11



$$N_T = \int_0^L dL \int_0^{2\pi} v_o \frac{I}{2\pi} r d\alpha = \mu_o IL > 0 \quad (15)$$

Thus, the magnetic field around the current-carrying wire tension  $\vec{T}$  is the field potential, its force characteristic  $\vec{T}$  is directed by the interaction forces of the currents, having produced the given field  $\vec{T}$ . At the full axial symmetry of the magnetic tension  $\vec{T}$  around the current I on the direct wire line along the Z axis, it is obviously:

$$\frac{dT_x}{dx} = \frac{dT_y}{dy} \quad (16), \text{ from where } \text{rot } \vec{T} = 0 \quad (17).$$

By the analogy with the definition:  $\text{div } \vec{E} = \frac{dN_E}{dV}$  (18), we will find and  $\text{div } \vec{T} = \frac{dN_T}{dV}$  (19), where:  $N_T = \mu_o IL$ . We will consider the case of the stationary current  $I = \text{Const}$ :

$$\text{div } \vec{T} = \frac{d}{dV} (\mu_o IL) = \mu_o I \frac{dL}{dV} = \mu_o \frac{dq}{dt} \frac{dL}{dV} = \mu_o \rho v_e \quad (20)$$

$$\text{Since } i = \rho v_e, \text{ then } \text{div } \vec{T} = \mu_o i \quad (21)$$

Thus, the central axial interaction at the large distances – the electromagnetic interaction of the elementary particles, having had the electric charges, is carried out by means of the accompanying strain, that is, by the electromagnetic field, in the vicinity of the corresponding TWISTED DEFONES – TOROIDS, having manifested themselves, in the following form: 1) The Asymmetric interaction in the statics – COULOMB INTERACTION OF THE ELECTRIC CHARGES – the like charges repulsion and the opposite charges attraction and 2) The Asymmetric interaction in the motion – THE MAGNETIC INTERACTION OF THE ELECTRICAL CURRENTS (e.g. THE MAGNETIC TENSION) – the counter currents repulsion and the parallel currents attraction

So, having summarized the already obtained results by (17) and (21) with the well-known Maxwell's equations for the steady-state current, we will obtain the following system:

$$\text{div } \vec{E} = \frac{1}{\epsilon_o} \rho \quad (22), \text{ div } \vec{T} = \mu_o i \quad (21), \text{ rot } \vec{E} = 0 \quad (23), \text{ and } \text{rot } \vec{T} = 0 \quad (17)$$

In the case of the statics, when the charges are the stationary ones, the equation (21) is degenerated into the equation (22), and the equation (17) is degenerated into the equation (23), thus, having reduced the equations system to the two well-known electrostatic field equations, as the particular case of the electromagnetic field, that is completely corresponds to the reality. Thus, after the replacing in the equations fundamental system of the classical inadequacy of the provisions electrostatics, that  $\text{div } \vec{B} = 0$  (17), which is meant the magnetic field sources absence, for the corresponding reality

principle, that  $\text{div } \vec{T} = \mu_o i$  (21) has been appeared to be quite possible not only to be removed «the electromagnetic paradox», but also to be solved many electrostatics theoretical challenges and the electrical engineering practical challenges [9]. Indeed, the magnetodynamics conclusion on the electromagnetic induction at the magnetic tension changing, near the conductor with the current change in time is quite obvious: since  $I = \frac{I}{2\pi r}$  (11), then

$$\frac{dT}{dt} = \frac{1}{2\pi} \frac{dI}{dt} + \frac{I}{2\pi r^2} \frac{dr}{dt} \quad (26). \text{ So, to this above-mentioned, according to the expressions for the electromagnetic induction EMF, it may be added, that, that the EMF value is composed of the two parts: } E = E_1 + E_2 \quad (27), \text{ where:}$$

$$E_1 = -A \frac{1}{r} \frac{dI}{dt} \quad (28) \text{ and } E_2 = -A \frac{I}{2\pi r^2} \frac{dr}{dt} \quad (29).$$

It is quite clear, that E1 is appeared, is appeared, due to the changes over time of the current I, and E2 is resulted in the secondary current I2 with the primary one I1 interaction at the distance changing between them. This circumstance, having expressed in dependence, as the function (28), it should be noted, here, especially, since the EMF dependence on  $\left(\frac{1}{r}\right)$ ,

meant the ultrahigh voltages creation principle possibility, in the direct vicinity of the primary conductors with the alternating currents. Thus, for example, the electrolytes, conductivity of which at 5 – 6 orders of their magnitude is less, than the metal conductors' conductivity, so, they are not considered, as the possible electrical circuits by the traditional electrical engineering. However, from the expression (29), it is immediately followed, that at the primary windings immersion into the electrolyte, it is quite possible to be formed the large currents in it and, therefore, to be caused the visible electromagnetic

(e.g., see the RF patents № 2041779, № 2026768 and etc.), the electromechanical (e.g., see the RF patents № 1424998, № 1574906 and etc), or the electrochemical (e.g., see the RF patents № 2147555, № 2197550 and etc), and the other effects. At the theoretical and practical conferences of «The Sibresource» [9] and the others, I have had to report on the technical solutions, on the basis of the MAGNETODYNAMICS, therefore, for the purpose for the place saving in the paper I, for the technical solutions, on the basis of the magnetodynamics, will refer the reader to the above – mentioned patens [9], but, here, I will only briefly recall on the main essence of the magnetodynamical look at some fundamental theoretical of the electromagnetism challenges.

III-2-1. «THE ELECTROMAGNETIC PARADOX»

Since the magnetic tension magnitude  $\vec{T} = -gradH(x, y, z)$  (9) has been introduced, as the vector – valued function

$$\vec{T}, \text{ on the basis of the Ampere's law on the electric currents interaction, then from its definition: } T = \frac{f}{I\Delta l} = \mu_0 \frac{I}{2r} \quad (11),$$

it should be immediately followed the direct conclusion on electric currents interaction with the magnetic tension field  $\vec{T}$  :

$$f = T(I\Delta l) \quad (30).$$

Having applied this conclusion to the interaction between each other the sides of the bent wire with the electric currents, as it has been shown in Fig. 12, it is quite possible to be expressed by us the interaction forces between the sides of the curved wire, which are the following:



Fig. 12

$f_{12} = T_{12}I_1\Delta l_1 \cos \alpha \cos \beta$  (6) and  $f_{21} = T_{21}I_2\Delta l_2 \cos \beta \cos \alpha$  (7). Since, from Fig.12 the identities are self – evident:  $I_1\Delta l_1 \cos \alpha = I_2\Delta l_2 \cos \beta$ , then, it is clear, that  $f_{12} = -f_{21}$ , that is, the sides forces of the bent wire are sought simply to be straightened it, which is immediately removed the «the electromagnetic paradox» [9].

III-2-2. THE PHYSICAL EFFECTS SYMMETRY IN ELECTROMAGNETISM

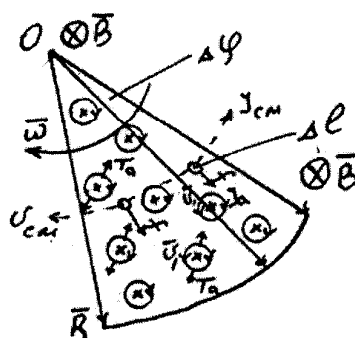


Fig. 13

In physics the effect of the magnetization electrified rod at its rotation around the longitudinal axis [10] and the electrization of the rotating around its longitudinal axis the magnetic rod [11] have already long been well - known, but due to the lack the nature magnetism «monopolies» could not succeeded to be built the logical one from the standpoint of the classical electrodynamics explanation electrization mechanism of the rotating magnet, that did not allow to be considered all these effects symmetrical, as it is usually done in the other areas of the physics (e.g. the electrostriction, the piezoelectric effect and etc.). So, in reality, by the virtue (11), the electric currents are the magnetism «monopolies», it is become quite clear the electrization mechanism of the rotating magnet from the magnetodynamics position, and, thus, the physical effects symmetry in the electromagnetism is being restored, as it has been shown n the paper [12]. And the experiments, having described by A. Einstein have finally been confirmed the A. Ampere hypothesis on the elementary currents of the electric having created the ferromagnetics magnetism. The further studies [14] have already been revealed the two groups of the electrons (s- and d-electrons) in the crystal lattice of the metals. The first of them have come from the unfinished shells of the metal atoms, that is why, they are easily freed and they are formed that «electric gas» in the crystal lattice of the met to which it is owed by its electrical conductivity. While the latter, are attached by their atoms, their «collectivized» behavior and are exactly determined the magnetic properties of the metal under the given conditions.

Let us imagine ourselves, on the basis of these presentations, the schematically distribution of s- and d- electrons in the cross-section of the magnetized iron rod, as it has been shown in Fig. 13, where are designated the following:  $v_e$  – the orbital velocities of d – electrons;  $I_a$  – the directions of the elementary electric currents in the iron atoms;  $I_{cm}$  – the direct of the electric current, having formed by the s – electrons offset at the rod rotating;  $f$  – the electromagnetic forces direction, having acted on the bias current of s – electrons by the fields tension  $\vec{T}_a$  of the elementary currents of the

atoms;  $\vec{B}$  – the magnetic induction direction of the rotating rod, which is parallel to the axis of the rod rotation with its speed  $\vec{\omega}$ . Since the geometric dimensions of the s – electrons' trajectory at the crystal lattice of the iron rod rotation are far exceeded the orbital paths sizes of the elementary electric currents in the iron atoms – the magnetism «monopolies» of the rotating magnet, then it is quite possible, with the high accuracy, to be considered their interaction, as the special case of the electrocutation loops interaction – the magnetism «monopolies» with the electric current by the direct wire [9]. The electrization mechanism of the rotating magnet is quite clear from Fig.3, in which  $f$  – the force, having acted on the s – electrons in the magnetic tension field  $\vec{T}_a$  of the elementary electric currents at the s – electrons offset with the crystal lattice during the rotation, is being directed radially. In accordance with the magnetodynamics suggestions [9], by the determination of the magnetic tension directions  $\vec{T}(\vec{r})$ , around the electric currents, the magnetism «monopolies» attraction is observed at the opposite direction of the vector – functions  $\vec{T}(\vec{r})$  of the interacting electric currents, and according to the vectors direction  $\vec{T}(\vec{r})$  of the interacting electric currents – the magnetism «monopolies» is led to their repulsion. Having summing up all sorts of the options to be changed the magnet rotation directions and the magnetic flux in it, it is quite possible to be noted only the two final effects: at the directions coincidence of these vectors (e.g.  $\vec{B}$  and  $\vec{\omega}$ ), the rotating magnet surface is electrified negatively, while the opposite direction of these vectors, the positive electric charge is being formed on the surface. Indeed, since the trajectories biasing force of the s – electrons can be found by the expression (5), then:  $f = (I_{cm} \Delta l) T_a$  (30), which at the electric charges cluster, near the rotation axis and on the surface of the rotating rod of the magnet will be compensated in the steady process of the electric field of these charges:  $E = \frac{df}{dq} = \omega \cdot I_{cm} T_a$  (31), which is also observed in the tests and the experiments with the rotating magnets. On the basis of the magnetodynamics determination by (9):

$\vec{T} = -gradH(x, y, z)$  with the microstructure parameters involvement of the ferromagnetics by [9] it can be shown, that the correlation is fair for the permanent magnets:  $T \cong kB$  (32), where  $k$  – is determined by the specific conditions of the experiment. Then:  $E = k_1 \omega RB$  (33).

Michael Faraday himself in his experiments [11] has already determined the rotating magnet electrization, by means of the simple electroscope, in which the indicator – paper strip is directly electrically connected to the electrified surface by the sliding contact, as it is clearly shown in his handwritten drawings, that is, in M. Faraday's experiments, the indicator has the electric charge, eponymous with the electrified surface charge of the rotating magnet.

In the cases of the electrization determination of the rotating magnet under the modern physical conditions, by means of ЭО, it should be considered its constructive peculiarities and the specific features. They have been shown in Fig. 14.

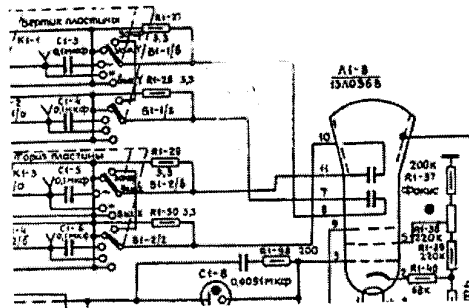


Fig. 14.

The Schematic wiring diagram of the physical laboratories with the input circuit ЭО C1-19B, by electronic. The Capacities at the entrance have been marked: the oscilloscopes must have the vertical plates C1-3 and C1-4 to be taken into account the circumstance, that of the horizontal plates C1-5 and C1-6, the indicator – electron beam, having left their mark on the ЭО screen, – has its unchanging negative electric charge – the electron charge of the electron beam, and so, the direction of deviation will be determined by the input terminals polarity of the ЭО control plates.

Since the bottom plate «U» is connected «to the body», that is, constantly it has the negative potential, then the positive impulse is created the ЭО image up from the OX-axis on the screen, and the impulse reverse polarity at the «U» entrance will be led to the images «rollover» on the ЭО screen. All this above – said is fairly, when the impulse is applied directly on the «U» plates, but when the capacitor filters are started up, the image will be turned over again on the ЭО screen» (e.g., see Fig. 14).

The CONCLUSIONS:

1. As the basic elementary particles, the stable existence of which have reliably been established empirically, it should be accepted the neutrino, the neutron, the electron, the positron, and the fotone.

2. The geometric nature of the electric charge is consisted in the direction of the torsional strain of the DEPHONES-TOROID: LEFT-TWISTED DEPHONE-TOROID-electron and RIGHT-TWISTED DEPHONE-TOROID-positron. Such geometric content of the electron and the positron is made understandable process of the positron with the electron annihilation, in the process of which their masses are converted into the energy, in the form of the two gamma - quanta and also is explained us the fundamental property of the electric charge - its relativistic invariance.
3. The centrally symmetric interaction at the large distances - the gravitational attraction of the elementary particles, having had the rest mass, is carried out, by means of the accompanying deformation, that is, with the help of the gravitational field, in the vicinity of the respective DEPHONES!
4. The centrally axial interaction at the large distances - the electromagnetic interaction of the elementary particles, having had the electric charges, is carried out, by means of the accompanying deformation, that is, with the help of the gravitational field, in the vicinity of the corresponding TWISTED DEPHONES - TOROIDS, having manifested themselves in the statistics, in the form of the Asymmetric interaction in the statistics - THE COULOMB INTERACTION of the ELECTRIC CHARGES - the repulsion of like charges and the opposite charges attraction.
5. The centrally axial interaction at the large distances - the electromagnetic interaction of the elementary particles, having had the electric charges, is carried out, by means of the accompanying deformation, that is, with the help of the electromagnetic field, in the vicinity of the corresponding TWISTED DEPHONES - TOROIDS, having manifested themselves in the motion, in the form of the Asymmetric interaction in the motion - THE MAGNETIC INTERACTION OF THE ELECTRIC CURRENTS (e.g. THE MAGNETIC TENSION) - the repulsion of the opposite electric currents and the attraction of the parallel electric currents [15].

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