CONTROLLED THERMO-NUCLEAR FUSION AND THE RIGHT OF MIND TO EXISTENCE AND DEVELOPMENT.
AUTOBIOGRAPHIC MONOGRAPH.

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This monograph is an expanded version of the brochure "On the revision of Maxwell's equations, thermonuclear fusion, gravitational engine and gamma laser" (ISBN 5-7997-0185-2) and describes the history of one bona fide scientific misconception caused by inaccurate description of the mathematics of real physical phenomena and the discovery to which it led.

My parents - Aleksander Dmitrievich and Lydia Georgievna,

my family and friends

my friends and good acquaintances,

my teachers, educators and mentors,

all kind and reasonable people who gave me the opportunity to spend and

finish theoretically and, partly, experimentally this work

- Dedicated with great gratitude.

Sites: http://thermonuclear.narod.ru   and   http://thermonuclear.ru

Energy is an inherent property of matter to bring itself, both on the micro and macro levels, into motion indirectly through fields.

Translated by computer. Comparing the original in Russian and the translation in English can be seen - how much more primitive is the translation than the original. The original can be bought at the link: https://www.super-izdatelstvo.ru/product/upravlyaemyy-termoyadernyy-sintez-i-pravo-razuma-na-suschestvovanie-i-razvitie

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I was born on February 17, 1953 in the city of Bryansk, in the USSR, in the Russian family of a personnel officer. Parents: Grigor'ev - Aleksander Dmitrievich (Porkhov town, Pskov region) and Lidia Georgievna (Bryansk town)
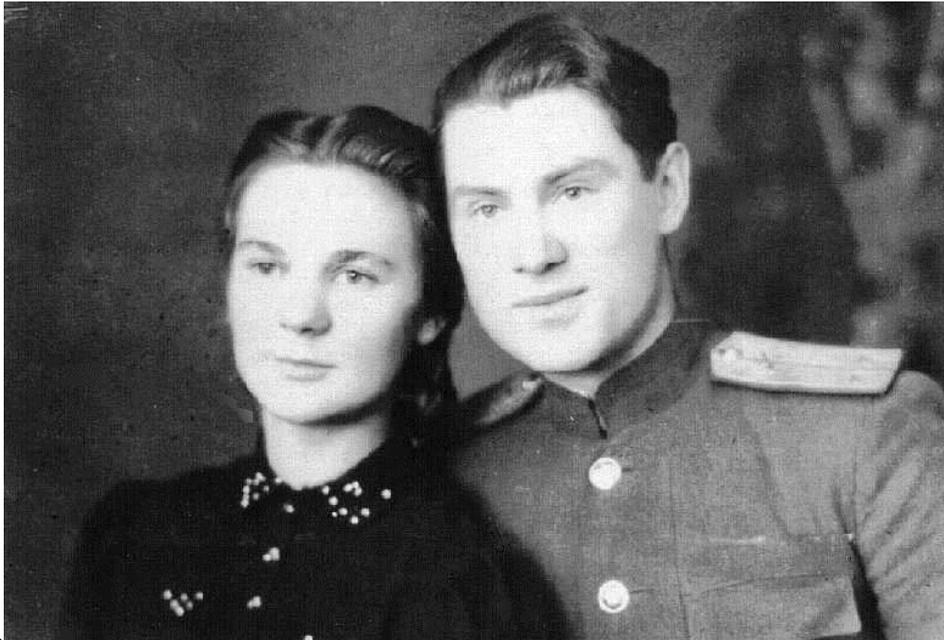
From early childhood I spoke with officers, friends of my father - highly educated and professional people. My toys were complex parts and mechanisms from the decommissioned military equipment - the advanced achievements of scientific and design ideas of the time. When I was 3 years old, I first learned that electricity is an interesting thing - a finger turned blue after it was inserted into an electronic cartridge instead of a light bulb. At the age of 4 I became closely acquainted with fire - I burned my hand while playing with a working wood-burning stove. Since then, fire and electricity have fascinated me. There were three children in the family - me and two sisters (all got a higher education). We lived in close quarters, did not glam, but amicably and cheerfully, respecting the interests of each other.

When me was 5 years old, I learned to read and began to read avidly fairy tales - Russian, Chinese, Indian, Arabic - parents spared no expense for books (in 1966, the ten-volume Children's Encyclopedia was bought, which became our reference book for many years). In 1960 I went to school in the city of Bui, Kostroma region, then my father was transferred to Tambov and I continued my studies there. In 1962, his father was transferred to a military unit of long-range radio reconnaissance by a military translator in the Leningrad Region, where he defended Leningrad on the Oranienbaum bridgehead during the Great Patriotic War and was contused. He conveyed to us, his children and students of the school, where he was responsible for patriotic education, love for the motherland, even despite the bureaucracy and not so widespread ignorance.

There I graduated from high school in 1970 in the Bolshaya Izhora urban-type settlement of the Lomonosov district. In the same year I entered the Leningrad Electrotechnical Communication School on the specialty "Television equipment and radio relay communication". In 1973 he graduated from college and was called to serve in the Soviet Army. I served in the Polish People's Republic in the Klyuchevo-Stargard-Szczecinski garrison in the aviation air defense regiment as a signalman. In 1975, I was demobilized and entered the LETI (Saint-Petersburg State Electrotechnical University) at the evening faculty of radio electronics (FEL), the department "Electron-Ion and Vacuum Technology" (FET) with a degree in «Industrial Electronics». I graduated from the institute already in places of restriction of freedom in 1983 (well, it turned out this way in life). After that, I went to work at a military factory of navigation equipment, where he worked as an electronic engineer and developed and accompanied military electronics. After this work, I went to work at the Leningrad State University at the Faculty of Physics at the Department of Computational Physics, founded by the then rector of Leningrad State University (SPSU) Merkuryev Stanislav Petrovich.

Being inquisitive by nature, in 1986 I came across an interesting physical effect — an external magnetic field of toroidal structures with a poloidal electric current. Knowing that according to the classical theory this can not be, I began to pester with questions to specialists, but I received the answer that these are scattering fields due to manufacturing errors (how they and i were taught), and this calmed down - and in vain, as shown My further research, it was necessary to continue the study of toruses with current. As a result, this work was carried out 14 years later - in 2000, I now regret the lost time, and world science and the development of civilization have slowed it down. On January 11, 2006, due to the black evil envy of psychiatrists and the so-called "scientists", "specialists" I was placed in a psychiatric hospital, where this monograph was written after all.

Now, thanks to my undertaking, many scientists have taken up the study of toruses.

The toruses are still waiting for their researchers - theorists and practitioners.

November 07, 2016

About Mind.

Only science and nothing personal.

IT WAS TIME FOR REASONABLE PEOPLE OF THE PLANET TO UNITE AND CREATE A "WORLD PARTY OF MIND".

Ignorance, already, united - supranational "elites", transnational capital, al Qaeda, ISIL, "monotheism", other organized crime.

Life is short - hurry to do good for the Mind and, perhaps, as will be shown below, your life can be extended.

Reason is an inherent property of matter for self-organization and purposeful accumulation, processing, transmission and storage of information about the world and its use for self-development. Mind is material - this is information contained in elementary biological (so far) carriers - neurons. The fruit of the work of the creative Mind is the entire material and mental world created by it (civilization).

Reason can exist without faith, but faith without Reason - never. That is, Mind is primary, it is the basis. The carrier of information can only be matter in two forms (substance, field). Weightless, immeasurable, with nothing interacting, invented by human imagination of substance (holy spirit, soul *[although the soul can be defined as a section of Reason responsible for emotions that determine the readiness of Reason to perceive information about the world around and from another Reason critically]* , aura, biofield, karma, dark energy, dark matter, neutrinos, etc. *[Occam's Razor]*) cannot store and process information using certain algorithms. Disputes and arguments about what is not, in the journal "Science and Religion" and others like him - ignorant nonsense and painful nonsense. Man is a biological information system, obtained in Nature for receiving, storing and processing information (the brain) - "I think, therefore I exist." Brain, subconscious and psyche still give us many surprises. Learning is not too early and never late. All processes occurring in nature (including in living), this movement is the movement of electrons in an atom when it is excited (transition from one sublevel or level to another), the movement of charge carriers that create a magnetic field, the movement of ions in the nerves of animals, in the transmission and processing of information (sodium pump), the

movement of the muscles of the body (energy cells), etc. To change the spatial position of matter, it is necessary to perform mechanical work, which, in turn, transforms into heat, i.e. the movement of electrons and atoms (the energy released during the work of the brain, the heat dissipation of the PC processor). Life is a confrontation of entropy, which requires energy. On planet Earth, this is the energy of the Sun, transformed and stored in fossil energy and food through photosynthesis. All animals and man, including, without need, do not move (they are lazy, the principle of least action or in society is the "issue price"), but to work with the brain, with the Mind is necessary all the time — for this it is given to man by Nature. Learning is hard work and that is why people and, especially, children do not want to think. Carriers of Reason - children, are born with Reason, filled only with genetic, hereditary information (instincts) - "a blank sheet of paper". To fill the Mind with knowledge useful for the development of other Minds (society) - should be the responsibility of every thinking person (coercion to Knowledge, criminal terms for crimes against the creative Mind and its carrier (man) - until receiving a complete secondary and higher education, which also provides education). There should be reasonable sufficiency in everything.

Ignorance, this is all conscious and instinctive, which prevents the existence and development of the mind. Futile living ("just living") is a waste of the planet's limited resources and is also ignorance. Religion (you can only believe in what you don't know — lack of knowledge, ignorance, ignorance, ignorance are all synonymous) and interest capital are tools of ignorance that suppress the mind and hinder its natural development. Religion teaches mindlessly to multiply ("... be fruitful and multiply ...", a ban on family planning), despite the limited resources of the planet *[birth of unsecured mind carriers, "Golden billion"]* and not to develop ("From many knowledge - many sorrows" , to eat the fruits from the TREE OF KNOWLEDGE is a sin. All this negates completely the well-known human values preached by the church, which hide all religions and which, in fact, are intended for receiving and creative, dialectical processing of information, knowledge, ["TRUTH"]. What was done with the name of God - remember "Gott mit uns", "In God We Trust". Religion is a medieval dead end of the development of the human Mind and Humanity. We can say that FAITH is an unreliable support in Life, if it is a support at all, and there is no personal feedback from God. Interest capital, in turn, violates the universal laws of conservation of the energy of the mass [matter], information (I say, as a physicist and rational person) - nothing can come out of nothing (profit, exploitation of Reason - Decline of world capitalism). The main task of ignorance is to make the Mind of third-party carriers to work for themselves, indirectly through the body of the carrier.

Money is the informational equivalent of the energy consumption of the Mind and its bearer to perform useful mental and physical work. For intelligent people, money is a means of ensuring the future, both of one's own and of one's own offspring, for ignorant money, the purpose and meaning of existence. It will always be bad for ignorant people, even if their gold is a scree, they simply do not know where to use it (drugs, weapons, etc.). Ignorant people do not understand that you can't run away from your stupidity and greed, even to Mars or the Moon, and you cann't spend so much on great-great-grandchildren.

The whole civilization is created by the research and creative Mind of man.

The economy is natural resources transformed by a highly educated Mind with the help of energy into the goods necessary for the maximum satisfaction of human needs. Politics - the continuation of the economy, the war - the continuation of ignorant policies in the sphere of economics and human relations. Wars are unleashed not by civilizations or cultures, but by ignorance (churches, transnational capital, individual ignoramuses or their groups fighting for power, as a means of intraspecific survival). Previously, the war of Mind and ignorance was hidden, now it has become a clear, open character. Wars will continue until the planetary principle is established and legally established - "to live and work for the good of the Mind and for its development", so that people, at least, start thinking about it; when such a principle is established, generally accepted human values, ensuring the Right of Mind to exist and develop, will be justified, war will be justified with ignorance (including armed, with ignorance incorrigible, aggressive and armed, as dangerous wild animals).

Why do the Anglo-Saxons hate the Russian mentality and its carrier - the Russian people?

As noted earlier, the Russian mentality has dreaminess, fantasy, kindness to the afflicted, the infirm, to foreigners who are instilled from childhood in the form of fairy tales, legends, tales, in the family and school, at the initial stage of the formation of the Mind (person) *[genius of Russian African poetry of origin - A. S. Pushkin and his nanny, Arina Rodionovna]*. In Russia, money-making, usury, greed, lust for power, the exploitation of man by man (the exploitation of Mind) are not accepted. It is for this reason that Western (and now our and global) capital hates the Russian mentality, sees in it a threat to its existence. The Bologna education system has not taken root in Russia because it does not provide a broad education and ability to critically (dialectically) comprehend the world around. For 25 years of "democracy", three full-fledged generations of not even fools, who have always been rich in Russia, but morons who cannot and

do not want to learn, work, create the country's economy, have been raised and brought up on Western values - all school teachers and university professors speak about it about this warn those in power remnants of sensible people. Created a consumer society. The Bologna education system is one of the ways to destroy the Russian mentality. Now ignorance is abusing Russian kindness, compassion and credulity - depriving work (means of livelihood), housing (Moskvabad, Piterbad, USA, Spain and the EU as a whole), hypocritically asking for help, then sticking a knife in the back on Russian on the earth, while bringing their ignorant, sometimes cruel traditions, hatred of everything Russian, or, as I called this process, "the demographic expansion of ignorance." Ignorance is mentally impervious to Reason - it is an enemy of Reason and itself, Reason is an enemy of ignorance, but not an enemy of itself.

Comparison of the capabilities of different languages.

HIGHER MATHEMATICS, elements of combinatorics.

Definition A permutation of *n* elements is any ordered set of these elements. The number of different permutations of *n* elements is denoted by *Pn* and is calculated by the formula *Pn = n!*

From 45 letters of the Old Slavonic alphabet, you can make up 3.30e+1013 combinations (a very high-level biosystems programming language)

Of the 39 letters of the Tatar alphabet, you can make up 2.04e+46 combinations (the programming language of high-level of biosystems)

Of the 33 letters of the Cyrillic alphabet, you can make 8,683e+36 combinations (the programming language of intermediate-level of biosystems)

Of the 26 letters of the Latin alphabet, you can make up 4.032e+26 combinations (the programming language of low-level of biosystems)
Also, the Russian language actively absorbs words from other languages, slangs and is enriched by this. Although, philologists, linguists and specialists in the transmission and processing of information should, of course, have their say.

Energy supply of human existence and the necessary place under the sun.

Fats are considered the most high-calorie. The energy value of one gram of fat is ~ 9 kilocalories (38 kJ/g). That is, 100 g of fat contains 900 kcal, which is almost half the minimum daily requirement for men. The caloric value of one gram of protein or carbohydrate is approximately equal to 4 kcal. The average caloric content is 6 kcal.

Men consume about 3500 kcal per day or 389 grams of fat. Annual need 1277500 kcal.

 The efficiency of photosynthesis is 5% *[the most optimistic estimate of researchers]*.

The efficiency of digestion is about 95%.

The efficiency of glycolysis in the cell is approximately 50%

The overall efficiency of converting solar energy into biological energy is 0.05•0.95•0.5= 0.02375

the energy of sunlight is approximately 1000 W•h/m^2 or 3.6 MJ or 860 kcal•h.

Photosynthesis in middle latitudes takes an average of 90 days • 24 hours = 2160 hours.

The total energy stored in plants for the season is 2160 hours • 0.05 • 860 kcal•hour = 92880 kcal / m^2 [100% of the area involved in photosynthesis].

To provide one person with energy for a year, a minimum of 1277500 kcal is needed: 92880 kcal / m^2 = 14 m^2 of fertile space under the Sun.

Social norms of the total area are calculated as follows:

If there is one tenant living alone - he is given an area equal to 35 squares [and we still have to wash, wash, dry, store food, household and household items, etc.].

42 squares - required for at least two people. If the family consists of three people, then each of them must receive at least 18 squares.

Recreational load on natural complexes in the organization of tourism, excursions and mass daily recreation. 0.05 people / ha or 20 ha / person.

It can be seen that the recreation area is approximately 4000 times larger than the actual food and accommodation.

About the meaning of life.
2017 year

The meaning of human life is only if it makes sense the existence of mankind. Man differs from all living things only by the presence of a creative mind, that is, by the fact that he can create something that does not exist in wild living and inanimate nature. All living things have a research mind, even a mosquito searches for an object and examines it to get drunk on blood. It can be assumed that the highest sense of the existence of humanity is the expansion of the creative mind in the universe, but this (until the new laws of the universe have been discovered) is impossible technically, energy or economically. The nearest star Proxima Centauri is at a distance of 4.2 light years (at the third cosmic velocity there fly 80,000 years).

Mankind is doomed to live on its planet, destroy the ecology, deplete its natural resources until they run out - after that, humanity will begin to die out. To overcome this, scientists need to discover the laws that allow information to be transmitted (teleportation) at a speed that is millions of times faster than the speed of light and learn how to get energy from a vacuum *[which I strongly doubt is not getting something from nothing]* or mastering sources of hydrogen and helium -3 in the solar system. So, with the existing level of knowledge and skills of Humanity, the great meaning of life is not, but there is a goal - the creation of an artificial Reason *[artificial intelligence]*, capable of reproducing itself and capable of creating universal Reason bearers of universal species based on accumulated knowledge humanity for trillions of years *[and it can be called GOD]*.

LOGICAL AND EXPERIMENTAL SUPPLEMENT
TO THE MAXWELL EQUATION SYSTEM.

THE CIRCULATION OF THE VECTOR OF THE TENSION OF A MAGNETIC FIELD.

The failure of the theorem on the circulation of the magnetic field strength vector is shown.

in electrical circuits including a hollow closed conductor.

The fact that this is a conscientious scientific error, which led to interesting results, will be discussed further.

The course of scientific thought and the logic of reasoning are shown.

It is known that Ampere's law, by which world science understands the law of total current, appeared as the result of a large number of careful experiments with various configurations of direct current electrical circuits. These experiments united one thing - all the circuits were linear - only in them the circuit along which the circulation of the magnetic field intensity vector was calculated either covered the conductor or not. Ampere also worked with linear electrical circuits. At the time when the law of total current (Ampere's law) was formulated, there was no possibility of numerical calculation of the magnetic field inside a hollow closed conductor (PPL), the field created by the current flowing over the PPP surface and between its poles. The analytical expression of such a vector field contains an elliptic integral of the second kind and, therefore, cannot be reduced to elementary form for simple numerical calculations. Theorists, with well-grounded caution, considered only linear circuits with current. J.K. Maxwell, who developed the theory of variable fields, adopted Ampere's law as an obvious axiom and only supplemented his equation with a bias current. Although Maxwell himself noted that the system of equations obtained by him is not complete and that it is inapplicable, for example, in the case of open currents, current segments and individual current elements.

Nevertheless, gradually, the law of Ampere, in its original formulation, was adopted as the norm, and the theorem on the circulation of the vector of tension of the MP became, over time, a scientific dogma. Due to the unconditional authority of the founders of electromagnetism and electrodynamics and their equally famous followers and interpreters, other current systems were not miscalculated in the future, which significantly slowed down the development of the theory and applied knowledge derived from it. It is time to fill this gap in electrodynamics.

Let's start with the basics and the obvious.

Fig. 1

It is impossible to create a separate, unclosed segment of a conductor in which direct current flows - this violates the law of conservation of charge (Fig. 1). Therefore, it seems obvious that it is impossible to create a constant magnetic field (MF) by means of a separate DC element [1, p.163]. The logic of this conclusion is simple - there is no object to consider. Thus, the concepts of "a separate, unclosed segment of a conductor" and "a separate element of a closed current" are equated. Based on this logic, well-known experimental facts are interpreted and conclusions are drawn in the theory of electromagnetism.

Check the completeness (sufficiency) of this logic.

We will consider only DC electrical circuits. Terminology:

1) A conductor is a body in which there is a movement of charges, i.e. electric current, if inside the conductor the electric field strength **E** is non-zero. [1, p.26].

2) Inverse square law. This is the law on central fields created by the centers of forces (gravitational masses, electric charges, magnetic poles) according to the law of inverse proportionality to the square of the distance. It is a question of the same description of such fields [1, p.19], [1, p.46]. It is known that the body inside the gravitating hollow sphere, does not feel the force.

3) In the space surrounding an arbitrary current, there is always a MF [1, p. 161].
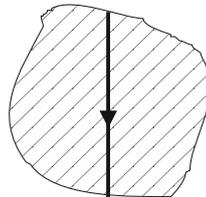
4) A closed conductor (CC) is a body that provides current flow along a closed linear circuit [1, p.164, p.167]. Usually this contour is unramified. The contour is made of a linear, metallic conductor. The current flowing through the CC creates an MF in the whole **surrounding** space (see p.3).

5) Bio-Savard law in vector form: $\mathbf{H} = \dfrac{I}{cR^3}[d\mathbf{s}\mathbf{R}]$ [1, c. 163];

I - current strength in the conductor; *d*s is the element of the linear conductor; **R** is the distance from the current element *I*d**s**, creating the MF, to the point where the intensity **H** of this MF is observed.

6) The hollow closed conductor (CHC) is a conducting body. It is made in the form of an inseparable closed surface, which completely covers a certain volume [2, p.65]. Usually, this is the surface of the body of revolution - cylindrical or spherical. The points of intersection of the

surface and axis of symmetry are the poles. The current flowing through the CHC between the poles does not create MF in the volume that it flows around, and more precisely the vector sum of the magnetic fields created by all the elements of this current is zero at any point inside the PPP, that is, the principle of full compensation based on on the undoubted principle of superposition and widely used in various measurement and experimental techniques.
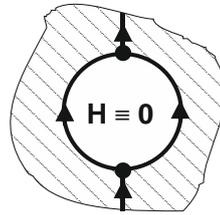
This property of the CHC follows from the laws of Bio-Savard and "inverse squares" (see p.2, p.5). Otherwise, it should be assumed that the intensity of the MF excited by the current element varies according to a law different from the law of inverse proportionality to the square of the distance, and this contradicts experience.

The same is confirmed by numerical calculations (Appendix 1, Appendix 2).
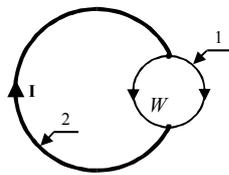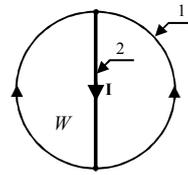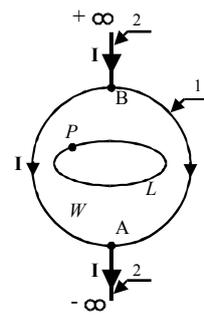
Рис. 2   Рис. 3   Рис. 4

So, in a closed electric circuit with a current there can be conductive areas of two types:
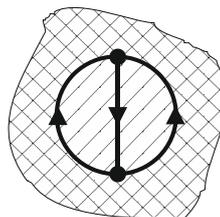
2) create MF everywhere; 1) not creating MF in some volume (W).

The minimum number of sections of both types needed to create a closed electric circuit is two (Fig. 2, Fig. 3). In the figures indicated: 1 - CHC; 2- linear conductor; **I** is the current flowing in the circuit; *W* is the volume covered by the CHC.

Let us analyze the circuit shown in Fig. 2

Denote the poles of the CHC as A and B (Fig. 4). Linear conductor 2, we represent in the form of semi-infinite rectilinear segments -∞A and + ∞B. The created circuit with current has axial symmetry. In this case, the power lines of the MF have an exclusively azimuth (tangential)

component. They are circles centered on the axis of the system. Consider the point P. It belongs to the contour L. The contour L is in the volume of W and coincides with the **assumed**, so far, power line. CHC covers volume W.

Find the circulation of the vector of magnetic field strength along the contour L. By definition: "If the curve L is *closed*, which is marked by a circle at the sign of the integral, then the linear integral of the vector **a** along it is called the circulation **a** along L:

$$C(\mathbf{a}) = \oint_L \mathbf{a} d\mathbf{s} = \oint_L a_s ds \quad (23^*) \text{ '' } [1, p.469].$$

In the following, the contour element L will be denoted by dl, and the current element ds. Since in our case the vector **H** is always parallel to d**l**, then: $C(\mathbf{H}) = \oint_L H dl$.

According to the superposition principle for a circuit with a current: "... the field strength **H** of a closed current I at an arbitrary point P is equal to the sum of the fields excited by each of its elements, i.e. equals: $\mathbf{H} = \dfrac{I}{c} \oint \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3}$ (42.4) " [1, p. 164]. In this expression, it is assumed that the current flows along a linear closed loop along which integration takes place. However, in the case under consideration, the current that flows through CHC 1 does not create a MF in the volume of W (see clause 6) and the formula (42.4) will look like this: $\mathbf{H} = \dfrac{I}{c}\left(\displaystyle\int_{-\infty}^{A} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3} + \int_{B}^{+\infty} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3}\right)$, and the circulation of the magnetic field vector along a closed curve L

$$C(\mathbf{H}) = \dfrac{I}{c} \oint_L \left(\int_{-\infty}^{A} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3} + \int_{B}^{+\infty} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3}\right) dl \ .$$

Очевидно, что в рассматриваемой цепи *циркуляция вектора напряженности магнитного поля по замкнутой кривой L, не охватывающей токов*, **не равна нулю**, а **предполагаемая** силовая линия оказалась **реальной**. Это противоречит теореме о циркуляции вектора напряженности МП, в которой говорится о том, что: " ...циркуляция вектора напряженности магнитного поля по кривой, не охватывающей токов, равна нулю... " [1, с.178].

It is obvious that in the circuit under consideration the circulation of the magnetic field strength vector along a closed curve L, not covering the currents, **is not equal to zero**, and the **assumed** power line turned out **to be real**. This contradicts the theorem on the circulation of the intensity vector of the magnetic field, which states that: "... the circulation of the magnetic field intensity vector along a curve not covering the currents is zero ..." [1, p. 178].

Where does this contradiction come from? Let's try to figure it out.

Stokes theorem.

"The circulation of an arbitrary vector a along a closed curve L is equal to the flow of the rotor of this vector through the surface S, resting on the curve L

$$C = \oint_L a_l dl = \int_S rot_n \mathbf{a} dS \quad \text{,,}$$

[1, p.472].

Formula was derived: " $rot\mathbf{H} = \dfrac{4\pi}{c}\mathbf{j}$ (47.3) " [1, p.177].

Stokes' theorem is purely mathematical, there is not a word about the flow of charges through the surface of the S - charges that create the flow of the rotor. Nevertheless, it is stated: "*On the basis of the Stokes theorem and equation (47.3) we can write*: $\oint_L H_l dl = \int_S rot_n H dS = \dfrac{4\pi}{c}\int_S j_n dS$

(47.4) " [1. p.177]. Obviously, there is a direct substitution of the rotor of the vector for current, i.e., for the vector that forms this same rotor. This is a consequence of the very "obvious" logic of reasoning. It can be concluded that equation (47.3), in this case, is incorrect and requires theoretical refinement, but "*... a complete system* of differential equations of the magnetic field of direct currents ...*" [1. p.182] is not complete, as is Maxwell's system of equations (not always $rot\mathbf{H} = \dfrac{4\pi}{c}\mathbf{j}$). This happened because only linear circuits with current were considered. More precisely, the theorem on the circulation of the intensity vector of an MF generated by an arbitrary current should look like this: "**The circulation of the magnetic field vector of an arbitrary current along an arbitrary closed curve *L* is equal to the algebraic sum of the circulations of the elements of this current along this curve**".

Nevertheless, the theorem on the circulation of the vector of tension of the MP became a scientific dogma. Because of this, other current systems were not miscalculated in the future.

Briefly repeat the output logic.

1) Or there are two types of conductors (1 - creating MPs in the whole surrounding space;

2 - creating MF in the whole surrounding space, except for a part of the space they cover;) - or the laws of Bio-Savard and inverse squares are incorrect.

2) Or there are closed DC circuits where the circulation of the magnetic field strength vector along a closed L curve that does not cover the currents is not zero - or the superposition principle is incorrect.

Consider the consequences of these arguments.

First, you need to eliminate infinity from the formulas and create a real physical system. Create an axisymmetric closed circuit (Fig.5), consisting of two linear conductors AC, BD and two spherical CHC 1 and 2, nested in one another and not touching each other. The line conductor BD connects the upper poles of the CHC 1 and 2. The line conductor AC connects the lower

poles of the CHC 1 and 2. The arrows indicate the direction of the currents in the circuit. Now

the formula (42.4) will look like this: $\mathbf{H} = \dfrac{I}{c}(\int\limits_{C}^{A}\dfrac{[d\mathbf{sR}]}{R^3} + \int\limits_{B}^{D}\dfrac{[d\mathbf{sR}]}{R^3})$, and the circulation of the vector of

the intensity of the MF along the contour L will be: $C(\mathbf{H}) = \dfrac{I}{c}\oint\limits_{L}(\int\limits_{C}^{A}\dfrac{[d\mathbf{sR}]}{R^3} + \int\limits_{B}^{D}\dfrac{[d\mathbf{sR}]}{R^3})dl$, since CHC 1

and 2 do not create MF in the amount of W (see clause 6). It is obvious that the MF in the

volume of W is the sum of the MF of **individual segments of the electrical circuit** - AC and

BD.

Such MF has the following features (Fig.6, 7, 8):
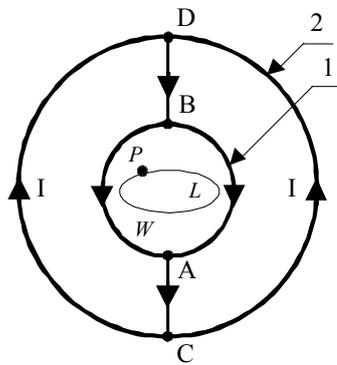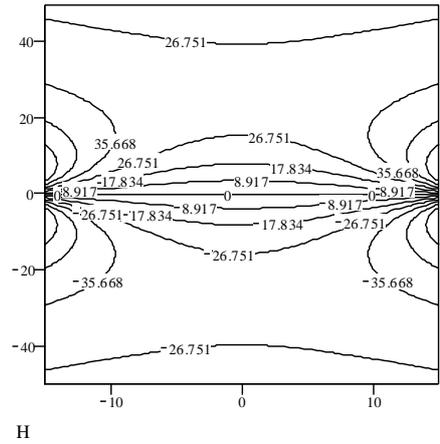

Fig. 5

H

Fig. 6

The structure of the magnetic field in the plane containing the axis of symmetry as a graph of Cantor.

The sections of the surfaces of the level of equal strength MF are shown.

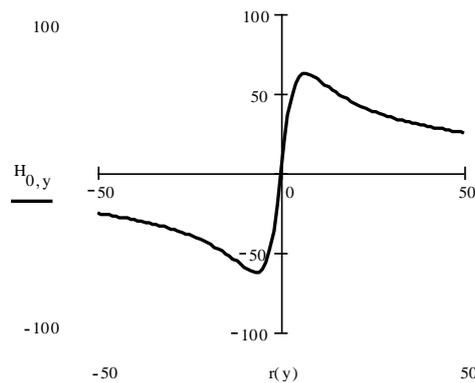The vector of tension is directed perpendicular to the plane of the figure.

Fig. 7

The dependence of the intensity of the MF on the distance to the axis of the system in the $Z = 0$ plane.
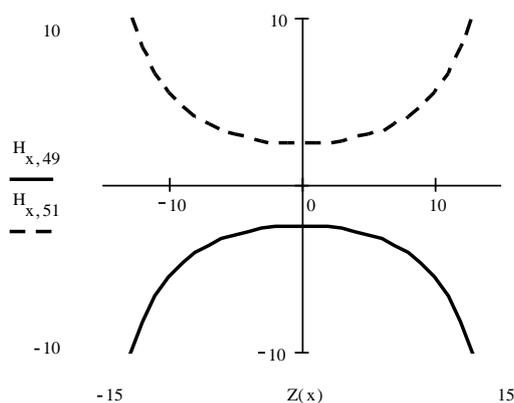
Fig. 8

The dependence of the intensity of the MF on the Z coordinate along a straight line parallel to the Z axis
and located from the axis at a distance of ± dR.

1) line of zero field strength (LZFS);

2) the minimum of tension in three coordinates in the center of the system (excluding the LZFS);

3) the gradient is such that the field strength increases in the direction from the center of curvature of the force lines.

Thus, for the study and application of a new class of permanent magnetic fields - the fields created by individual segments of direct current.

In nature, such an MP exists in any current channel where a current bypasses some obstacle. In such a channel with a current **I** (Fig. 9), one can always find a tube of current **i** (up to a single moving charged particle - MCP) whose diameter **d** is smaller than the size of heterogeneity **D**. Such a MF exists in the space between two MCP moving along one line and one way (Fig.10, Appendix 3).
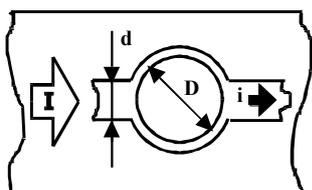
Рис. 9
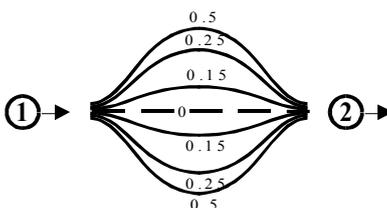
Рис. 10
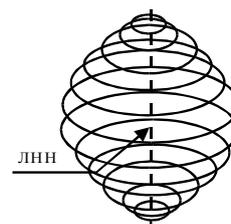
Рис. 11

It is of interest to study the behavior of free radicals in a variable MP of such a configuration. Here, the formation of helical polymeric (organic) structures like proteins and DNA (Appendix 4) is possible, and repair of DNA and RNA is also possible.

The MF configuration (Fig.11) is similar to the field in the "mirror cell" [3], but with a "mirror ratio" of more than 100. Due to the obvious similarity, such MF is called a "magnetic cocoon". The configuration of the magnetic field in the "magnetic cocoon" corresponds to the condition of

the minimum field strength [4]. This allows you to create a long-awaited open trap for plasma and industrial, safe, compact, powerful and environmentally friendly controlled thermonuclear reactor with magnetic plasma confinement [5].
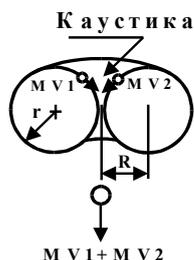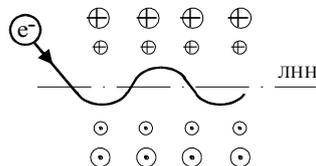
Рис. 12   Рис. 13

According to calculations, MCP in the "magnetic cocoon" will create a toroidal formation with a poloidal velocity vector of particles and R → r - caustics (Fig. 12, Appendix 5). With an increase in the MF, the Larmor radius of the MCP will decrease — the plasma will be fully crimped. The effect is called "spherical pinch" (Appendix 6). It is expected that in the toroidal formation the concentration of charges in the toroidal layer will be much higher than in metals. This will increase the refractive index of gamma rays — it is possible to create efficient gamma optics.

In the caustic, there will be collisions of particles and reactions of nuclear synthesis of hydrogen, carbon and other cycles (including neutron-free ones) will take place. Toroidal formation can change the size under the influence of external forces. This will change the MF in the system - you can create a detector of these forces.

If DZCH flies at an angle in the MF of this configuration, it will be reflected from the "magnetic walls" (Fig. 13, Appendix 7). This is equivalent to the MF system in undulators — systems used in relativistic electronics to create radiation generators (free electron laser) [6, p.486].

The experiments of Evgeny Podkletnova (see "Science and Life", No. 1, 1999, p.100) in the rotation of a superconducting disk in a constant MF are known. They recorded a decrease in the weight of objects above the disk. High-temperature plasma, like a superconductor, is an ideal diamagnetic. This allows us to hope for obtaining some gravitational (space-time) effects during the rotation of a relativistic plasma in a magnetic field. It is quite possible to create a radiator and a detector of high-frequency gravitational waves.

Based on the MP of such a configuration, devices could and should have been created long ago:

UNIVERSAL MAGNETIC LENSES refers to the technique of electronic optics. The lens can be diffusing and used to increase the resolution of electron-optical systems by reducing aberrations.

A REGULATED ONDULATOR refers to an accelerator technique and can be used to create a radiation generator that is adjustable over a wide (UHF-X-RAY) frequency range and output power.

DEVICE FOR HOLDING PLASMA refers to the technique of plasma. It can be used to create plasma installations and autonomous, compact, powerful, environmentally friendly and safe energy sources (fusion reactors) from 0.01 to 100 kW with a specific power of 0.5 - 2 kW / kg.

In a series of experiments in 2000
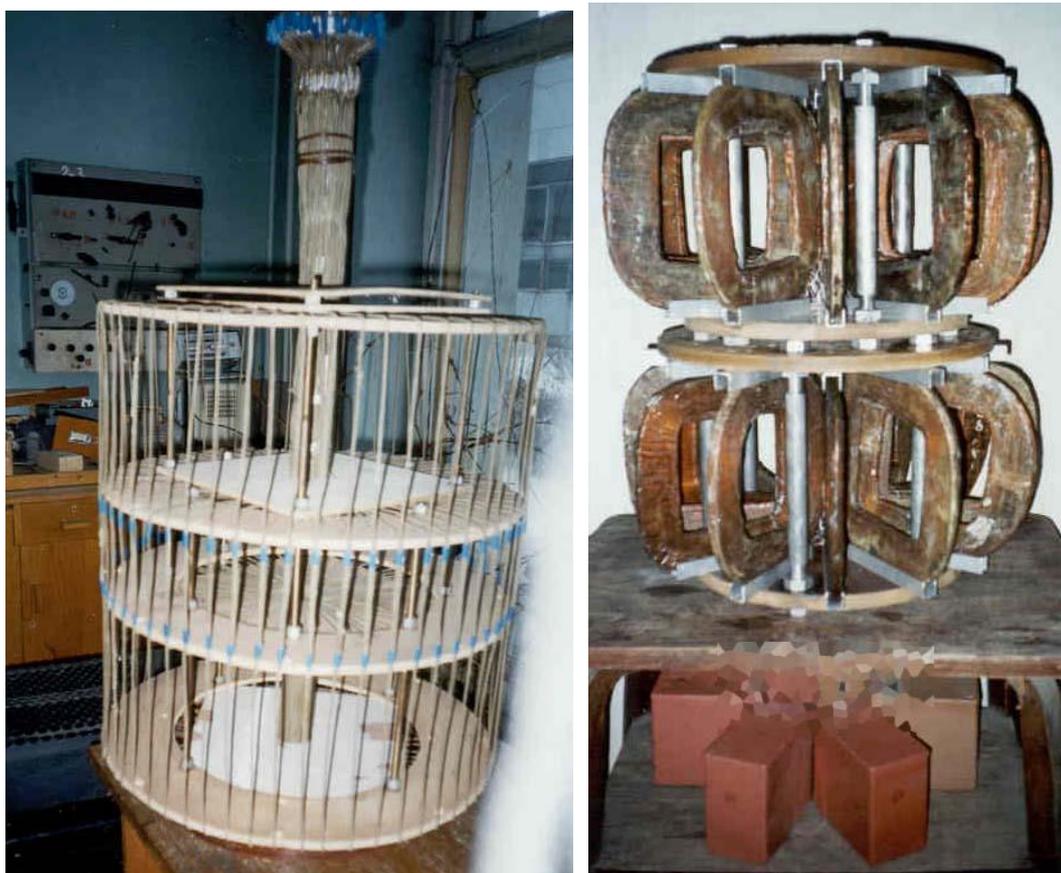
It turned out that the device shown in Fig.5 can be transformed into two coaxial tori, as shown in Fig. 14. The properties of toroidal current structures will be discussed below. This is what I had in mind when I wrote that I abandoned the study of tori in vain in 1986 - a scientific discovery could have taken place 14 years earlier and the history of mankind could be different - more

reasonable.
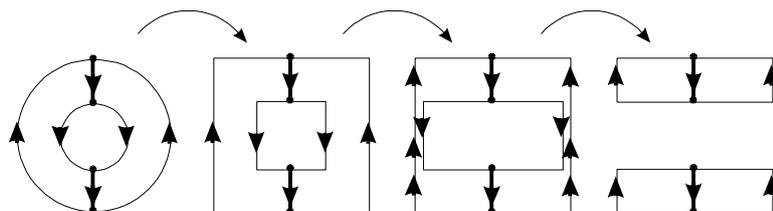
Fig.14

Now consider the circuit shown in Fig. 3. The theorem on the circulation of the magnetic field strength vector (MF) reads: "... the circulation of the magnetic field strength vector along a curve ... encompassing currents is equal to the sum of the forces of these currents (taken with proper signs) multiplied by $4\pi/c$. "[1, p.178]. From the theorem it follows that the circulation is constant and does not depend on the geometry of the chain.

Check the position of the theorem.
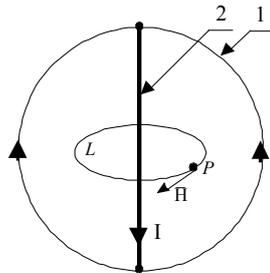
Fig.15

Let us create an axisymmetric closed circuit (Fig.15) consisting of a spherical hollow closed conductor (CHC) 1 and a linear conductor 2. A linear conductor connects the poles of the CHC. The arrows indicate the direction of the currents in the circuit. Because of the symmetry, the MF power lines have only an azimuth component. They are circles centered on the axis of the system. Consider the point P belonging to the contour L. The contour L coincides with the power line. Find the circulation of the vector of the MF intensity along the contour L. The circulation of the vector **H** along the closed curve L is determined by the expression $C(\mathbf{H}) = \oint_L \mathbf{H}d\mathbf{l}$.

In our case, vector **H** is parallel to $d\mathbf{l}$ and $C(\mathbf{H}) = \oint_L Hdl$.

To verify the validity of the theorem, it is necessary and sufficient to prove that the intensity of the MF at point P is constant when the size of the system changes (the integration circuit L and the current **I** in the linear conductor are constant). PPP 1 does not create an MP in the amount it covers (see clause 6). Therefore, according to the superposition principle, only the linear conductor AB can be considered (Fig. 16).
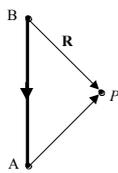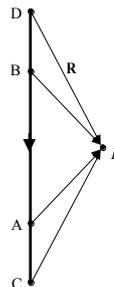
Fig. 16   Fig. 17

By the same principle, the intensity of the MF **H** of the current I at an arbitrary point P is equal to the sum of the fields of its elements: $\mathbf{H} = I\int\limits_{A}^{B} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3}$; I - conductor current; $d\mathbf{s}$ - circuit element;

$Id\mathbf{s}$ – element of current;   **R** - distance from current element to point P.

Increase the size of the system (Fig. 17). The intensity of the MF at point P will be:

$\mathbf{H} = I(\int\limits_{A}^{B} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3} + \int\limits_{B}^{D} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3} + \int\limits_{C}^{A} \dfrac{[d\mathbf{s}\mathbf{R}]}{R^3})$. CHC 1 still does not create MF in the volume that it covers (see clause 6), and the MF strength at point P varies, which contradicts the position of the theorem. **It was necessary to show**.

FUNDAMENTAL PROPERTIES OF TOROIDAL CURRENT STRUCTURES.

The existence of an external magnetic field and the structure of the internal magnetic field
in toroidal structures with a poloidal current.

Again, for the first time in science, numerical calculations of the magnetic field (MF) of toroidal structures with a poloidal current were made (Fig. 1). The arrows labeled **i** show the current element vectors. We considered tori with the ratio R / r ≈ 1 and R / r ≈ 2. The results of the calculations are derived in the form of Cantor graphs. The lines in the graphs show the cross section of the surfaces of the level of equal strength of MF.

The direction of the intensity vector MF is perpendicular to the image plane, since the field lines MP are exclusively azimuthal (or tangential or tangent to the circle, which lies in the XY plane and centered on the Z axis) component.

Initially, the MF was calculated inside the torus.

A torus with the ratio R / r ≈ 1 (Fig. 1).
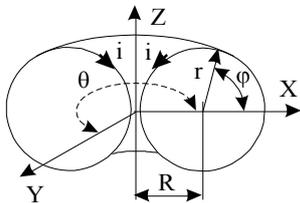
Fig.1
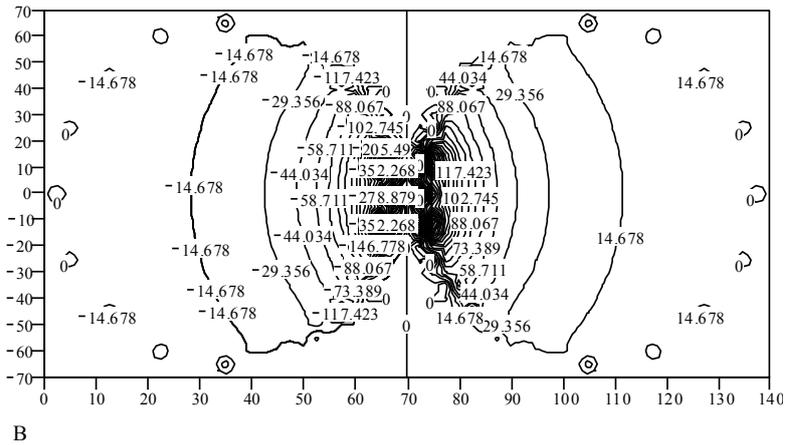
Fig.2

A torus with the ratio R / r ≈ 2 (Fig.3).
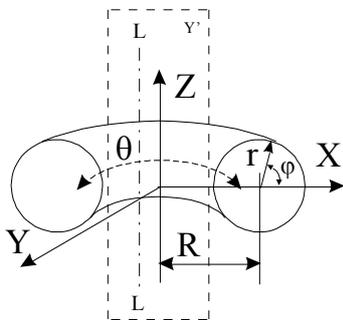
Fig. 3
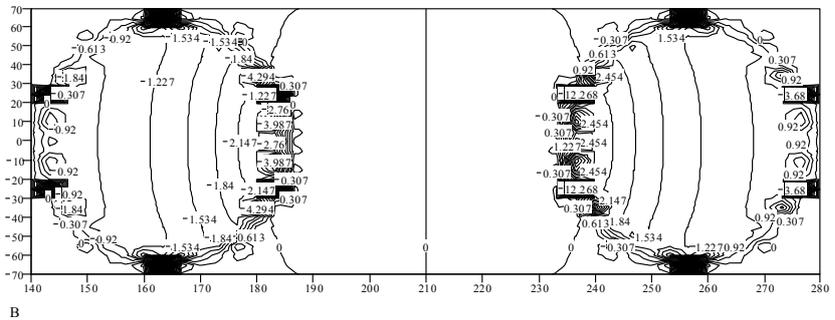
Fig. 4

The graphs (Fig. 2, Fig. 4) show that the structure of the MF inside the torus does not correspond to the structure of the MF of an infinite direct conductor with current, as was considered until now in the classical theory of electromagnetism. This MF structure corresponds to the field

created by a separate current element located in the center of the torus on its main axis and directed along this axis. The graph of this MF is shown in Fig. 5.

H

Fig. 5

Then the MF was calculated outside the torus in the XZ plane in its part Y' (see Fig.3).

B

Fig. 6

MF intensity in the Y' plane (y = 0) as a Cantor graph.

$B_{39,z}$

Fig. 7

MT strength along a straight line L - L; [y = 0, x = const, B = f (z)].

The graph (Fig. 6) shows that the outer MF of the torus exists. The graph in Figure 7 reveals a feature of this MP - three extrema and two zeros. It is seen from Fig. 7 that when two tori approach each other axially, their repulsion first occurs, and after overcoming the potential

barrier, attraction. The system enters a state with a minimum magnetic flux (minimum energy) and becomes stable. Curiously, the ratio of internal and external MFs is about 100, respectively. The calculation of the MP created by the system of two coaxial tori and between them (Fig.8, Appendix 8) shows that it has at least three coordinates in the center of the system (Fig.9). All this shows the futility of plasma confinement by internal MF in closed traps with a toroidal configuration of Tokamak and Stellarator MF - retention is possible only by an external MF of a system of toruses of arbitrary configuration.
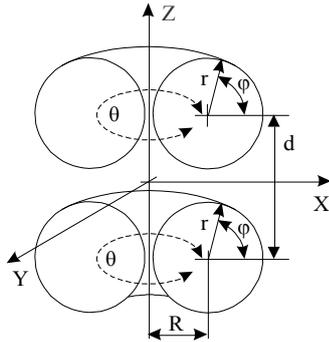
Fig. 8
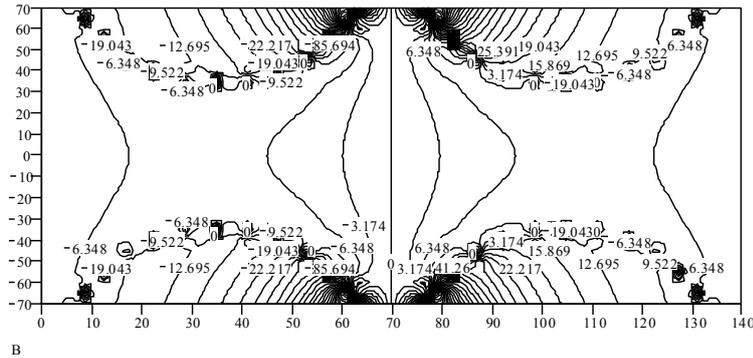
Fig. 9

Previous calculations have been made for continuous current surfaces. Now we will do the calculation for a torus consisting of individual rectangular turns with a current (segmented torus) Fig.10, Fig.11. This is done to test the possibility of reproducing an MF of a continuous torus by a field of segmented (real) tori. Graphs - in conventional units

Fig. 10

B
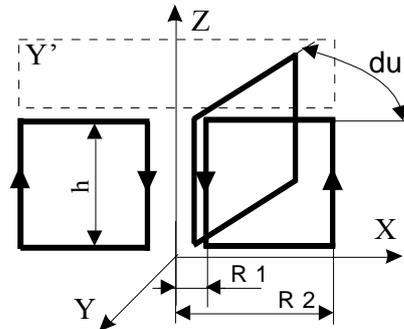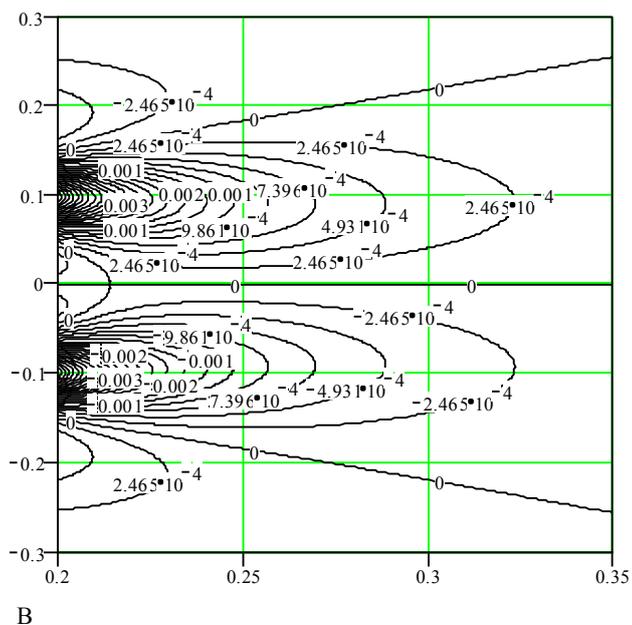
The structure of the magnetic field of a segmented torus in the Y' (XZ) plane as a Cantor graph.

The sections of the surfaces of the level of equal strength of MF are shown.

The vector of tension is directed perpendicular to the plane of the figure.
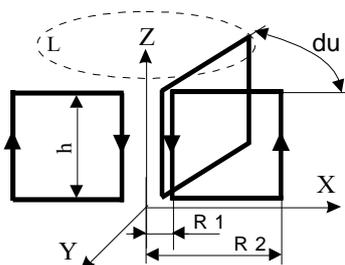
Fig. 11
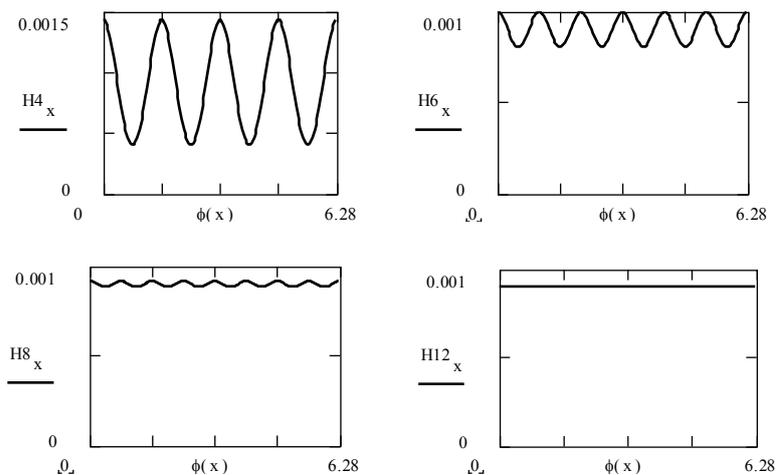
The graphs of the dependence of the intensity of the MF **H** along the contour L (Z = 0.1) on the angle ϕ.

The number of turns of N_W is 4, 6, 8 and 12, respectively. Amp-turns are constant.
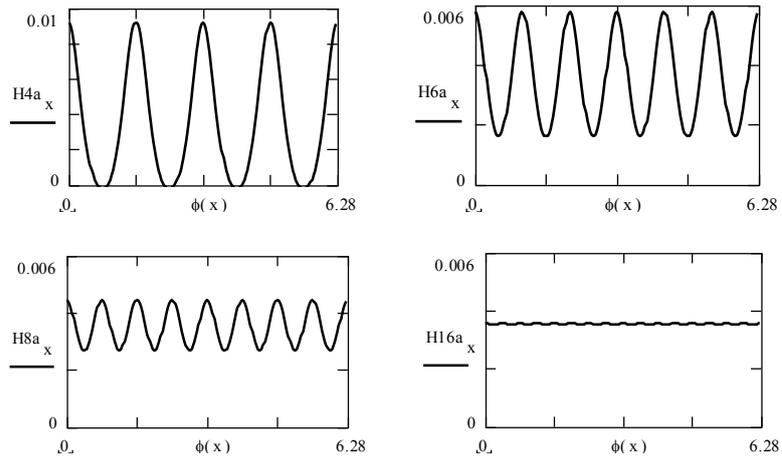
The graphs of the dependence of the intensity of the MF **H** along the contour L (Z = 0.05) on the angle ϕ.

The number of turns of N_W is 4, 6, 8 and 16, respectively. Amp-turns are constant.

From these two series of graphs it can be seen that the field line MF over a partitioned torus is an axisymmetric circle with a wave-like axial component. As the number of turns increases and the distance from the torus increases, it more and more approaches the shape of the MF force line created by a continuous toroidal current surface - an ideal circle.

A coil may consist of several conductors, be multi-row and multi-layered.

<u>The graphs related to the eight-turn segmented torus are 85% confirmed by experimental measurements! - the remaining 15% is my know-how.</u>

These measurements confirmed the existence of such a calculated external and calculated structure of the internal MF.

The experiment confirmed the Maxwell equations and the theorem on circulation.

A conscientious scientific error was caused by the inaccuracy in describing the properties of a magnetic field by mathematics. Nevertheless, the existence of an <u>EXTERNAL</u> magnetic field of a toroidal current structure with a poloidal current was proved <u>EXPERIMENTALLY</u> (!!!).

Explanations for this section are in Appendix 9 and Appendix 10.

THERMONUCLEAR REACTOR OF EUGENE GRIGOR'EV (TREG).

The possible basic design of an industrial thermonuclear reactor is shown.

The urgency of the problem of mastering the energy of controlled thermonuclear fusion is known. It has not yet been solved due to the impossibility of prolonged plasma confinement with a temperature of more than 100,000,000°. This is prevented by the absence of a magnetic field (MF) of a closed configuration and a minimum of intensity, which leads to plasma instabilities. Such MP can be created by a system of two coaxial tori (Fig. 1).
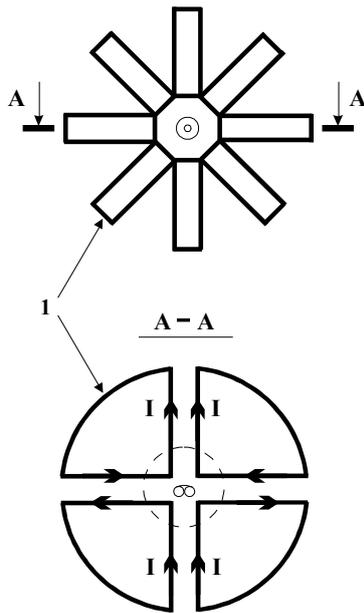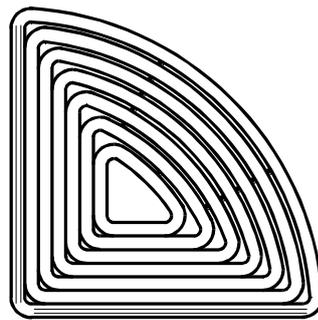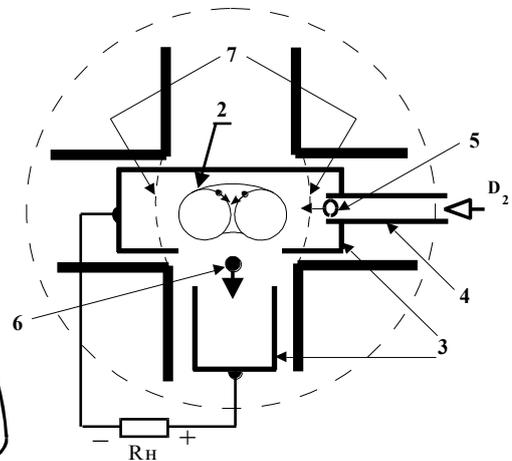
Fig.1   Fig.2   Fig.3

In Fig. 2 shows one of the composite coils of a segmented torus.

In Fig. 3 shows the fusion reaction zone (ZTR). In the figures, the numbers indicate: 1) coils of a partitioned torus; 2) toroidal plasma formation; 3) charged particle collectors; 4) fuel injector; 5) a neutral particle of fuel flying into ZTR; 6) a charged particle is a reaction product; 7) the surface of the maximum intensity of the MF (conditionally).

The device works like this. A current is passed through the coils 1. Then gaseous thermonuclear fuel is fed to the ZTR through the injector 4. Using an electrical discharge in ZTR, an initial toroidal plasma formation is created. Then increase the current in the coils - the plasma will be fully crimped and heated (spherical pinch). When the reaction starts, reduce the value of MF to the worker and adjust the position of the injector, depending on the speed of the fuel supply. This is done because the injected neutral particle freely approaches the maximum intensity of the MF 7. Its ionization must occur at such a distance from the maximum that the kinetic energy of its nucleus is enough to overcome the barrier, and the electron energy does not.

Then the nucleus will go to ZTR, and the electron will settle on the negative collector 3. The intensity of the MF must be chosen so that the heavy, contaminating impurities leave ZTR due to their larger Larmor radius of rotation. Positively charged reaction products will leave ZTR and fall on the positive collector 3. The load R_H is switched on between the positive and negative collectors 3. Coils that create a holding MF are better fed directly from the collectors. Since the energy of the particles - the reaction products is high (more than 1.5 MeV), it is necessary to produce coils from a thin wire - the ampere-turns remain, and the operating voltage rises. With such switching on (parallel to R_H), with an increase in the load current, the retaining MF and the intensity of the synthesis will decrease — self-regulation.

These are the basic principles for constructing an industrial thermonuclear reactor. The site http://thermonuclear.ru/treg_r.html discloses the main know-how, completed and planned experiments.

If you use the reaction products as the working fluid of a jet engine, and not catch them with a collector, then it is possible to create such a thermonuclear engine that will be 2000 times more efficient than analogs on chemical fuel. The speed of the expiration of the working fluid will be more than 15,000 km/s. These are super-energy-armed [more than 10e+16 J/m^3], super-cargo-lifting [more than 3,500 tons] and super-speed [more than 10,000 km/s] aerospace transport systems and mobile, super-energy-armed (on human, but not by cosmic standards), warm and bright dwellings and power stations for the Earth and the Solar system.

More details on http://thermonuclear.ru/jet_r.html and http://thermonuclear.narod.ru/jet_r.html

A possible mechanism of hard radiation in systems of binary stars

with interstellar accretion channel

As noted in the "Maxwell Equations" (Fig.10), there is a magnetic field (MF) between two particles that move in one direction. In order to verify this, it is sufficient to calculate the intensity of the magnetic field at the points of the matrix shown in Fig.1.
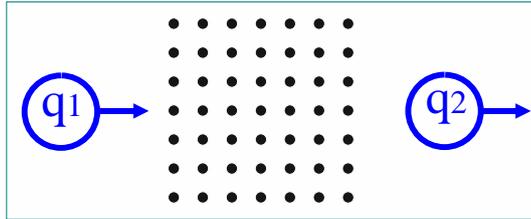
Fig.1

The intensity of the MF of moving charge can be calculated by the formula:

$$\mathbf{H} = k \cdot q \cdot \frac{[\mathbf{V} \times \mathbf{R}]}{R^3} = k \cdot q \cdot \frac{V \cdot \sin\left(\angle \widehat{V,R}\right)}{R^2} = \left. \frac{\sin\left(\angle \widehat{V,R}\right)}{R^2} \right|_{k \cdot q \cdot V = 1}$$

Particles in the accretion channel have, basically, a longitudinal component of the velocity of motion. Due to the rotation of the binary system (Fig.2), there is also the relative relative motion of the particles of the interstellar plasma and the accretion channel (Fig.2). This leads to the capture of particles of interstellar plasma and the appearance of transverse, relative to the motion of channel particles, oscillations and generation of undulator radiation with different wavelengths and intensity of radiation ("Maxwell Equations" Fig.11, "Free Electron Laser"). The radiation propagates in a certain cone, and the center of the cone of radiation is screened by an acceptor star. When such a system rotates, double radiation pulses will be observed (Fig. 3).

By the way, such a mechanism of capture and entrainment of interstellar matter can significantly increase the rate of increase of the mass of an acceptor star due to the "vacuum-sweeping out" of the surrounding space.

Межзвездная плазма
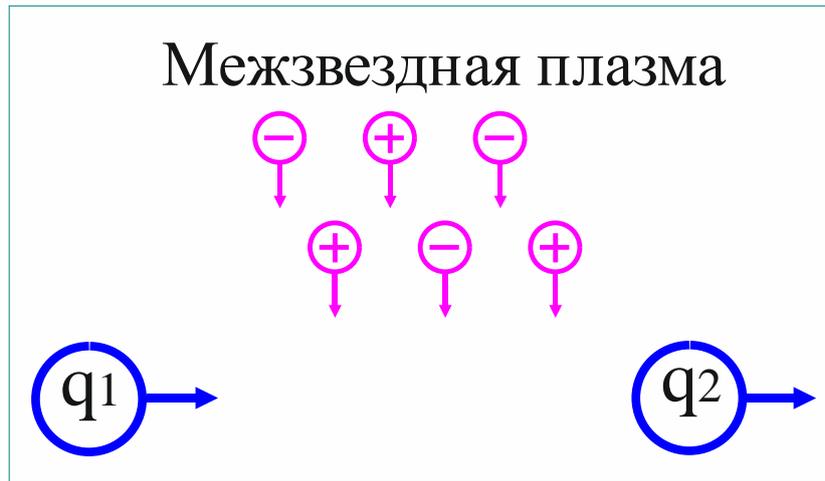
Fig.2
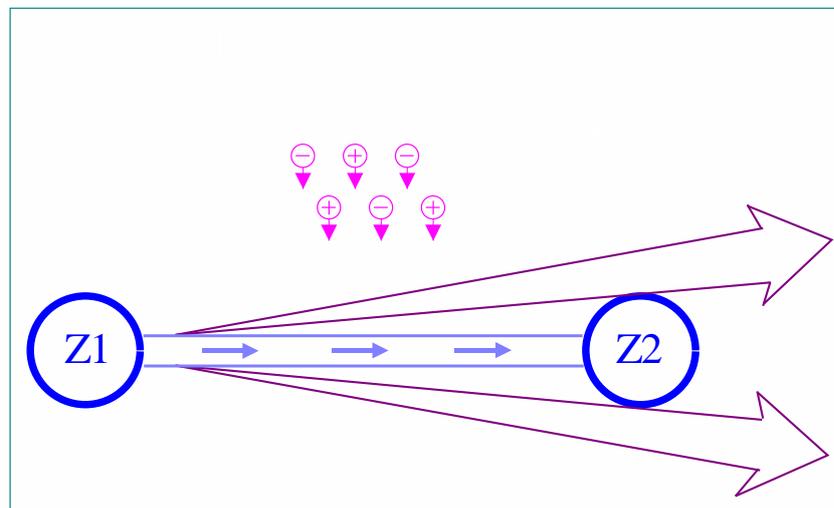
Fig.3

Possible mechanism for the appearance of ball lightning. The origin of life.

Ball lightning (BL) can occur in a linear lightning discharge channel if there is a water drop in it. Due to the skin-effect, the current in the channel flows around a drop, inside which a magnetic field of a closed configuration is created and a minimum of tension ("magnetic cocoon"), i.e. that which is necessary for keeping high-temperature plasma. Then, under the influence of high temperature in the channel, water evaporates, dissociates, and hydrogen and oxygen ionize. As a result of this gas-kinetic process, a sphere-like plasma formation is formed. It has high conductivity - the skin-effect continues. Oxygen ions, which have a much larger m / e ratio than hydrogen and, consequently, a larger Larmor radius of rotation, leave the field minimum.
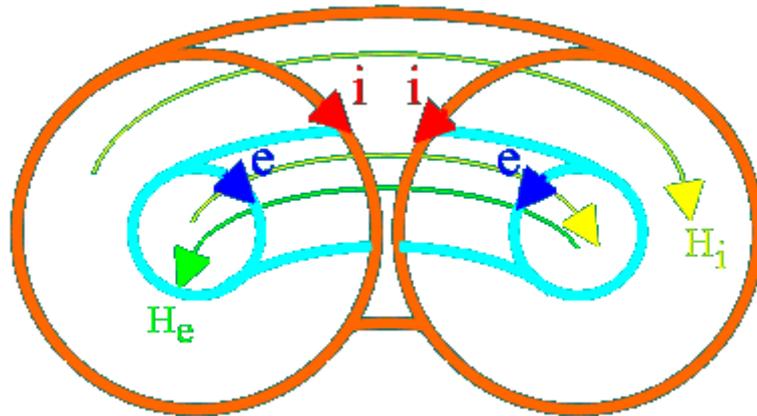
Hydrogen ions **i** are held by a magnetic field and form a toroidal current **surface**. The **e** electrons form the same torus, but smaller and located inside the ion torus due to the much smaller Larmor radius.

According to the law of induction, the direction of the electron current will be such that its magnetic field compensates for the external (ionic) magnetic field. Thus, inside the electron torus $\mathbf{H} = 0$.

The Coulomb attraction of the electron torus and its own external magnetic field impede the expansion of the ion torus. The compression of the ion torus is impeded by its own Coulomb repulsion and the pressure of its own internal magnetic field.

The expansion of the electron torus is hampered by the pressure of an external magnetic field. The compression of the electron torus is prevented by its own Coulomb repulsion. The displacement of tori relative to a common center is also hampered by the instantaneous arising Coulomb force, like that which ensures the plasma quasi-neutrality. A system is formed with an abnormally long lifetime (perhaps, also, due to thermonuclear reactions, the accompanying signs of which are found in statistical materials on BL). In the course of its autonomous existence, the BL can catch, include in its accompanying external structure (aura, crown) and modify various particulates contained in the atmosphere. The toroidal plasma formation (TPF) itself has small dimensions, on the order of fractions of a millimeter, which allows it to penetrate through small-diameter holes, or to burn them in any material. The wave front of radiation, which provides heating, ionization and luminescence of the surrounding TPF air, at distances of long-range order (100÷1000), is practically smoothed and acquires spherical symmetry. This determines the spherical shape of the BL in a calm environment. Under the influence of gas-dynamic processes, the shape of the BL may be distorted. If thermonuclear reactions occur in the BL, the mechanism of its destruction is as follows: positively charged reaction products with incomparably large energies leave the BL, an uncompensated negative charge increases - the system is destroyed with charge recombination (a sufficiently large energy) and an electrical breakdown of the uncompensated charge to the nearest object with less potential. The released energy of the magnetic field creates an electromagnetic pulse much more powerful than that (in the near distance) that is used in an electromagnetic weapon to destroy electronic devices — that is how metallic objects can evaporate or collapse.

Linear lightning is a sequence of single digits with a unit frequency of kilohertz. Naturally, the magnetic field in the lightning channel will not be constant. Due to electromagnetic induction and the compressive action of MP inside a non-evaporated water droplet from free radicals and polar molecules (sea water - the primary broth from amino acids and sulfuric compounds) complex polymer helix structures like DNA can form. Academician Oparin's hypothesis speaks of coacervated drops, but there is not a word in it about where the proteins and DNA come from — the first bout of life. My hypothesis gives the answer to this question. Thus, living matter could have appeared in the ocean (more precisely, above it).

PRINCIPLE OF CREATING A HIGH-POWER FREE ELECTRON LASER.

The possibility of creating a free electron laser is shown.

tunable down to x-ray range.

Currently, relativistic electronics are intensively developing. A significant place in it is occupied by devices called free electron lasers (FEL). Their principle is based on the fact that a moving charged particle (MCP) is driven into oscillatory motion across its direction of motion. When this occurs, radiation in a small solid angle forward in the direction of motion of the DZCH. This radiation depends on the longitudinal velocity of the MCP and on the undulator pitch (see below). It can be coherent, which gave the name of the FEL.

In order for the particle to have transverse oscillations, a system called an *undulator* is used. By the principle of influence on MCP, undulators are divided into electric and magnetic. Here the magnetic system is considered. one.

The disadvantage of existing ondulators is that permanent electromagnets with a core are used to create the required magnetic field (MF). This constructively limits the undulator step - Lund (the period of change of MF in the system).
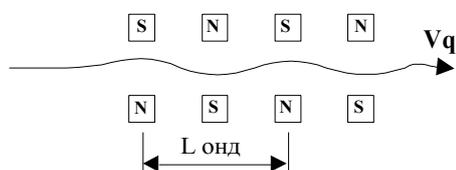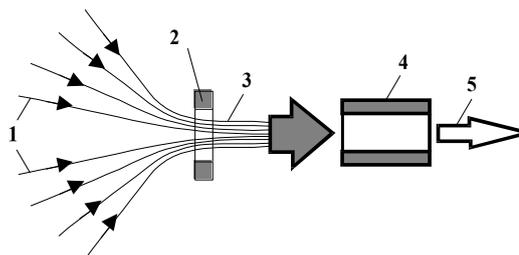
Fig. 1   Fig. 2

To create an intensive MCP beam and increase the output power of the FEL, a multichannel scheme with the addition of individual beams was applied (Fig. 2) The source of MCP can be electron and ion guns, high intensity radioactive sources (Pu, Co, Sr ...), cosmic rays and MCP streams from the Sun.

Figure 2 shows: 1 - primary MCP bundles; 2 - scattering magnetic lens; 3 - total bundle MCP; 4 - undulator; 5 - output radiation. The features of this scheme are: 1) using a universal magnetic lens for assembling beams in a scattering mode — this minimizes the aperture of the total MCP beam; 2) the use of a magnetic undulator with an ultralow, adjustable period, which allows to significantly increase the frequency of the output radiation. With an increase in the energy of the emitted quantum up to 80 MeV, the photonuclear reaction becomes possible: $_{83}Bi^{209}+80MeV \rightarrow _{79}Au^{197}+2_2He^4+4n^O$. The possibility of photonuclear splitting of radioactive waste, conventional and military nuclear materials.

Figure 3 shows: 1) a sectioned toroidal coil with current I (for sections windings of electric motors of various types, power and purpose can be used); 2) toroidal plasma formation with MCP; 3) MF, playing the role of undulator; 4) output radiation. The dotted line shows additional control low-current windings. They are used to create a weak MF, which is unidirectional with the main MF and is rotated by sequential cycling of the windings. This MF is for dynamic alignment of possible technological inhomogeneities of the main MP.
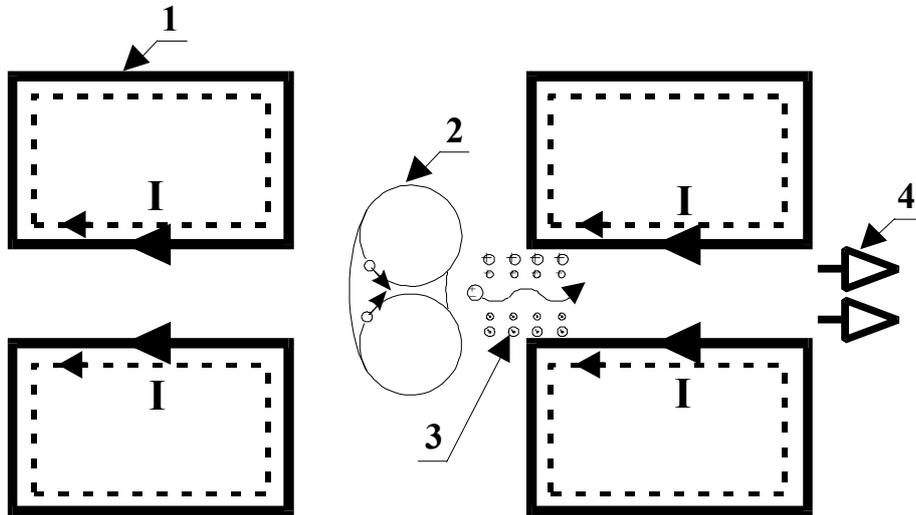
Fig. 3

The use of magnetic field type "magnetic cocoon"
in biology and medicine.

The medicine. {14.04.2017, 03.00 Moscow time, St. Petersburg "Kashchenko"} The theory, which requires a completely safe and relatively cheap experimental test, predicts that with the help of a special configuration of such a magnetic field, it becomes possible to treat diseases of the joints, the circulatory, lymphatic and nervous systems of the body due to deep endophoresis. I also assume that in certain conditions such a field can contribute to the rejuvenation of the body and a significant increase in life expectancy due to a significant extension of youth and maturity. It is known that living organisms are colloidal solutions with the orderly and purposeful movement of matter (atoms and molecules interacting with the help of electric and magnetic fields) and information using energy. This is known to biophysics and information specialists. So, with the help of such a field, it is possible to control the energetics and processes occurring in the body at the molecular and atomic levels, namely to sew the damaged parts of proteins, RNA and DNA and restore the mechanism that compensates for telomerase shortening.

© Eugene Aleksandrovich Grigor'ev with the help of the program *MathCad*

January 1997

For the first time in science - the calculation of the magnetic field inside the system of conductors, equivalent in electromagnetic properties to a hollow closed conductor.

The magnetic field strength is calculated along the coordinate axis X.

The surface current **I**s flowing through the hollow closed conductor between its poles A and B

can be represented as "current filaments" i [I.E. Tamm, Fundamentals of the Theory of Electricity, p. 140], currents flowing along the mathematical meridians of the sphere from B to A. This greatly simplifies the program for calculating the magnetic field inside a system of conductors, which is equivalent in electromagnetic properties (in the necessary approximation) to a spherical hollow closed conductor (CHC).
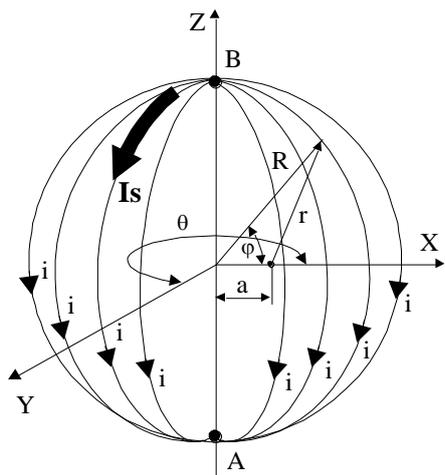
$$R := 1 \quad NL := 12 \quad n := 0 .. NL - 1 \qquad d\theta := \frac{2 \cdot \pi}{NL}$$

$$Ndl := 50 \qquad m := 0 .. Ndl - 1 \qquad d\varphi := \frac{\pi}{Ndl}$$

$$Na := 100 \qquad a := 0 .. Na - 1 \qquad s(a) := \frac{R}{Na} \cdot a$$

$$Is := 1 \qquad i := \frac{Is}{NL} \qquad dl := \frac{R \cdot \pi}{Ndl - 1}$$

Bio-Savara-Laplace Law in vector form

$$\mathbf{H} = \frac{I}{cR^3}\left[d\mathbf{s}\mathbf{R} \right]$$

$$ds(n,m) := \begin{pmatrix} \sin(m \cdot d\varphi + 0.5 \cdot d\varphi) \cdot \cos(n \cdot d\theta) \\ \sin(m \cdot d\varphi + 0.5 \cdot d\varphi) \cdot \sin(n \cdot d\theta) \\ -\cos(m \cdot d\varphi + 0.5 \cdot d\varphi) \end{pmatrix} \qquad r(n,m,a) := \begin{bmatrix} s(a) - R \cdot (\cos(m \cdot d\varphi + 0.5 \cdot d\varphi) \cdot \cos(n \cdot d\theta)) \\ R \cdot \cos(m \cdot d\varphi + 0.5 \cdot d\varphi) \cdot \sin(n \cdot d\theta) \\ -\sin(m \cdot d\varphi + 0.5 \cdot d\varphi) \end{bmatrix}$$

$$H(a) := i \cdot dl \cdot \left[\sum_n \sum_m \frac{(ds(n,m) \times r(n,m,a))_1}{(|r(n,m,a)|)^3} \right]$$
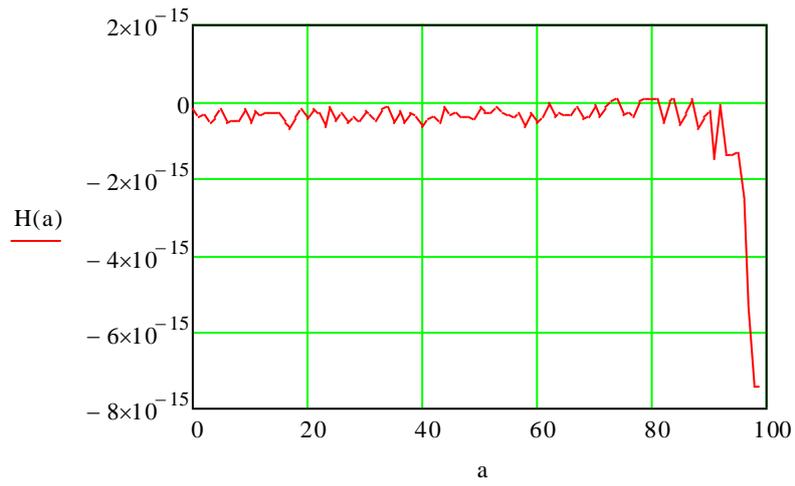
It can be seen that within the limits of the accuracy of the machine calculation, the MF inside the CHC is zero.

Appendix 2

The program for calculating the intensity of the magnetic field inside a spherical hollow closed conductor along the X coordinate in the programming language Quick BASIC

1995

```
'SFERA

SCREEN 12

TIMER ON

LOCATE 12, 1

COLOR 15

PRINT "Calculation of a magnetostatic field inside a Spherical Conductors System, which";

LOCATE 14, 2

PRINT "is equivalent by electromagnetic properties to a Closed and Hollow Conductor."

ON TIMER(7) GOSUB 1

DO WHILE INKEY$ = "": LOOP

1

CLS

Nl = 150      'number of lines with current in Spherical Conductor System

Nds = 50       'number of elements of current in line of SCS

DIM SG(Nds + 1), CG(Nds + 1)

C$ = "  +###.##"

Pi = 3.14159265359#

I = 10                'SCS line current

IL = I * Nl           'current of Linear Conductor

Ndl = Nds             'number of elements of current in Linear Conductor

Rs = 20

L = Rs                'length of Linear Conductor     strength

dl = L / Ndl

dg = 2 * Pi / Nds

ds = Rs * dg

      FOR j = 0 TO Nds - 1
      SG(j) = SIN(j * dg + dg / 2)
      CG(j) = COS(j * dg + dg / 2)
      NEXT j


LINE (500, 10)-(500, 60), 9
```

```
LOCATE 3, 64
COLOR 9
PRINT "LC"


CIRCLE (500, 110), 50, 15
LINE (500, 110)-(550, 110), 8
LOCATE 7, 66
COLOR 8
PRINT "Rs"


COLOR 5
LINE (20, 40)-(320, 40)          'X-axis
LINE (20, 105)-(320, 105)        'Y-axis
LINE (20, 165)-(320, 165)        'Z-axis
LINE (20, 230)-(320, 230)        'SCS module-axis
LINE (20, 300)-(320, 300)        'Linear current module-axis
LINE (320, 10)-(320, 350), 8, , &HFF00
LOCATE 23, 40
COLOR 8
PRINT "Rs (radius of SCS,"
LOCATE 24, 30
PRINT "along which calculates a magnetic field)"
FOR X = 0 TO Rs - 1 STEP 1
        HVx = 0
        HVy = 0
        HVz = 0
        Hs = 0
        HCx = 0
        HCy = 0
        HCz = 0
        HL = 0
        FOR v = 0 TO Nds - 1
                HUx = 0
                HUy = 0
                HUz = 0
```

```
        FOR u = 0 TO Nl - 1
        Rx = X - Rs * SG(v) * COS(u)
        Ry = -Rs * SG(v) * SIN(u)
        Rz = -Rs * CG(v)
          R3 = (SQR(Rx * Rx + Ry * Ry + Rz * Rz)) ^ 3
        dsx = -ds * CG(v) * COS(u)
        dsy = -ds * CG(v) * SIN(u)
        dsz = ds * SG(v)
        Hsx = (dsy * Rz - Ry * dsz) / R3
        Hsy = (dsz * Rx - Rz * dsx) / R3
        Hsz = (dsx * Ry - Rx * dsy) / R3
        HUx = HUx + Hsx
        HUy = HUy + Hsy
        HUz = HUz + Hsz
    NEXT u
HVx = HVx + HUx
HVy = HVy + HUy
HVz = HVz + HUz
Hs = SQR(HVx ^ 2 + HVy ^ 2 + HVz ^ 2)

        RLx = X
        'RLy = 0
        RLz = Rs + dl * v + dl / 2
          RL3 = (SQR(RLx * RLx + RLz * RLz)) ^ 3
        'dlx = 0
        'dly = 0
        dlz = dl
        'Hlx = (dly * RLz - RLy * dlz) / RL3
        Hly = (dlz * RLx - RLz * dlx) / RL3
        'Hlz = (dlx * RLy - RLx * dly) / RL3
        'HCx = HCx + Hlx
        HCy = HCy + Hly
        'HCz = HCz + Hlz

        'HL = SQR(HCx ^ 2 + HCy ^ 2 + HCz ^ 2)
```

```
                    HL = HCy
           NEXT v
LOCATE 2, 1
COLOR 14
PRINT "Hsx ="; USING C$; I * HVx
PSET (X * 300 / Rs + 20, HVx + 40)


COLOR 10
LOCATE 6, 1
PRINT "Hsy ="; USING C$; I * HVy
PSET (X * 300 / Rs + 20, HVy + 105)


COLOR 11
LOCATE 10, 1
PRINT "Hsz ="; USING C$; I * HVz
PSET (X * 300 / Rs + 20, HVz + 165)


COLOR 15
LOCATE 14, 1
PRINT "Hs ="; USING C$; I * Hs
PSET (X * 300 / Rs + 20, Hs + 230)
LOCATE 14, 25
PRINT "Magnetic intensity in Spherical Conductors System (SCS)"
'LOCATE 14, 25
'PRINT "in Spherical Conductors System (SCS)"


COLOR 9
LOCATE 18, 1
PRINT "HL ="; USING C$; HL * IL * 10
PSET (X * 300 / Rs + 20, HL * IL * 10 + 300)
LOCATE 18, 25
PRINT "Magnetic intensity from Linear Conductor current (LC)"


NEXT X
```

```
FOR X = Rs TO Rs * 2 STEP 1
        HCx = 0
        HCy = 0
        HCz = 0
        HL = 0
        FOR v = 0 TO Nds - 1
                RLx = X
                'RLy = 0
                RLz = Rs + dl * v + dl / 2
                 RL3 = (SQR(RLx * RLx + RLz * RLz)) ^ 3
                'dlx = 0
                'dly = 0
                dlz = dl
                'Hlx = (dly * RLz - RLy * dlz) / RL3
                Hly = (dlz * RLx - RLz * dlx) / RL3
                'Hlz = (dlx * RLy - RLx * dly) / RL3
                'HCx = HCx + Hlx
                HCy = HCy + Hly
                'HCz = HCz + Hlz

                'HL = SQR(HCx ^ 2 + HCy ^ 2 + HCz ^ 2)
                HL = HCy
        NEXT v
        PSET (X * 300 / Rs + 20, HL * IL * 10 + 300)
NEXT X
STOP
COLOR 15
        END
```

Appendix 3

The movement of one charged particle in a magnetic field created by two other moving particles and between them.

```
SCREEN 12
TIMER ON
COLOR 3
LOCATE 2, 12
PRINT "        Motion of one charged corpuscle (OMC)"
LOCATE 4, 12
PRINT "    in a magnetic field (MF) such as a  Magnetic; Cocoon,"
LOCATE 6, 12
PRINT "which is created by two others mobile charged corpuscles (TMC)"
LOCATE 8, 25
PRINT "Etmc = 5 eV;    Eomc = 50 eV"
ON TIMER(5) GOSUB 1
DO WHILE INKEY$ = "": LOOP


1
CLS
C$ = "  +#.#####^^^^"
Pi = 3.141593
Mo = 4 * Pi * .0000001
K = Mo / (4 * Pi)      'SI
M = 1.67E-27 * 2       '[kg]
Q = 1.6E-19            '[C]


LOCATE 6, 2
COLOR 9
INPUT "distance between TMC [sm](10 - 50)="; A0
a = A0 * .01    '[m] distance between TMC
Xk1 = 0
Yk1 = 0
Xk2 = Xk1 + a
Yk2 = 0
CIRCLE (Xk1 * 1000 + 50, Yk1 + 240), 10, 9
```

```
CIRCLE (Xk2 * 1000 + 50, Yk2 + 240), 10, 9
Ek = 5          '[eV] energy of TMC
TVk = 0         'angle of moving of TMC
Vk = SQR(2 * Ek * ABS(Q) / M)      'velocity of TMC
Vkx = Vk * COS(TVk)
Vky = 0
Vkz = 0
LOCATE 1, 60
PRINT "V tmc ="; USING C$; Vk


COLOR 13
Eq = 50         '[eV] energy of entry of OMC
LOCATE 8, 2
INPUT "angle of entry of OMC (0 - 360)="; TVq
Vq = SQR(2 * Eq * ABS(Q) / M)      'velocity of OMC
Vqx = Vq * COS(TVq)
Vqy = Vq * SIN(TVq)
Vqz = 0
LOCATE 3, 60
PRINT "V omc ="; USING C$; Vq
dlq = .0001#              'step of moving of OMC
Xq = Xk1 + .5 * a         'coordinate began movements of OMC
LOCATE 10, 2
INPUT "Coordinate Y began movements of OMC [sm](-25/+25)="; Yq0
COLOR 8
Yq = Yq0 * .01
Zq = 0

Fx = 0
Fy = 0
Fz = 0
FOR t = 0 TO 100000
dt = dlq / Vq
     Rx1 = Xq - Xk1
     Rx2 = Xq - Xk2
```

Ry1 = Yq - Yk1

Ry2 = Yq - Yk2   'Rz1 = 0   Rz2 = 0

R1 = SQR(Rx1 * Rx1 + Ry1 * Ry1)

R2 = SQR(Rx2 * Rx2 + Ry2 * Ry2)

'B = K * Q * [V x R] / R^3 MF, created by TMC [Tl]

'Љ—1

'Bx1 = K * Q * (Vky * Rz1 - Ry1 * Vkz) / R1 ^ 3   == 0

'By1 = K * Q * (Vkz * Rx1 - Rz1 * Vkx) / R1 ^ 3   == 0

Bz1 = K * Q * (Vkx * Ry1 - Rx1 * Vky) / R1 ^ 3

'Љ—2

'Bx2 = K * Q * (Vky * Rz2 - Ry2 * Vkz) / R2 ^ 3   == 0

'By2 = K * Q * (Vkz * Rx2 - Rz2 * Vkx) / R2 ^ 3   == 0

Bz2 = K * Q * (Vkx * Ry2 - Rx2 * Vky) / R2 ^ 3

'Lorentz force which influence on OMC   FL = Q*[V x B]

          'Px = (Vy * (Hz1 + Hz2) - (Hy1 + Hy2) * Vz)

          'Py = (Vz * (Hx1 + Hx2) - (Hz1 + Hz2) * Vx)

          'Pz = (Vx * (Hy1 + Hy2) - (Hx1 + Hx2) * Vy)

Fx = Vqy * (Bz1 + Bz2)

Fy = -(Bz1 + Bz2) * Vqx

'Fz = (Vqx * (By1 + By2) - (Bx1 + Bx2) * Vqy) ==0

'F = M*dV/dt = FL = Q*[V x Bk] ==> dV=PX*dt/M

dVqx = Fx * dt / M

dVqy = Fy * dt / M

dVqz = 0   'dVz = Fz * dt / M

 Vqxt = Vqx + dVqx

 Vqyt = Vqy + dVqy

 Vqzt = 0   'Vqzt = Vqz + dVqz

```
      Vqt = SQR(Vqxt ^ 2 + Vqyt ^ 2)        '+ Vqzt ^ 2)
      kV = Vq / Vqt
'kV - because velocity of OMC must be constant
      Vqx = Vqxt * kV
      Vqy = Vqyt * kV
      Vqz = 0                    'Vqz = Vqzt * kV
      V = SQR(Vqx ^ 2 + Vqy ^ 2)      '+ Vqz ^ 2)
      dXq = Vqx * dt
      dYq = Vqy * dt
      dZq = 0                    'dZq = Vz * dt
       Xq = Xq + dXq
       Yq = Yq + dYq
       Zq = 0                    'Zq = Zq + dZq
    PSET (Xq * 1000 + 50, Yq * 1000 + 240), 13
    NEXT t
END
```

Appendix 4

Motion of a charged particle in a magnetic field of the Magnetic Cocoon type.

```
SCREEN 12

TIMER ON

COLOR 3

LOCATE 3, 17

PRINT " Motion of one deuteron in a magnetic field "

LOCATE 5, 17

PRINT "       such as a Magnetic Cocoon "

LOCATE 7, 17

PRINT "          Ed = 500 eV"

COLOR 15

ON TIMER(3) Gosub 1

DO While INKEY$ = "": LOOP


1

CLS

Dim X1(80), X2(80)

C$ = "  +#.#####^^^^"

Pi = 3.141593

Mo = 4 * Pi * .0000001

M = 1.67E-27 * 2

Q = 1.6E-19

E = 500        '[eV]

2  CLS

LOCATE 2, 10

INPUT "ANGLE (50 - 175)="; AN

If 175 < AN Goto 2

If AN < 50 Goto 2

TV = AN * Pi / 180

    V = Sqr(2 * E * Abs(Q) / M)

    Vx = V * Cos(TV)

    Vy = V * Sin(TV)

    Vz = 0

    LOCATE 2, 60
```

```
        PRINT "V ="; USING C$; V
dlq = .0002
'dt = dlq / V
A = .04
YL1 = 0
YL2 = 0
Xv = 0
Yv = .001
Zv = 0
L = .08
DL = .001
N = L / DL
IL = 3000000
K = Mo / (4 * Pi)
    For I = 0 To N - 1
    X1(I) = -I * DL - DL / 2 - A
    X2(I) = I * DL + DL / 2 + A
    Next I
For t = 0 To 3000
dt = dlq / V
    PXx = 0
    PXy = 0
    PXz = 0
    For I = 0 To N - 1
    Rx1 = Xv - X1(I)
    Rx2 = Xv - X2(I)
        Ux = DL
        Uy = 0
        Uz = 0
        Ry1 = Yv + YL1
        Ry2 = Yv + YL2
        Rz = Zv
         R1 = Sqr(Rx1 * Rx1 + Ry1 * Ry1 + Rz * Rz)
         R2 = Sqr(Rx2 * Rx2 + Ry2 * Ry2 + Rz * Rz)
```

```
        Hy1 = (-Rz * Ux) / R1 ^ 3
        Hz1 = (Ux * Ry1) / R1 ^ 3


         Hy2 = (-Rz * Ux) / R2 ^ 3
         Hz2 = (Ux * Ry2) / R2 ^ 3
            Px = (Vy * (Hz1 + Hz2) - (Hy1 + Hy2) * Vz)
            Py = -(Hz1 + Hz2) * Vx
            Pz = Vx * (Hy1 + Hy2)
        PXx = PXx + Px
        PXy = PXy + Py
        PXz = PXz + Pz
      Next I
    dVx = Q * K * IL * PXx * dt / M
    dVy = Q * K * IL * PXy * dt / M
    dVz = Q * K * IL * PXz * dt / M
     Vxt = Vx + dVx
     Vyt = Vy + dVy
     Vzt = Vz + dVz
     Vt = Sqr(Vxt ^ 2 + Vyt ^ 2 + Vzt ^ 2)
     kV = V / Vt
'kV - the particle must have a constant value modulo of velocity
     Vx = Vxt * kV
     Vy = Vyt * kV
     Vz = Vzt * kV
     V = Sqr(Vx ^ 2 + Vy ^ 2 + Vz ^ 2)
     dXv = Vx * dt
     dYv = Vy * dt
     dZv = Vz * dt
      Xv = Xv + dXv
      Yv = Yv + dYv
      Zv = Zv + dZv
    PSET (Xv * 10000 + 320, Yv * 10000 + 240), 12
    Next t
End
```

Appendix 5

The motion of two charged particles in a magnetic field of the Magnetic Cocoon type,

taking into account the Coulomb interaction.

```
SCREEN 12
TIMER ON
COLOR 3
LOCATE 3, 17
PRINT " Motion of two deuterones in a magnetic field "
LOCATE 5, 17
PRINT "      such as a Magnetic Cocoon "
COLOR 15
ON TIMER(3) GOSUB 1
DO WHILE INKEY$ = "": LOOP

1
CLS
DIM XP1(150), XP2(150)
C$ = " #.###^^^^"
Pi = 3.141593
Eo = 8.85E-12
Mo = 4 * Pi * .0000001
M = 1.67E-27 * 2
Q = 1.6E-19
E = 700!    '[eV]
J = 8E+08
LOCATE 3, 10
INPUT "ANGLE (30 - 170)="; AN
IF 170 < AN GOTO 1
IF AN < 30 GOTO 1
TV = AN * Pi / 180
    V = SQR(2 * E * ABS(Q) / M)
    Vx1 = V * COS(TV)
    Vy1 = V * SIN(TV)
```

```
    Vz1 = 0
     Vx2 = Vx1
      Vy2 = -Vy1
dlq = .0001
A = .007
Xv1 = 0
Yv1 = .0003
 Xv2 = 0
 Yv2 = -.0003
L = .25
DL = .01
N = L / DL
Du = .06
S = Pi * Du ^ 2 / 4
IL = S * J
K = Mo / (4 * Pi)
    FOR I = 0 TO N - 1
    XP1(I) = -I * DL - DL / 2 - A
    XP2(I) = I * DL + DL / 2 + A
    NEXT I
FOR t = 0 TO 8000
IL = S * J
K1 = 5000000!
dt = dlq / V
LOCATE 2, 65
PRINT "t ="; USING C$; t * dt
    PXx1 = 0
    PXy1 = 0
    PXx2 = 0
    PXy2 = 0
    PCx1 = 0
    PCy1 = 0
    PCx2 = 0
    PCy2 = 0
    FOR I = 0 TO N - 1
```

Rx11 = Xv1 - XP1(I)

Rx12 = Xv1 - XP2(I)

Rx21 = Xv2 - XP1(I)

Rx22 = Xv2 - XP2(I)

Ux = DL

REM Uy = 0 Uz = 0

Ry1 = Yv1

Ry2 = Yv2

R11 = SQR(Rx11 * Rx11 + Ry1 * Ry1)

R12 = SQR(Rx12 * Rx12 + Ry1 * Ry1)

R21 = SQR(Rx21 * Rx21 + Ry2 * Ry2)

R22 = SQR(Rx22 * Rx22 + Ry2 * Ry2)

RGx1 = Xv1 - Xv2

RGy1 = Yv1 - Yv2

RG1 = SQR(RGx1 ^ 2 + RGy1 ^ 2)

RGx2 = -RGx1

RGy2 = -RGy1

RG2 = RG1

REM Hx1 = (Uy * Rz - Ry * Uz) / R1 ^ 3

REM Hy1 = (Uz * Rx1 - Rz * Ux) / R1 ^ 3

REM Hz1 = (Ux * Ry - Rx1 * Uy) / R1 ^ 3

Hz11 = (Ux * Ry1) / R11 ^ 3

Hz12 = (Ux * Ry1) / R12 ^ 3

Hz21 = (Ux * Ry2) / R21 ^ 3

Hz22 = (Ux * Ry2) / R22 ^ 3

REM Px = (Vy * (Hz1 + Hz2) - (Hy1 + Hy2) * Vz)

REM Py = (Vz * (Hx1 + Hx2) - (Hz1 + Hz2) * Vx)

REM Pz = (Vx * (Hy1 + Hy2) - (Hx1 + Hx2) * Vy)

PGx1 = RGx1 / (ABS(RG1 ^ 3)) * K1

PGy1 = RGy1 / (ABS(RG1 ^ 3)) * K1

PGx2 = RGx2 / (ABS(RG2 ^ 3)) * K1

PGy2 = RGy2 / (ABS(RG2 ^ 3)) * K1

'Coefficient "K1" imitates group of particles

Px1 = Vy1 * (Hz11 + Hz12)

Py1 = -(Hz11 + Hz12) * Vx1

Px2 = Vy2 * (Hz21 + Hz22)

Py2 = -(Hz21 + Hz22) * Vx2

PCx1 = PCx1 + PGx1

PCy1 = PCy1 + PGy1

PCx2 = PCx2 + PGx2

PCy2 = PCy2 + PGy2

PXx1 = PXx1 + Px1

PXy1 = PXy1 + Py1

PXx2 = PXx2 + Px2

PXy2 = PXy2 + Py2

NEXT I

dVx1 = Q * K * IL * PXx1 * dt / M

dVy1 = Q * K * IL * PXy1 * dt / M

dVx2 = Q * K * IL * PXx2 * dt / M

dVy2 = Q * K * IL * PXy2 * dt / M

Vxt1 = Vx1 + dVx1

Vyt1 = Vy1 + dVy1

Vt1 = SQR(Vxt1 ^ 2 + Vyt1 ^ 2)

kV1 = V / Vt1

Vxt2 = Vx2 + dVx2

Vyt2 = Vy2 + dVy2

Vt2 = SQR(Vxt2 ^ 2 + Vyt2 ^ 2)

kV2 = V / Vt2

'kV - the particle must have a constant value modulo of velocity

dVCx1 = Q ^ 2 * PCx1 * dt / M / (4 * Pi * Eo)

$dVCy1 = Q \wedge 2 * PCy1 * dt / M / (4 * Pi * Eo)$

$dVCx2 = Q \wedge 2 * PCx2 * dt / M / (4 * Pi * Eo)$

$dVCy2 = Q \wedge 2 * PCy2 * dt / M / (4 * Pi * Eo)$

$Vx1 = Vxt1 * kV1 + dVCx1$

$Vy1 = Vyt1 * kV1 + dVCy1$

$Vx2 = Vxt2 * kV2 + dVCx2$

$Vy2 = Vyt2 * kV2 + dVCy2$

$Vt = SQR(Vx1 \wedge 2 + Vy1 \wedge 2 + Vz1 \wedge 2)$

REM LOCATE 23, 20

REM PRINT "Vt ="; USING C$; Vt

$dXv1 = Vx1 * dt$

$dYv1 = Vy1 * dt$

$dXv2 = Vx2 * dt$

$dYv2 = Vy2 * dt$

$Xv1 = Xv1 + dXv1$

$Yv1 = Yv1 + dYv1$

$Xv2 = Xv2 + dXv2$

$Yv2 = Yv2 + dYv2$

PSET (Xv1 * 70000 + 320, Yv1 * 60000 + 240), 9

PSET (Xv2 * 70000 + 320, Yv2 * 60000 + 240), 12

IF t = 2000 THEN CLS 1

IF t = 5000 THEN CLS 1

IF t = 6500 THEN CLS 1

NEXT t

LOCATE 29, 5

INPUT "repeat under other angle - 1 "; U1

IF U1 = 1 THEN GOTO 1

IF U1 <> 1 THEN END

Appendix 6

The motion of two charged particles in a growing magnetic field of the type "Magnetic Cocoon"

- "Spherical Pinch".

```
SCREEN 12
TIMER ON
COLOR 3
LOCATE 3, 12
PRINT "          Motion of two deuterones"
LOCATE 5, 12
PRINT " in a increasing magnetic field such as a Magnetic Cocoon "
LOCATE 7, 12
PRINT "             (Spherical pinch)"
COLOR 15
ON TIMER(4) GOSUB 1
DO WHILE INKEY$ = "": LOOP

1
CLS
DIM XP1(80), XP2(80)
C$ = " ##.###^^^^"
Pi = 3.141593
Eo = 8.85E-12
Mo = 4 * Pi * .0000001
M = 1.67E-27 * 2
Q = 1.6E-19
E = 10000      '[eV]
J = 7E+10
LOCATE 2, 10
INPUT "ANGLE (60 - 300)="; AN
IF 300 < AN GOTO 1
IF AN < 60 GOTO 1
TV = AN * Pi / 180
      V = SQR(2 * E * ABS(Q) / M)
```

```
        Vx1 = V * COS(TV)
        Vy1 = V * SIN(TV)
        Vz1 = 0
         Vx2 = Vx1
         Vy2 = -Vy1
dlq = .0003
A = .015
Xv1 = 0
Yv1 = .001
 Xv2 = 0
 Yv2 = -.001
L = .08
DL = .001
N = L / DL
Du = .01
s = Pi * Du ^ 2 / 4
IL = s * J
K = Mo / (4 * Pi)
        FOR i = 0 TO N - 1
        XP1(i) = -i * DL - DL / 2 - A
        XP2(i) = i * DL + DL / 2 + A
        'PSET ((XP1(I) * 2000 + 320 - A * 5000), 240)
        'PSET ((XP2(I) * 2000 + 320 + A * 5000), 240)
        NEXT i
tt = 0
FOR t = 0 TO 8000
dt = dlq / V
tt = tt + dt
LOCATE 2, 65
PRINT "t ="; USING C$; tt
LOCATE 4, 65
PRINT "I ="; USING C$; IL

        PXx1 = 0
        PXy1 = 0
```

PXx2 = 0

PXy2 = 0

PCx1 = 0

PCy1 = 0

PCx2 = 0

PCy2 = 0

FOR i = 0 TO N - 1

Rx11 = Xv1 - XP1(i)

Rx12 = Xv1 - XP2(i)

Rx21 = Xv2 - XP1(i)

Rx22 = Xv2 - XP2(i)

$\qquad$ Ux = DL

$\qquad$ REM Uy = 0 Uz = 0

$\qquad$ Ry1 = Yv1

$\qquad$ Ry2 = Yv2

$\qquad$ R11 = SQR(Rx11 * Rx11 + Ry1 * Ry1)

$\qquad$ R12 = SQR(Rx12 * Rx12 + Ry1 * Ry1)

$\qquad$ R21 = SQR(Rx21 * Rx21 + Ry2 * Ry2)

$\qquad$ R22 = SQR(Rx22 * Rx22 + Ry2 * Ry2)

$\qquad$ RGx1 = Xv1 - Xv2

$\qquad$ RGy1 = Yv1 - Yv2

$\qquad$ RG1 = SQR(RGx1 ^ 2 + RGy1 ^ 2)

$\qquad$ RGx2 = -RGx1

$\qquad$ RGy2 = -RGy1

$\qquad$ RG2 = RG1

$\qquad$ REM Hx1 = (Uy * Rz - Ry * Uz) / R1 ^ 3

$\qquad$ REM Hy1 = (Uz * Rx1 - Rz * Ux) / R1 ^ 3

$\qquad$ REM Hz1 = (Ux * Ry - Rx1 * Uy) / R1 ^ 3

$\qquad$ Hz11 = (Ux * Ry1) / R11 ^ 3

$\qquad$ Hz12 = (Ux * Ry1) / R12 ^ 3

$\qquad$ Hz21 = (Ux * Ry2) / R21 ^ 3

$\qquad$ Hz22 = (Ux * Ry2) / R22 ^ 3

REM Px = (Vy * (Hz1 + Hz2) - (Hy1 + Hy2) * Vz)

REM Py = (Vz * (Hx1 + Hx2) - (Hz1 + Hz2) * Vx)

REM Pz = (Vx * (Hy1 + Hy2) - (Hx1 + Hx2) * Vy)

PGx1 = RGx1 / (ABS(RG1 ^ 3))

PGy1 = RGy1 / (ABS(RG1 ^ 3))

PGx2 = RGx2 / (ABS(RG2 ^ 3))

PGy2 = RGy2 / (ABS(RG2 ^ 3))

Px1 = Vy1 * (Hz11 + Hz12)

Py1 = -(Hz11 + Hz12) * Vx1

Px2 = Vy2 * (Hz21 + Hz22)

Py2 = -(Hz21 + Hz22) * Vx2

PCx1 = PCx1 + PGx1

PCy1 = PCy1 + PGy1

PCx2 = PCx2 + PGx2

PCy2 = PCy2 + PGy2

PXx1 = PXx1 + Px1

PXy1 = PXy1 + Py1

PXx2 = PXx2 + Px2

PXy2 = PXy2 + Py2

NEXT i

dVx1 = Q * K * IL * PXx1 * dt / M

dVy1 = Q * K * IL * PXy1 * dt / M

dVx2 = Q * K * IL * PXx2 * dt / M

dVy2 = Q * K * IL * PXy2 * dt / M

Vxt1 = Vx1 + dVx1

Vyt1 = Vy1 + dVy1

Vt1 = SQR(Vxt1 ^ 2 + Vyt1 ^ 2)

kV1 = V / Vt1

```
Vxt2 = Vx2 + dVx2
Vyt2 = Vy2 + dVy2
Vt2 = SQR(Vxt2 ^ 2 + Vyt2 ^ 2)
kV2 = V / Vt2
```

'kV - the particle must have a constant value modulo of velocity

```
kq = 3000       'Magnification of distance of a Coulomb interaction
                'imitates group of particles
```

```
dVCx1 = (kq * Q) ^ 2 * PCx1 * dt / M / (4 * Pi * Eo)
dVCy1 = (kq * Q) ^ 2 * PCy1 * dt / M / (4 * Pi * Eo)
dVCx2 = (kq * Q) ^ 2 * PCx2 * dt / M / (4 * Pi * Eo)
dVCy2 = (kq * Q) ^ 2 * PCy2 * dt / M / (4 * Pi * Eo)
```

```
Vx1 = Vxt1 * kV1 + dVCx1
Vy1 = Vyt1 * kV1 + dVCy1
Vx2 = Vxt2 * kV2 + dVCx2
Vy2 = Vyt2 * kV2 + dVCy2
Vt = SQR(Vx1 ^ 2 + Vy1 ^ 2 + Vz1 ^ 2)
```

```
REM LOCATE 23, 20
REM PRINT "Vt ="; USING C$; Vt
```

```
dXv1 = Vx1 * dt
dYv1 = Vy1 * dt
dXv2 = Vx2 * dt
dYv2 = Vy2 * dt
```

```
Xv1 = Xv1 + dXv1
Yv1 = Yv1 + dYv1
Xv2 = Xv2 + dXv2
Yv2 = Yv2 + dYv2
```

PSET (Xv1 * 25000 + 320, Yv1 * 25000 + 240), 9

PSET (Xv2 * 25000 + 320, Yv2 * 25000 + 240), 4

Y12 = Yv1 - Yv2

IF Y12 < .0000000000002# THEN dlq = .00000000000001#

IF Y12 > .0000000000002# THEN dlq = .00000000000002#

IF Y12 > .000000000002# THEN dlq = .0000000000002#

IF Y12 > .00000000002# THEN dlq = .000000000002#

IF Y12 > .0000000002# THEN dlq = .00000000002#

IF Y12 > .000000002# THEN dlq = .0000000002#

IF Y12 > .00000002# THEN dlq = .000000002#

IF Y12 > .0000002# THEN dlq = .00000002#

IF Y12 > .000002 THEN dlq = .0000002#

IF Y12 > .00002 THEN dlq = .000004#

IF Y12 > .0002 THEN dlq = .00004#

IF Y12 > .002 THEN dlq = .0001#

   IF t = 7000 THEN CLS 1

J = J + 8E+07

IL = s * J

NEXT t

LOCATE 29, 5

INPUT "Repeat with other angle - 1 "; U1

IF U1 = 1 THEN GOTO 1

IF U1 <> 1 THEN END

Motion of an electron in a magnetic field of a torus with a poloidal current - "Ondulator"

```
SCREEN 12
COLOR 3
 LOCATE 5, 5
 PRINT "     Motion of an electron in a magnetic field "
 LOCATE 7, 5
 PRINT "       such as a Magnetic Cocoon (undulator) "
COLOR 15
C$ = "  +#.#####^^^^"
Pi = 3.14159265359#
M = 9.1E-31
Q = 1.6E-19
jc = 6E+08
dt = 3E-10
Uq = 400!
Du = .001
TV = 30 * Pi / 180
K = 4 * Pi * .0000001 * (-Q) * (jc * Du ^ 2 / 4) / (4 * Pi)
   V = SQR(2 * Q * Uq / M)
   Vx = V * COS(TV)
   Vy = V * SIN(TV)
   Vz = 0
   LOCATE 3, 60
   PRINT "V= "; USING C$; V
A = .03
X1 = -.05
X2 = .05
dX = (X2 - X1) / 100
dG = Pi / 50
Xv = -.32
Yv = 0
Zv = 0
PSET (Xv * 1200 + 420, Yv * 4000 + 300)
```

```
DIM X(100)
FOR i = 0 TO 99
X(i) = X1 + i * dX + dX / 2
PSET (X(i) * 1200 + 420, A * 4000 + 300)
PSET (X(i) * 1200 + 420, -A * 4000 + 300)
NEXT i
    PGx = 0
    PGy = 0
    PGz = 0
  FOR t = 1 TO 100
    FOR j = 0 TO 99
    CG = COS(j * dG)
    SG = SIN(j * dG)
        PXx = 0
        PXy = 0
        PXz = 0
        Ry = -A * CG + Yv
        Rz = -A * SG + Zv
        Ry2 = Ry * Ry
        Rz2 = Rz * Rz
        Ux = dX              'Uy = 0    Uz = 0
        FOR i = 0 TO 99
        Rx = -X(i) + Xv        'R = SQR(Rx * Rx + Ry2 + Rz2)
        R3 = (SQR(Rx * Rx + Ry2 + Rz2)) ^ 3
        Hx = (Vy * Rz - Vz * Ry) / R3
        Hy = (Vz * Rx - Vx * Rz) / R3
        Hz = (Vx * Ry - Vy * Rx) / R3
                    'Px = Uy * Hz - Uz * Hy
        Py = -Ux * Hz        'Py = Uz * Hx - Ux * Hz
        Pz = Ux * Hy         'Pz = Ux * Hy - Uy * Hx
                    'PXx = PXx + Px
        PXy = PXy - Py
        PXz = PXz - Pz
        NEXT i
    'PGx = PGx + PXx
```

```
        PGy = PGy + PXy

        PGz = PGz + PXz

        NEXT j
'dVx = K * PGx * dt / M

dVy = K * PGy * dt / M

dVz = K * PGz * dt / M

        Vxt = Vx + dVx

        Vyt = Vy + dVy

        Vzt = Vz + dVz

        Vt = SQR(Vxt ^ 2 + Vyt ^ 2 + Vzt ^ 2)

        kV = V / Vt
'kV - the particle must have a constant value modulo of velocity

        Vx = Vxt * kV

        Vy = Vyt * kV

        Vz = Vzt * kV

        V = SQR(Vx ^ 2 + Vy ^ 2 + Vz ^ 2)

dXv = Vx * dt

dYv = Vy * dt

dZv = Vz * dt

  Xv = Xv + dXv

  Yv = Yv + dYv

  Zv = Zv + dZv

  PSET (Xv * 1200 + 420, Yv * 4000 + 300), 12

NEXT t
```

Calculation of the magnetic field between two coaxial toruses with a poloidal current.

Mathcard

$$\text{TOL} = 0.01 \quad r = 64.2 \quad R = 70 \quad d = 400$$

$$x = 0..112 \quad z = 0..28$$

$$b(x) = 2.5x - 140 \quad zm(z) = 5 \cdot z - 70$$

$$H1_{x,z} = \int_0^{2\cdot\pi} \int_0^{2\cdot\pi} \frac{\begin{pmatrix} -\sin(\phi)\cdot\cos(\theta) \\ -\sin(\phi)\cdot\sin(\theta) \\ \cos(\phi) \end{pmatrix} \cdot \left[\dfrac{1}{(R + r\cdot\cos(\phi))}\right] \times \begin{bmatrix} (R + r\cdot\cos(\phi))\cdot\cos(\theta) - b(x) \\ (R + r\cdot\cos(\phi))\cdot\sin(\theta) \\ r\cdot\sin(\phi) + \dfrac{d}{2} - zm(z) \end{bmatrix}_1}{\left[\left|\begin{bmatrix} (R + r\cdot\cos(\phi))\cdot\cos(\theta) - b(x) \\ (R + r\cdot\cos(\phi))\cdot\sin(\theta) \\ r\cdot\sin(\phi) + \dfrac{d}{2} - zm(z) \end{bmatrix}\right|\right]^3} \, d\phi \, d\theta$$

$$H2_{x,z} = \int_0^{2\cdot\pi} \int_0^{2\cdot\pi} \frac{\begin{pmatrix} -\sin(\phi)\cdot\cos(\theta) \\ -\sin(\phi)\cdot\sin(\theta) \\ \cos(\phi) \end{pmatrix} \cdot \left[\dfrac{1}{(R + r\cdot\cos(\phi))}\right] \times \begin{bmatrix} (R + r\cdot\cos(\phi))\cdot\cos(\theta) - b(x) \\ (R + r\cdot\cos(\phi))\cdot\sin(\theta) \\ r\cdot\sin(\phi) - \dfrac{d}{2} - zm(z) \end{bmatrix}_1}{\left[\left|\begin{bmatrix} (R + r\cdot\cos(\phi))\cdot\cos(\theta) - b(x) \\ (R + r\cdot\cos(\phi))\cdot\sin(\theta) \\ r\cdot\sin(\phi) - \dfrac{d}{2} - zm(z) \end{bmatrix}\right|\right]^3} \, d\phi \, d\theta$$

$$H_{x,z} = H1_{x,z} + H2_{x,z}$$
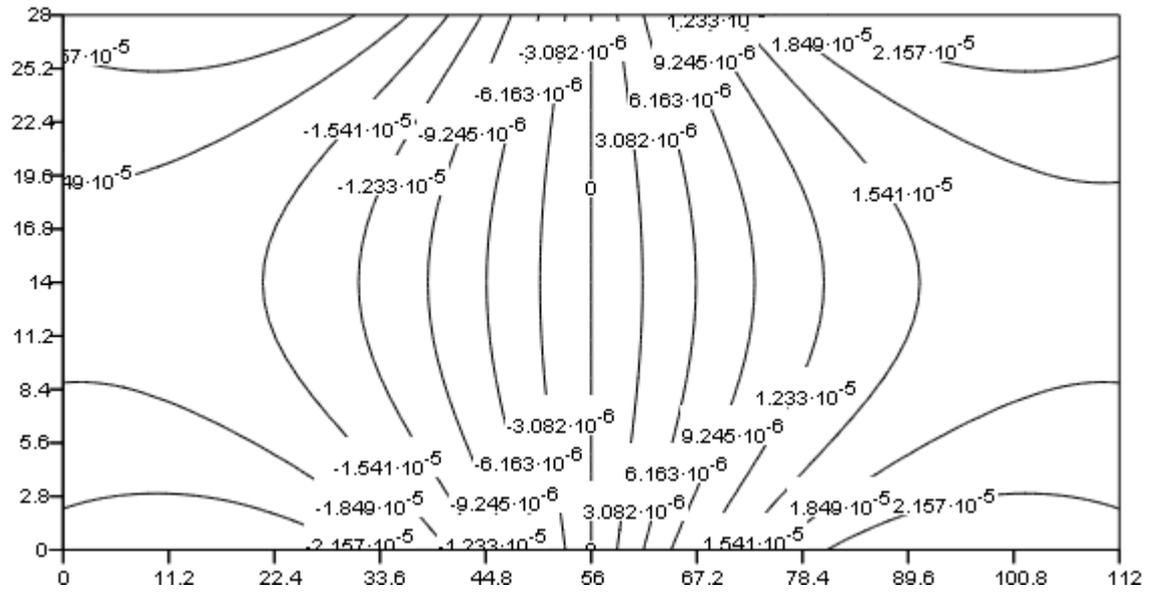
H

Level lines of equal magnetic field strength.

The lines of force are perpendicular to the plane of the figure.

Calculation of the system of conductors of the type "cell"

$\mu := 4 \cdot \pi \cdot 10^{-7}$ $I := 10$ $A := 0.071$ $L := 0.23$

$Z1 := A$ $Z2 := A + L$ $R1 := 0.022$ $R2 := 0.2983$

$x := 0..80$ $y := 0..70$

$zm(x) := 0.01 \cdot x - 0.4$ $b(y) := 0.01 \cdot y - 0.35$

$N := 60$ $i := 0..N-1$

$$du := \frac{2 \cdot \pi}{N}$$

$$HL1_{x,y} := \sum_i \left[\int_{Z1}^{Z2} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \times \begin{pmatrix} -R1 \cdot \cos(du \cdot i) + b(y) \\ -R1 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -R1 \cdot \cos(du \cdot i) + b(y) \\ -R1 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right| \right]^3} dz + \int_{-Z2}^{-Z1} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ 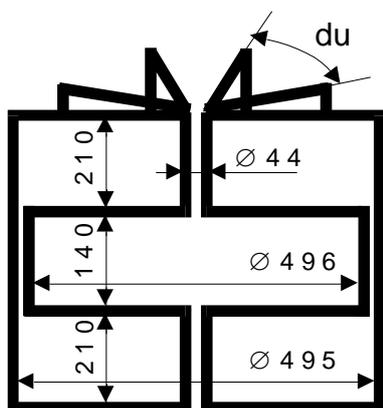1 \end{pmatrix} \times \begin{pmatrix} -R1 \cdot \cos(du \cdot i) + b(y) \\ -R1 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -R1 \cdot \cos(du \cdot i) + b(y) \\ -R1 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right| \right]^3} dz \right]$$

$$HL2_{x,y} := \sum_i \left[\int_{-Z1}^{Z1} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \times \begin{pmatrix} -R2 \cdot \cos(du \cdot i) + b(y) \\ -R2 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -R2 \cdot \cos(du \cdot i) + b(y) \\ -R2 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right| \right]^3} dz + \int_{-Z2}^{Z2} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ 1 \end{pmatrix} \times \begin{pmatrix} -R2 \cdot \cos(du \cdot i) + b(y) \\ -R2 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -R2 \cdot \cos(du \cdot i) + b(y) \\ -R2 \cdot \sin(du \cdot i) \\ -z + zm(x) \end{pmatrix} \right| \right]^3} dz \right]$$

$$HR1_{x,y} := \sum_i \left[\int_{R1}^{R2} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ -Z1 + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -r \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ -Z1 + zm(x) \end{pmatrix} \right| \right]^3} dr + \int_{R2}^{R1} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ Z1 + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ Z1 + zm(x) \end{pmatrix} \right| \right]^3} dr \right]$$

$$HR2_{x,y} := \sum_i \left[\int_{R1}^{R2} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ -Z2 + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ -Z2 + zm(x) \end{pmatrix} \right| \right]^3} dr + \int_{R2}^{R1} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ Z2 + zm(x) \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} -r \cdot \cos(du \cdot i) + b(y) \\ -r \cdot \sin(du \cdot i) \\ Z2 + zm(x) \end{pmatrix} \right| \right]^3} dr \right]$$

$$H_{x,y} := HL1_{x,y} + HL2_{x,y} + HR1_{x,y} + HR2_{x,y}$$
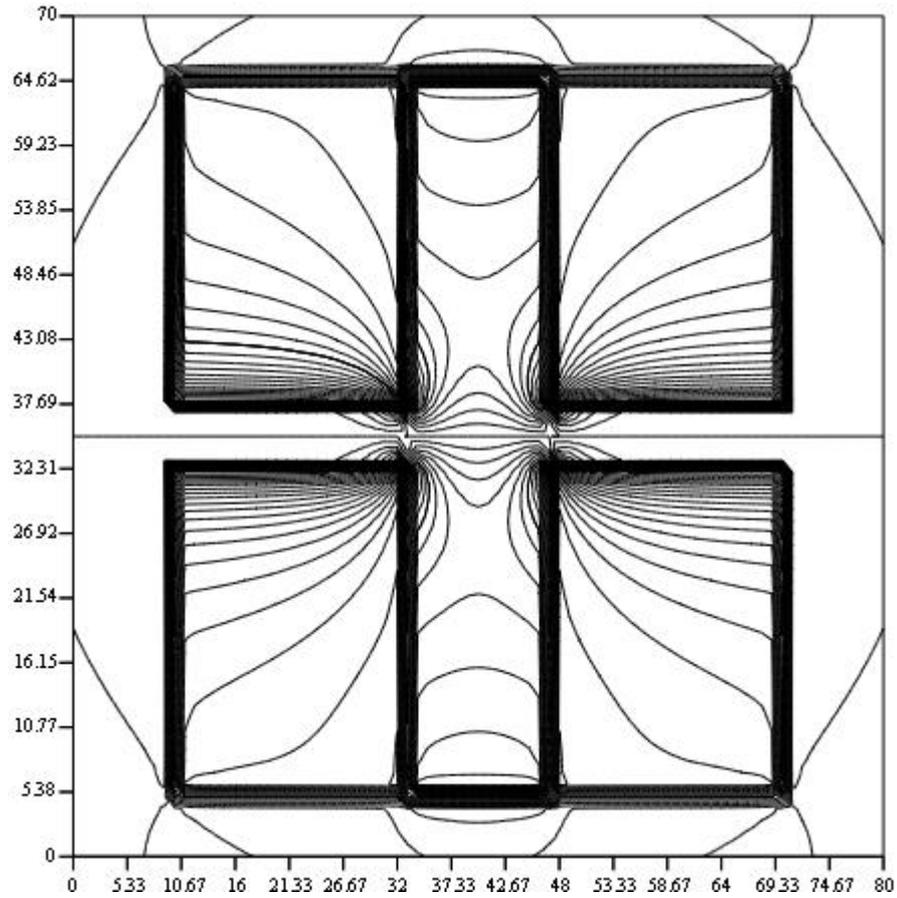
B

Calculation of a real, segmented torus (*MathCad*).

© Grigor'ev Eugene Aleksandrovich. 2004
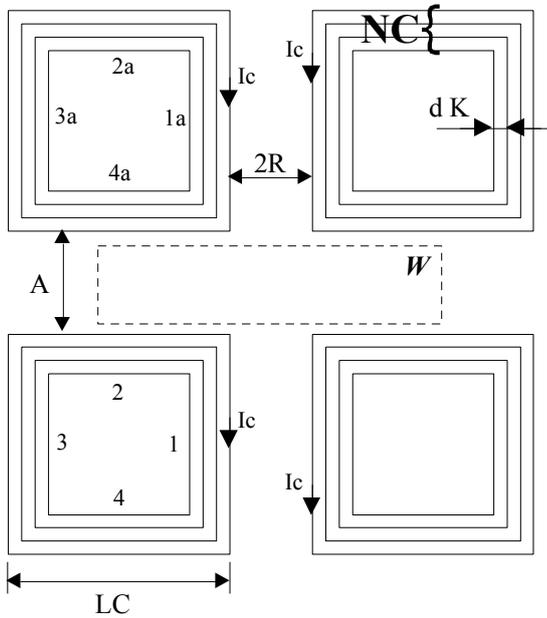
A - distance between tori [m];

NS - number of sections in tori;

du - angle between sections [radian];

NC - the number of coils in the section;

dK - the distance between the coils in the section;

LC - side of the largest coil in the section [m];

Ic - current in one coil [A];

R - radius of the internal hole of the torus [m];

W - calculated magnetic field area;

$\mu 0 := 4 \cdot \pi \cdot 10^{-7}$ $Ic := 500$ $A := 0.1$ $R := 0.02$ $LC := 0.2$

$dK := 0.01$ $NC := 7$ $NS := 12$ $i := 0..NS - 1$

$du := \dfrac{2 \cdot \pi}{NS}$

$j := 0..NC - 1$ $x := 0..20$ $zm(x) := 0.0048x - 0.048$

$Z1(j) := 0.5A + j \cdot dK$ $Z2(j) := Z1(j) + LC - j \cdot 2 \cdot dK$

$y := 0..20$ $b(y) := 0.01 \cdot y - 0.1$ $R1(j) := R + j \cdot dK$

$R2(j) := R1(j) + LC - j \cdot 2 \cdot dK$

$$H1_{y,x} := \sum_j \sum_i \int_{-Z1(j)}^{-Z2(j)} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} \times \begin{pmatrix} b(y) - R1(j) \cdot \cos(du \cdot i) \\ -R1(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix} \right]_1}{\left[\left| \begin{pmatrix} b(y) - R1(j) \cdot \cos(du \cdot i) \\ -R1(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix} \right| \right]^3} \, dz$$

$$H2_{y,x} := \sum_j \sum_i \int_{R1(j)}^{R2(j)} \frac{\left[\begin{pmatrix} -\cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{bmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - (-Z1(j)) \end{bmatrix} \right]_1}{\left[\left| \begin{bmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - (-Z1(j)) \end{bmatrix} \right| \right]^3} \, dr$$

$$H3_{y,x} := \sum_j \sum_i \int_{-Z2(j)}^{-Z1(j)} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} \times \begin{pmatrix} b(y) - R2(j) \cdot \cos(du \cdot i) \\ -R2(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix}\right]_1}{\left[\left\| \begin{pmatrix} b(y) - R2(j) \cdot \cos(du \cdot i) \\ -R2(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix} \right\|\right]^3} \, dz$$

$$H4_{y,x} := \sum_j \sum_i \int_{R2(j)}^{R1(j)} \frac{\left[\begin{pmatrix} -\cos(du \cdot i) \\ \sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{bmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - (-Z2(j)) \end{bmatrix}\right]_1}{\left[\left\| \begin{bmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - (-Z2(j)) \end{bmatrix} \right\|\right]^3} \, dr$$

$$H1a_{y,x} := \sum_j \sum_i \int_{Z2(j)}^{Z1(j)} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} \times \begin{pmatrix} b(y) - R1(j) \cdot \cos(du \cdot i) \\ -R1(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix}\right]_1}{\left[\left\| \begin{pmatrix} b(y) - R1(j) \cdot \cos(du \cdot i) \\ -R1(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix} \right\|\right]^3} \, dz$$

$$H2a_{y,x} := \sum_j \sum_i \int_{R1(j)}^{R2(j)} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ -\sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - Z1(j) \end{pmatrix}\right]_1}{\left[\left\| \begin{pmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - Z1(j) \end{pmatrix} \right\|\right]^3} \, dr$$

$$H3a_{y,x} := \sum_j \sum_i \int_{Z1(j)}^{Z2(j)} \frac{\left[\begin{pmatrix} 0 \\ 0 \\ -1 \end{pmatrix} \times \begin{pmatrix} b(y) - R2(j) \cdot \cos(du \cdot i) \\ -R2(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix}\right]_1}{\left[\left\| \begin{pmatrix} b(y) - R2(j) \cdot \cos(du \cdot i) \\ -R2(j) \cdot \sin(du \cdot i) \\ zm(x) - z \end{pmatrix} \right\|\right]^3} \, dz$$

$$H4a_{y,x} := \sum_j \sum_i \int_{R2(j)}^{R1(j)} \frac{\left[\begin{pmatrix} \cos(du \cdot i) \\ -\sin(du \cdot i) \\ 0 \end{pmatrix} \times \begin{pmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - Z2(j) \end{pmatrix}\right]_1}{\left[\left\|\begin{pmatrix} b(y) - r \cdot \cos(du \cdot i) \\ -r \cdot \sin(du \cdot i) \\ zm(x) - Z2(j) \end{pmatrix}\right\|\right]^3} dr$$

$$HS_{y,x} := H1_{y,x} + H2_{y,x} + H3_{y,x} + H4_{y,x}$$

$$HSa_{y,x} := H1a_{y,x} + H2a_{y,x} + H3a_{y,x} + H4a_{y,x}$$

$$H_{y,x} := HS_{y,x} + HSa_{y,x}$$

$$B_{y,x} := H_{y,x} \cdot \mu 0 \cdot Ic \qquad \text{" Tesla "}$$
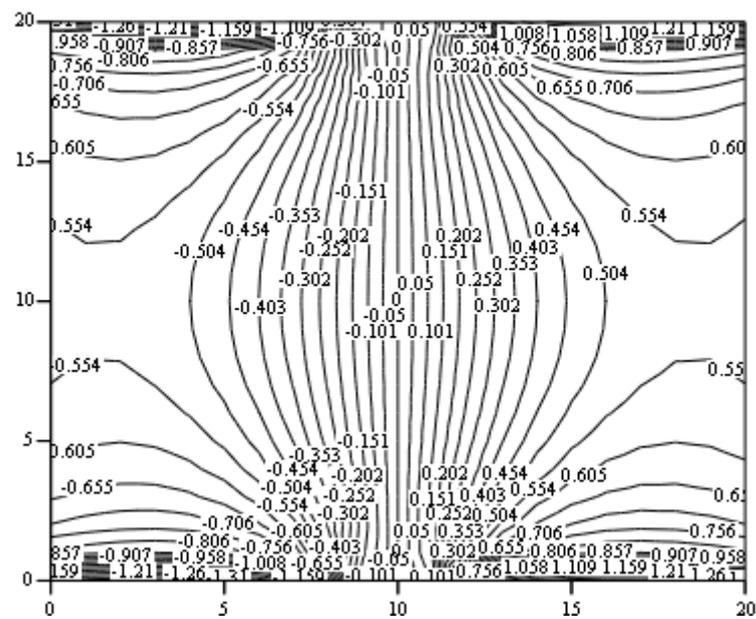
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Bibliography.

1) I.E. Tamm // "Fundamentals of the Theory of Electricity", M, Science, the main edition of the physical and mathematical literature, 1989. p. 504.

2) S.G. Kalashnikov // "General course of physics", volume 2, state publishing house of technical and theoretical literature, Moscow, 1956.

3) S.Yu. Taskaev // Plasma Physics, September 1997, Vol.23, No. 12, p.1123; "Dynamics of potentials when a jet is heated in a glass beam atomic beams".

4) TS Simonen // Plasma Physics, September 1997, vol.23, No.9, p.771; "The stability of high-pressure plasma with a favorable curvature of the magnetic field lines".

5) S.V. Putvinsky // UFN, November 1998, v.168, No. 11, p. 1235; "Is the future world energy system possible without nuclear fusion?"

6) "Physical Encyclopedic Dictionary", ch. editor AM Prokhorov, Moscow, "Soviet Encyclopedia", 1983.

РЕЦЕНЗИЯ НА РАБОТУ Е. А. ГРИГОРЬЕВА
"О ПЕРЕСМОТРЕ УРАВНЕНИЙ МАКСВЕЛЛА, ТЕРМОЯДЕРНОМ СИНТЕЗЕ, ГРАВИТАЦИОННОМ ДВИГАТЕЛЕ И ГАММА-ЛАЗЕРЕ".

Данная работа рассмотрена в Академии Гражданской Авиации на кафедре прикладной математики. Ценностью работы является то, что автор, на основе существующих знаний, смог расширить применение одного из основных правил электродинамики, а именно - теоремы о циркуляции вектора напряженности магнитного поля. Автору удалось экспериментально доказать то, что существующее правило является частным случаем более общего закона.

Многие исследователи в течение последних лет все более склонялись к такому выводу, например, теоретические работы доцента Я. Г. Клюшина. Однако, теоретикам не хватало экспериментальных данных.

Заслугой автора является то, что ему удалось экспериментально измерить внешнее магнитное поле тороидальных токовых структур. По существующим представлениям это поле вообще не должно было существовать. Таким образом, удалось преодолеть один из догматов в науке. Объясняя результаты эксперимента, автор правомочно и корректно использовал основные законы физики, математический аппарат и научную логику. Поэтому, все последующие выводы и расчеты, которые следуют из эксперимента, достоверны в рамках существующих физических представлений.

С осторожностью, но можно сказать, что данная работа является революционной и, несмотря на некоторую претенциозность названия, требует самого серьезного рассмотрения по всем указанным в ней направлениям. В противном случае может повториться история с кибернетикой и генетикой - Россия еще больше отстанет от мировой науки и экономики.

Заведующий кафедрой прикладной математики Академии ГА
доктор физико-математических наук профессор

/ Береславский Э. Н. /

О Т З Ы В

на работу Е.А. Григорьева «О пересмотре уравнений Максвелла,
термоядерном синтезе, гравитационном двигателе и гамма-лазере»

В своих исследованиях автор пытался найти ответы на ряд интересных вопросов, отсутствующих в классических учебниках по теории электромагнетизма. К сожалению, в большинстве учебников описаны или рассмотрены простые примеры, в которых сама постановка задачи часто не имеет физической основы. Проводники прямолинейные и бесконечные, по ним протекают токи (как они протекают без излучения??) и т.д. Переход к реальным моделям (которые достаточно сложны) ставят вопросы, которые в существующей литературе отсутствуют.

Имеется, по крайней мере, два пути решения поставленного вопроса. Это математическое моделирование (современные средства это уже позволяют) и эксперимент на реальной физической модели. Используя классический подход к решению реальной задачи, автор проработал проблему по обоим путям и нашел перспективные аспекты по дальнейшим исследованиям.

Считаю, что на данном этапе предварительная, самая важная часть работы, практически, завершена. Необходимо продолжить исследования новых классов реальных задач, которые открывает представленная для рецензии работа и которые могут быть применены в разных областях науки и техники, в том числе и в первую очередь в энергетике.

Доктор физ.-мат. наук, вед. н. сотр. НИИФ СпбГУ

Г.Н. Крылов

Характеристика

Я, Цыганов Александр Борисович, кандидат физико-математических наук по специальности «физика плазмы», паспорт гражданина РФ 4000 № 738654, выданный 37 отделом милиции Василеостровского района Санкт-Петербурга, проживающий по адресу: 199397 Санкт-Петербург, ул.Наличная, д.45, корпус 1, кв.5, тел. +7 (812) 925-2534, познакомился с Григорьевым Евгением Александровичем в 1985 году, когда он устраивался на работу на физический факультет Ленинградского государственного университета (нынешний СПбГУ). Т.к. он окончил Ленинградский электротехнический институт им. В.И.Ульянова-Ленина (ЛЭТИ), то я посоветовал ему устроиться на кафедру вычислительной физики, где он за короткое время проявил себя грамотным инженером-электронщиком. Он сразу начал принимать активное участие в создании первой в университете компьютерной сети, разрабатывая и создавая с коллективом единомышленников различные электронные устройства для этого. Естественно, что при тесном рабочем общении с сотрудниками физического факультета, Евгения, как человека научного склада ума, заинтересовали нерешённые проблемы физики.

С 1986 году, сначала в инициативном порядке, освоив необходимую научную литературу, он начал заниматься проблемами физики плазмы и процессами в шаровой молнии. Занимался математическим моделированием магнитных полей различной конфигурации, а затем приступил к построению экспериментальной установки для проверки своих теоретических данных. В результате Е.А.Григорьев рассчитал и экспериментально измерил внешнее магнитное поле тороидальной токовой структуры с целью найти конфигурацию источника поля с пространственным минимумом индукции, т.к. эта проблема представляет значительный интерес с точки зрения термоядерных реакторов типа «Токомак».

Мне неизвестны в деталях обстоятельства, по которым он попал в Городскую психиатрическую больницу №1 им П.П.Кащенко, и где находится уже более десяти лет, но я с 2011 года неоднократно посещал его в этой больнице, регулярно беседовал с ним по телефону, переписывался по электронной почте и не заметил никаких психических отклонений в его словах и поведении. Несмотря на то, что я не являюсь дипломированным специалистом в области психиатрии, но готов утверждать, что у Е.А.Григорьева присутствует здравый смысл и логика рассуждений, я также вижу и слышу при нашем общении хорошее воспитание и доброжелательность. Более того, и в "Кащенко" он продолжает размышлять над проблемами физики, проводить на компьютере математическое моделирование своих гипотез, которые мы регулярно обсуждали. В процессе нашего общения Е.А.Григорьев был готов воспринимать критические замечания по ходу обсуждения, проявлял уважительное отношение к мнению собеседника без малейших признаков мании «величия», которая упоминается в его диагнозе, приведенном в Судебном постановлении Гатчинского городского суда Ленинградской области от 16.01.2016г. по Делу 6-28/2016, с которым он меня ознакомил. Также указанная в диагнозе мания «изобретательства», на мой взгляд, никак не может быть основанием для принудительного психиатрического лечения, т.к. наше государство для развития экономики и науки всячески стимулирует и поощряет создание гражданами новых изобретений (находящих свое выражение, в том числе, в патентах Российской Федерации и других стран для закрепления нашего национального приоритета). Т.к. сотрудники ГПБ № 1, в свою очередь, не являются дипломированными специалистами в области физики плазмы, то они вряд ли могли квалифицированно оценить правильность или ошибочность научных идей Григорьева (к тому же, очевидно, не несущих никакой общественной опасности). Поэтому требование независимой экспертизы состояния Е.А.Григорьева выглядит совершенно обоснованным.

Кроме того, суд на основании Закона РФ «О психиатрической помощи и гарантиях прав граждан при ее оказании» может самостоятельно провести собеседование с Е.А.Григорьевым и убедиться, что перед ними вполне нормальный и здравомыслящий человек, не подлежащий дальнейшему принудительному психиатрическому лечению.

10 марта 2016г. _(подпись)_ /Цыганов Александр Борисович/

Характеристика на Григорьева Евгения Александровича.

Я, Канцеров Александр Иванович, знаю Григорьева Евгения Александровича с 1985 года, с момента устройства его на работу в СПбГУ (ЛГУ) на кафедру вычислительной физики. Он вместе с группой единомышленников создавал электронные устройства для первой в ЛГУ компьютерной сети. Он обладает разносторонними научными интересами, но более всего его интересовала физика плазмы и, как частный её аспект, проблема шаровой молнии (ШМ). Имея высшее электротехническое образование, владея аппаратом численного математического моделирования реальных физических задач, он разработал, смоделировал и рассчитал свою, оригинальную гипотезу шаровой молнии. Вначале коллеги, в том числе и я, скептически относились к его идеям. Однако, будучи целеустремлённым человеком, он поставил серию экспериментов и показал, что его идеи не лишены смысла. В ходе проведённых им экспериментов он измерил внешнее магнитное поле торов с электрическим током. До этого считалось, что такое поле вообще не должно существовать. До экспериментов он предсказал наличие такого поля численным моделированием. За такое открытие я, с полным основанием, называю его "живым классиком". Не многие могут решиться на сомнение в области классической электродинамики. Несмотря на это, он остался скромным и простым в общении человеком. Очень много помогал нам в нашей работе в те тяжелые времена. Кроме прекрасно мыслящей головы Евгений обладал ещё и «золотыми ручками», что случается не так уж часто.

С 2006 года он находится в психбольнице "Кащенко". Регулярно общаясь с ним по телефону, e-mail и посещая лично, я не заметил у него никаких психических отклонений - всё тот же живой интерес к жизни, к науке, здравый смысл и правильное логическое мышление. Я знаю Григорьева Е. А. как критически, здраво мыслящего исследователя и крайне честного человека. Считаю, что его нахождение в "Кащенко" - трагическая, а может быть, как он пишет, и умышленная ошибка судебно-психиатрической экспертизы. Я и мои коллеги, на глазах которых Григорьев Е. А. занимался своей, очень серьёзной научной работой, считаем, что Григорьева Е. А. необходимо как можно скорее выписать из психбольницы, чтобы он мог в соответствующих условиях продолжить свою научно-прикладную работу, имеющую, в потенциале, значительное народно-хозяйственное значение.

Кандидат физико-математических наук Канцеров Александр Иванович.

Россия, Санкт-Петербург, ул. Маршала Захарова, д.27, корп.3, кв.97.

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30.11.2017

European Academy of Natural Sciences. **Диплом**

Johann Karl Friedrich Gauss was a German mathematician, astronomer, surveyor and physicist. 1777 -1855

In accordance with the decision of the Board of Trustees and the Academic Council

Eugene A. Grigor'ev

awarded the **Karl Friedrich Gauss** Medal

for outstanding achievements in scientific research.

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Europäische Akademie der Naturwissenschaften

Johann Carl Friedrich Gauss war ein deutscher Mathematiker, Astronom, Geodät und Physiker

1777 — 1855

Diplom

Nach dem Beschluss
des Kuratoriums der Vereinigung und des
Wissenschaftlichen Rates
wird

Evgeny A. Grigoryev

mit der

CARL FRIEDRICH GAUSS – MEDAILLE

für besondere Verdienste um die Wissenschaftlichen
Forschungen ausgezeichnet

Der Vorstand

Prof. V. Tyminskiy   Kanzlei

Hannover   N 18   05. 10. 2017

Conclusion.

As can be seen from the above, without full-scale experiments, this is all with a large, true degree of probability, but only assumptions, everything requires experimental verification in all specified directions - everything except the **experimentally (!!!)** established presence of an **<u>EXTERNAL</u>** magnetic field of toroidal conducting structures with poloidal electric current with a specific configuration.

Experiments within the framework of a psychostandard cannot be carried out - there is no necessary experimental base - the special equipment created by me.

Touching upon Reason and ignorance, one can say that belief in supernatural forces is not a support in life - only solid knowledge and skills gained on their basis in the learning process can serve as a support.

Further, I, of course, can reveal my know-how to humanity, but I am afraid that it will be primarily used by ignorance to destroy Mind (means of delivering troops and weapons of mass destruction) (including Russia). Is humanity ready for this? - I, of course, am ready to work for its benefit (and not in Russia), but only when the principle "For the good of Mind and for its development" is established as a global legislative basis, and this is not subject to discussion — this is strictly interconnected. In the meantime, my content in the mental hospital, for the discovery I made, which makes Russian gas, oil, coal, atom and my inaction cost mankind 1 billion m3 of gas, 1 million tons of oil, 2 million tons of coal and EUR 5 billion daily. So, humanity and the world scientific elite should think about whether they need my being here and forced inaction.

Read Russians pages of site for best understanding.
E-mail: eugene-53@mail.ru.
Call +7 921 745 41 70, write & speak in Russian only.

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О Разумном менталитете. About Reasonable Mentality.
04 февраля 2019 года. February 4, 2019.

Подводя итог всему написанному на этом сайте, хочу спросить тебя - хочешь ли ты стать реально Разумным человеком?
Summing up everything written on this site, I want to ask You - do You want to become really Reasonable MEN?

Хорошо ли ты понял основные мысли, которые я изложил на сайте?
How well do You understand the basic thoughts that I have stated on the site?

Хочешь ли ты сам стать (и чтобы твои дети и внуки стали) закалённым, как в русской бане (из парилки - в снег), образованным, добрым и сильным человеком, чтобы бороться с невежеством всех видов, защищать свой и другие Разумы? Или ты хочешь стать изнеженным комфортом и необразованным дураком, извращенцем и преступником (педофил, гомосексуалист, вор, грабитель, убийца, мошенник и так далее...), религиозным не думающим и верующим фанатиком, постоянно, всю жизнь чувствовать мощный комплекс неполноценности и из-за этого ненавидеть всё Человечество? Или ты хочешь, чтобы твои дети и внуки стали алкоголиками, наркоманами, проститутками и преступниками?
Do You want to become yourself, and that Your children and grandchildren become seasoned, as in a Russian bath (from a steam room — into snow), an educated, kind and strong person, to fight against the ignorance of all kinds, to protect yours and other Minds? Or do you want to become pampered of comfort and an uneducated fool, a pervert and a criminal (pedophile, homosexual, thief, robber, murderer, swindler and so on...) for that hate all of Humanity? Or do You want Your children and grandchildren to become alcoholics, drug addicts, prostitutes and criminals?

Тогда изучай Русский язык и Русскую классическую культуру и литературу, которые впитали в себя и продолжают впитывать всё лучшее из других языков и культур. Я повторюсь, но скажу, что Русские менталитет, язык, культура и образование в наибольшей степени приближены и соответствуют менталитету Разума и междучеловеческого общения.
Then learn Russian and Russian classical culture and literature that have absorbed and continue to absorb all the best from other languages and cultures. I will repeat it, but I will say that the Russian mentality, language, culture and education are most approximate and correspond to the mentality of Reason and interpersonal communication.

Критически обдумывай информацию, которую получаешь из средств массовой информации (СМИ). В большинстве случаев это ложь (фейк), которую распространяют зависимые, продажные СМИ во главе с их трусливыми (или глупыми) журналистами и редакторами в интересах тех, кто нажил и продолжает получать свои богатства преступным путём - разграблением природных ресурсов планеты и эксплуатации Человека-"человеком" (если "человека" можно назвать человеком, конечно).
Critically think about the information, which You get from the media. In most cases, this is a lie (fake) spread by dependent, corrupt media led by their cowardly (or stupid) journalists and editors in the interests of those who have acquired and continue to receive their wealth by criminal means - the plundering of the planet's natural resources and the exploitation of MAN— by "man"(if the"man"can be called a MAN, of course).

И даже не думай воевать с Россией потому, что много веков назад сказано - "Кто к нам с мечом придёт - от меча и погибнет".
Береги Русских потому, что они надежда Разумного Человечества.
Я снова повторю, но после раскрытия моих Ноу-хау Земля станет очень маленькой.
And do not even think about fighting with Russia, because many centuries ago it was said, "Whoever comes to us with a sword will die by the sword."
Take care of the Russians because they are the hope of Reasonable Humanity.
I will repeat it again, but after the disclosure of my Know-how, the Earth will become very small.

August 27, 2018 Know-how is revealed - we will see how everything is ingeniously simple. To create this simplicity, I spent half my life.

Flying in a plasma is just for reference, although the hypersonic flight in the atmosphere is yesterday's century — I am now thinking about Subspace Superlight Engine of Eugene Grigor'ev [SSE/EG].
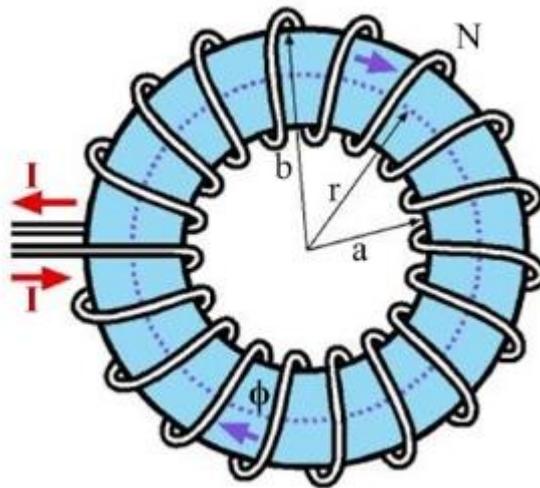
1) Ferrite core MH3000, a=40; b=60; h=20.

2) Something like this, only winding was made one turn clockwise around the main axis of the torus and then against to compensate for the magnetic field of one turn with current around the main axis of the torus and fully compensate the potential of the electric field between the beginning and the end of the winding. Winding around the minor axis of the torus was performed in the same direction in both cases, so that the magnetic flux "F"
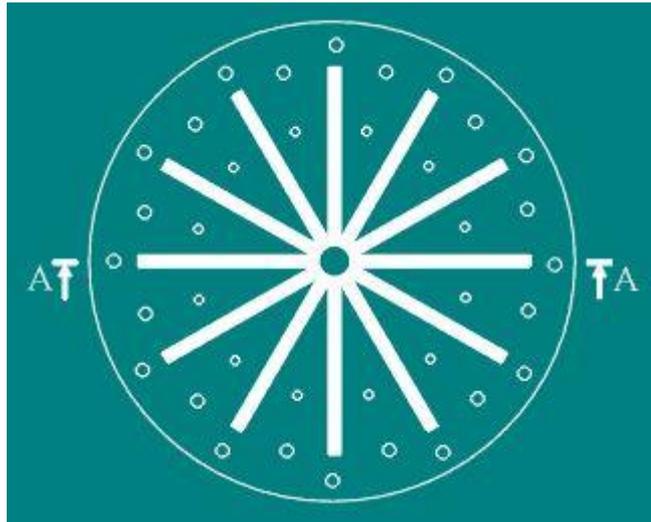
was unidirectional. The winding was done very carefully, "turn to turn." An additional (control) winding, obviously larger than manufacturing errors, was also made on top of the main one to check the effect of manufacturing errors on the properties of the torus EXTERNAL magnetic field. Unipolar rectangular pulses with a voltage of 1 volt, a duration of 0.5 s and a duty cycle of 10 were applied to the windings.

3) Oscillographic tube 3LO1I - indicator and source of a beam of moving electrons in the non-sweep mode (point). It was placed in the inner hole of the torus parallel to its main axis and parallel to it moved there. The amplitude and direction of movement (collection point, focus [actually turned out to be the point of current injection into the torus]) of the beam on the screen of the tube were fixed. The supply of pulses to the additional (control) winding did not cause a deflection of the beam. A witness to the above experiment was my friend and colleague, Ph.D. in Physics and Mathematics, Physics Department, St. Petersburg State University Alexander Kanzerov (akan.51@mail.ru). This experiment does not require large material costs and high technology and, therefore, can be easily and quickly repeated.

4) Work on laser fusion in GPI RAS (http://www.gpi.ru/eng/):
   a) http://thermonuclear.ru/tor/page0008.jpg
   b) http://thermonuclear.ru/tor/page0009.jpg
   c) (P=10MJ-? – may by P=10MW? B=10^4Tl?)
   d) http://thermonuclear.ru/tor/page0010.jpg

5) Sections of the real torus (see Fig. 1 - http://thermonuclear.ru/treg/treg1_r.gif).

Sections were powered axisymmetrically.
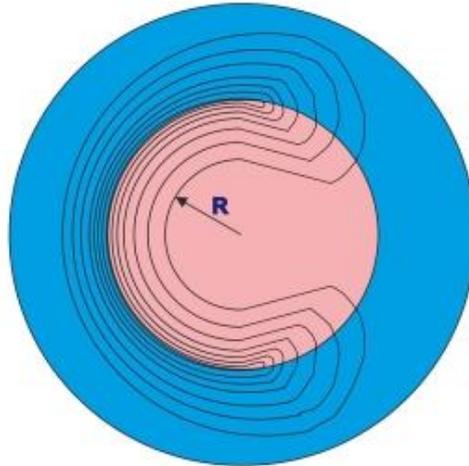
Экспериментально установлено, что
напряженность поля нарастает по направлению
из центра кривизны силовых линий

It was experimentally established that
the field strength increases in direction
from the center of the curvature of the lines of force

6) Magnetic field (MF) of the "shell" type. Blue - toroidal coil; pink color - "donut hole". The failure of the MF is located opposite one of the sections of the torus, shown in paragraph 5); the direction of the dip is very sensitive (the more precise the manufacturing, the more sensitive) to the angle between the sections (at the slightest change in the angle, the closure of the lines of force occurs).

7) Fusion reaction zone (Fig. 1). Positive particles-reaction products fly out against the current in the internal conductors of the torus. In order for them to fly to the right place (the law of conservation of momentum), it is necessary to create a dedicated direction - they can become 10-20% larger internal radius of the torus (one of the two) from the side of particle escape. When merging particles of thermonuclear fuel, they will drop their MPs into 4π, but due to the chosen direction, the field pulse (Electromagnetic Radiation Pressure) will interact with the MP of the double torus (according to Newton's third law) more from its small radius. This will help create a THERMO-NUCLEAR ROCKET ENGINE.

8) Hc - MF coils segmented (real) double torus; Vd - the velocity vector of the deuteron, which moves in the shell type MF; FdL - Ampere force with Larmor radius, which acts on the deuteron; Hd - MF, which creates a moving deuteron. The directions of the MP vectors, speed, and force are easily checked using the "Drill Rule" and "Left Hand Rule". How toroidal plasma formation (TPF) is formed can be found on the Qbasic page (http://thermonuclear.ru/calc_r.html - strictly follow the instructions); run the mono.bas and culon.bas files and play with them [an interesting angle is 132.5 °, which is found in quantum electrodynamics].

Items 1-6 are confirmed by experiments; Clauses 7-8 should be verified by experiments, which are as follows:
a) verification of creation of TPF by a magnetic field of the "shell" type (it is possible that the TPF will have to be created, as shown in clause 4));

b) TPF is an ideal diamagnetic and, therefore, will be squeezed toward the minimum (failure) of Hc;

c) The TPF will create a unidirectional (see figure) with the main shell "MP" on its outer border;

d) the power lines of the MF "Shell" will have to be re-closed due to the sensitivity of the dip to the manufacturing accuracy and the strength of the MF Hc. The failure will be formed already opposite the other section of the torus (self-healing of the minimum of Hc);

e) The TPF will start to be pushed towards the new failure of the MF (auto-regulation);

f) it is known that the closed currents (and the TPF and the real torus are closed currents) interact according to the 3rd Newton law.

g) The experiment scheme is http://thermonuclear.ru/treg/xper.pdf. The experiment should be put in that form in order to immediately register and confine the plasma and the presence of jet thrust, since the ball lightning (namely, its creation is supposed to be in the experiment) can be unstable, explode and destroy the installation. Although the patient was Stakhovich Andrei Nikolaevich (St. Petersburg, Vesselnaya street), with whom I was "lying" in the psychiatric hospital "Buckle" (department No. 8), he said that once a red ball lightning flashed into his window, 2-3 mm in diameter burned through the wall of the glass cup and, leaving a hole, disappeared without any effects. Coils (only one set) are available upon request. The experiment should be automated as much as possible (servos, the CAMAC system, etc.) in order to rule out a possible accident (a new, unknown thing).

I can provide missing know-how links to military scientists of Japan, China, India, NATO in their countries of residence.

FOR THE EXTENSION OF LIFE AND PANATSIA, HUMANITY IS NOT READY - THEREFORE, THIS KNOW-HOW I HID.