

Original Paper

The Gravitational Levitation in Aerospace Technologies of Future

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Abstract

*The discovery and research by the author of real magnetic charges in structures of atoms and substance allowed him to establish that atomic shells are electromagnetic, not electronic. It is the electromagnetic shells of atoms are the source of gravitational field which is the vortex electromagnetic field. Depending from the vector conditions the gravitational field can be both **paragravitational** (PGF) so and **ferrogravitational** (FGF). Between the masses (bodies, atoms, nucleons etc.) emitting of PGF is realized forces which pressing masses to each other. The masses emitting FGF are repelled from PGF sources, for example, from the Earth what represents the effect of **Gravitational levitation** (GL) discovered and investigated by present author. The effect of GL is widespread in Nature. For example, the volatility of so-called light gases (hydrogen, helium, etc.), as well as the convection processes in liquids and gases are determined by the GL effect. The principles of FGF generation developed by the author and technical generators of FGF, created on their basis, allow for the exit of people and loads from the gravitational field of Earth, as well as their return back, without the use of the jet thrust. However, in space, in the absence of PGF the GL effect does not work and traditional technology are needed for further spacecraft movements. Another important aspect associated with the use of FGF in aerospace projects is the possibility of creating artificial gravity on board the spacecraft which will allow to get rid of the state of weightlessness in long-term space voyages. To create artificial gravity the same FGF generators mentioned above are used. The main problem associated with the generation of FGF is of the need to use low temperatures, i.e., superconductivity conditions. However, the latter problem is significant only when the space vehicle is move in atmospheric conditions and is excluded when the FG-generators operate in deep space. In the future, it is possible to use of solid-state ferrogravitational materials (ferrogravitonics) that, like magnets, emit FGF at room and even elevated temperatures. The ferrogravitonics, like atoms of light hydrogen, will pushed out of the Earth's gravitational field and there may even be such an interesting problem as their retention on Earth, since*

the forces of the GL will to throw away these materials into space.

Keywords

magnetic spinor particles, magneton and antimagneton, bispinor, vortex electromagnetic (gravitational) field, paragravitation and ferrogravitation, levitation effect, artificial gravity

1. Introduction in Physics of Real Magnetic Charges, Ferrogravitational Field and Gravitational Levitation

The experimental and theoretical studies carried out by the author (period: 1968 - present) have shown that the magnetic charges are real structural components of atoms and substance and are the immediate sources of all magnetic fields in Nature (Sizov, 2001, 2015). Magnetic particles with a negative charge (g^-), existing in the compositions of atomic shells, received the author's name **magnetons**, that should not be confused with such a theoretical surrogate as the Bohr magneton. Magnetons in its physical parameters are magnetic analogs of electrons. Together with electrons and magnetons in the compositions of atomic shells there are their antiparticles, i.e., **true antielectrons** (e^+) and **antimagnetons** (g^+). Magnetons in its physical parameters are magnetic analogs of electrons. Together with electrons and magnetons in the compositions of atomic shells there are their antiparticles, i.e., true **antielectrons** (e^+) and **antimagnetons** (g^+).

Thus, the shells of atoms are electromagnetic, and not purely electronic, as is now commonly believed (Sizov, 2016). The magnitude charges of electric and magnetic particles in atomic shells corresponds to the condition $e = g$. It is important to emphasize that the above-mentioned real magnetic poles (magnetic charges) have nothing in common with the known Dirac monopoles (Dirac, 1931; Sizov, 2018), and also do not participate in such physical manifestations as the magnetricity (Giblin, Bramwell, Holdsworth, Prabhakaran, & Terry, 2011). All these last theoretical constructions and manifestations in the formation of magnetic field used electrons and their currents, i.e., they are, in fact, of electrified constructions based on Maxwell's vicious electric magnetism (Maxwell, 1873; Sizov, 2019).

Note 1. It is important to note that of the first person to experimentally observe real magnetic charges was the remarkable Austrian physicist Felix Ehrenhaft who for more than 40 years (1910-1952) explored these "elusive" fundamental particles that actually exist in atoms and substance (Ehrenhaft, 1951). In 1970, regardless of Ehrenhaft, the author of this article came to the problem of real magnetic charges in atoms and substance based on the results of his neutron diffraction studies of the magnetic structures of hexagonal ferrites (Sizov, 1971). The displacements of the so-called the magnetic moments of Fe^{3+} Ions from atomic nuclei, discovered in this study, served as the basis for the author's assumption that these moments are theoretical surrogates invented for compelled replacement of magnetic poles (magnetic charges) which really exist in atomic shell. Subsequent experiments of the author fully confirmed his preliminary conclusions (see Sizov, 2001, 2015).

The true sources of magnetic field, i.e., real magnetic charges turned out to be unrecognized in physical

science due to the special conditions of their confinement in atoms and substance which are radical different from the confinement of electrons. In addition, very negative role in the history with of the recognition of real magnetic charges played the vicious Maxwell's concept of electric magnetism (1873) which is the result of the superficial and, exclusively erroneous, impression of the Great Physicist from the famous experience of Oersted (Sizov, 2019).

The joint orbital currents of electric and magnetic charges in atomic shells are the source of the **gravitational field** (GF) which is the vortex electromagnetic field. The elementary source of gravitational field is the electromagnetic quasi-particle which received the name **S-Graviton** (S = source). The S-Graviton is combination of the electric and magnetic dipole rotating in antiphase at same atomic orbit. The model representation of the orbital electromagnetic current or S-Graviton can be written in following form: $\text{rot}[\mathbf{J}_e - \mathbf{J}_g]$, where \mathbf{J}_e and \mathbf{J}_g are vectors the density instantaneous orbital currents of electric (e) and magnetic (g) charges. Then the equation process gravitational field formation by means the S-Graviton can be presented in the form:

$$k \text{rot}[\mathbf{J}_e - \mathbf{J}_g] = \text{rot}[\mathbf{E} - \mathbf{H}] \quad (1)$$

where \mathbf{E} and \mathbf{H} are the vectors of the instantaneous electric and magnetic field strength in the structure of the vortex electromagnetic (gravitational) field, k is the proportionality coefficient. The minus signs indicated in the above equation for formation of the gravitational field correspond to both the antiphase of the orbital currents of electric and magnetic charges, and the anti-directionality of the vectors of the instantaneous electric and magnetic field strength at each point of gravitational field.

Vector-vortex analogy between magnetic (**a**) and gravitational (**b**) of fields is shows in Figure 1. Unlike from vortex magnetic field of every point which is answered one vector of instantaneous strength of \mathbf{H} , every point of gravitational field is responsible two vectors of instantaneous strength of fields \mathbf{E} and \mathbf{H} equal by value and oriented antiparallel to each other. In addition, in Figure 1 shown that the magnetic vortex field, which is determined by the vortex vector $\text{rot}\mathbf{H}$ is formed by means of the rotating the magnetic dipole. The elementary source gravitational field is S-Graviton which can be defined as the dynamic EM-bidipole, i.e., two related dipoles (electric and magnetic) rotating in opposite phase on one atomic orbital. The classical equations of the processes formation magnetic and electromagnetic (gravitational) of fields in Physics with magnetic charges also shows in Figure 1.

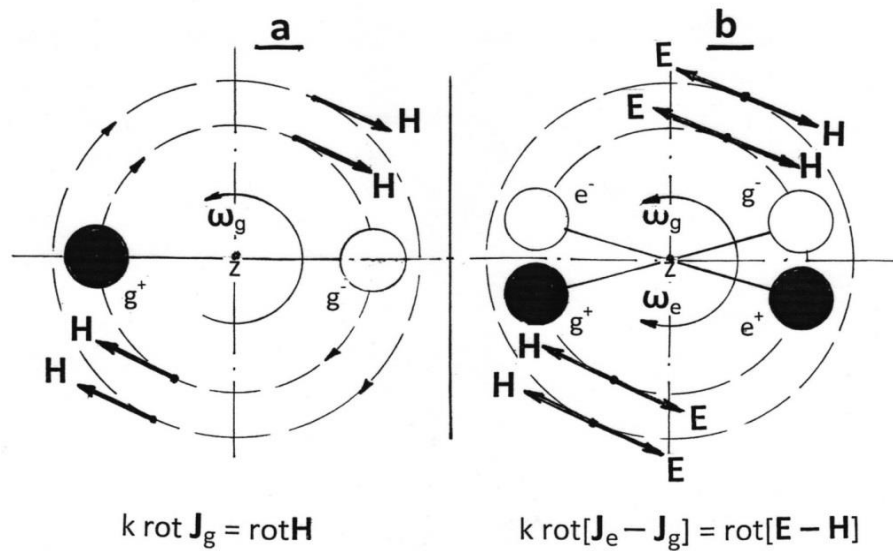


Figure 1. Schemes of Mechanisms Formation of Vortex Spinor Fields: Magnetic (a) and Electromagnetic (Gravitational) (b)

By white circles on the Figure 1 showed negative charged electric and magnetic spinors: electron (e^-) and magneton (g^-) and black circles - positively charged antispinors corresponding to them with charges e^+ and g^+ .

If polarization of vortex vectors $\text{rot}[\mathbf{J}_e - \mathbf{J}_g]$ of S-Gravitons is realized in the structures of Physical masses (in atoms, nucleons, substance et al) that is accompanied by polarization of vortex vectors $\text{rot}[\mathbf{E} - \mathbf{H}]$, then by analogy with magnetic fields of ferromagnetics the gravitational fields being emitted these masses can be called the **ferrogravitational fields (FGF)**. The gravitational fields formed by the Physical masses in the absence polarization of the vortex vectors of S-gravitons in their structures are tensor or quasi-scalar fields. And again, by outward analogy with magnetism such fields can to define as **paragravitational fields (PGF)**.

It is important to note that the system of two coupled of the electric and magnetic dipole rotating in antiphase in one atomic orbit, is shown in Figure 1b, is real shell of a hydrogen atom (protium). If in the center of Figure 1b to place proton, then we get of the scheme real atom of protium. It is the electromagnetic shell of protium, representing the S-Graviton, is the elementary source ferrogravitational field $\text{rot}[\mathbf{E} - \mathbf{H}]$.

The mathematical expression corresponding to the state of FGF is have the form $\langle \text{rot}[\mathbf{E} - \mathbf{H}] \rangle \neq 0$. The gravitational field corresponding to condition $\langle \text{rot}[\mathbf{E} - \mathbf{H}] \rangle = 0$ by analogy with the paramagnetism can be defined as paragravitational field (PGF).

Between the masses (bodies) that emit paragravitational field is implemented generally accepted in of physical science the attraction or gravity. Since the overwhelming number of masses in the Universe emit the paragravitational field the processes of "attraction" between them define the famous Law of universal gravitation. The masses which emit ferrogravitational field repelled from is masses-sources

the paragravitational field, for example, from Earth. This last effect, discovered by the author of the article, called the effect of **Gravitational Levitation (GL)** (Sizov, 2015).

The ignoring by physical science for more than a hundred years of real magnetic spinor particles (magnetic charges) is the main reason that the forces of Gravitational Levitation were not mastered and, therefore, the energy possibilities associated with the gravitational field of our planet were not used in practice. It is important to note that currently used reproducible energy sources such as wind, sun and even hydropower stations, significantly inferior to the energy potential associated with the gravitational field of the Earth.

As part of its experimental research the author has implemented in practice the method of separation of magnetic charges in the pairs g^+ и g^- , as well as developed of the technology of enrichment of the obtained magnetic charge. Using the obtained difference of magnetic charged potential, it has implemented the currents of magnetic charges in a lead superconductor. The technique and results of the author's experiments with real magnetic charges and their currents are described in detail in the author's book (Sizov, 2008), as well as briefly presented in the article (Sizov, 2015).

2. World Physical Triad and “Dark Energy” in the Physics of Gravitational Levitation

The results of years of research of the real magnetic charges allowed the author to formulate the conception of the **World Physical Triad (WPT)** according to which the real World consists of three fundamental phases: **Matter**, **Antimatter** and **Energo-phase (Energo-medium)**. Particles Matter are spinors and has charge with negative sign, and of the Antimatter particles are antispinors with positive charge. Particles of Antimatter constitute approximately half all of real spinor particles, i.e., charged particles in real World, and their absence in the physical representations is determined by Physics confinement these particles in structures of substance. The process so-called annihilation of pair: spinor and antispinor, is accompanied by a strong compression of these particles to one another by forces “**Dark Energy**” (“DE”) and, in principle, not lead to the annihilation of the particles.

The Energo-phase (Energo-medium, Power-medium) is of the global medium which executes all force acts on the particles and masses in real World. In the basic (undisturbed) state the Energo-phase is the isotropic superhigh-density gas-like medium formed by its own fundamental particles referred to as the **energions** which are spinless and massless. These particles are very small, they move in all directions at speeds close to the speed of light and can be only of the Lefts and Rights what linked with the appropriate direction of its own rotation. General state of the energions within Energo-medium is determined as doubly degenerate. Super-high mobility and not-inertial behavior of the energions allow the particles and masses to move relatively freely in Energo-phase when this medium is in basic (undisturbed) state.

Figure 2 presents a scheme of the World Physical Triad which includes three fundamental World phases: Matter, Antimatter and Energo-medium (Energo-phase). The fundamental particles that constitute Phases of the Triad are indicated on the diagram, i.e., the spinors, antispinors and energions. In Figure 2

marked and such derivatives from phases of Triad as the spinor fields and “Dark energy”. Outside of this scheme remain are condensates consisting of the spinor particles of Matter and Antimatter which called Masses.

According to the Physical Triad Concept all forces direct action on the particles and masses which are implemented in the Energo-phase are the forces of the so-called “**Dark Energy**” (“DE”) which is determined by nonequilibrium states in Energo-medium in the form of oblasts of local pressures created by its particles - energions.

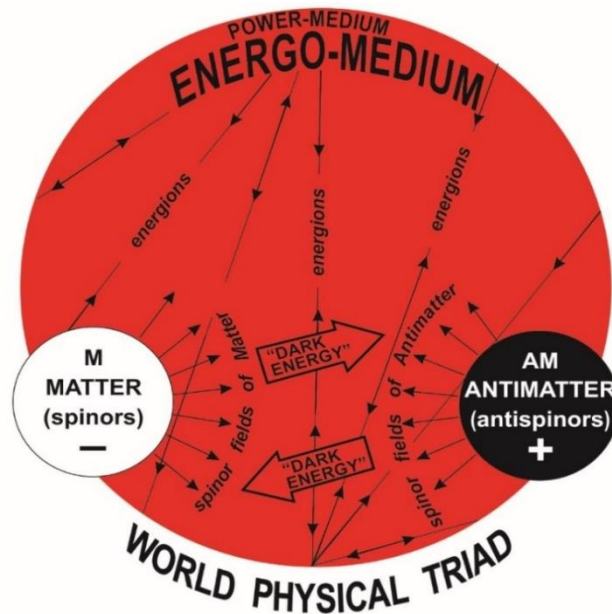


Figure 2. The Diagram of the World Physical Triad

The formation of “Dark Energy” in Energo-phase is induced by spinor fields, i.e., fields of charged particles. In so doing all variety of spinor fields, including gravitational fields, have no significant energy value. They only play the role of intermediaries exerting influence on state of the Energo-medium and inducing formation of “Dark Energy” in it. Namely “Dark Energy” is real source of forces which are responsible for the dynamics of particles and bodies, as in the scale of the Universe (the movement of galaxies, stars, planets and other objects) so and in the microcosm, for example, the dynamics of the spinor particles within in atoms, nucleons, etc.

Note 2. The Energo-medium can also be called as the Energo - ether, and instead of the ethereal particles known as the Amers in composition of the Physical Triad were been injected particles of the Energions. The introduction of the prefix “Energo” in the composition of the name third component of PT and its particles is a reflection of the global force significance of this phase in the dynamics of particles and bodies in the real World. The author in his articles show that namely “Dark Energy” is the global driving force of the Universe.

In detail the concept of the Physical Triad of the real World and the questions connected with the fields

of Matter and Antimatter, as well as the essence of the “Dark energy” contain in two editions of the author’s book (Sizov, 2011/2012), and presented in article (Sizov, 2016).

3. Physics and Technology of FGF Generation

3.1 Joint Currents of Magnetic and Electric Charges in the Process of Formation FGF

In 1979 - 1983 by the author managed to obtain the experimental FGF as a result of joint current of electric and magnetic charges in closed winding of superconducting lead wire wound on coil. The marked joint currents were of the result action inertia forces arising from a change in the rotation speed of the coil in a bath with liquid helium (see Sizov, 2001, 2015). In subsequent years the author developed method for separating magnetic charges in pairs + and - and also learned to enrich the magnetic charge on the material (lead). As a result of this activity the source of experimentally significant direct current of magnetic charges was obtained which was then was realized in in a superconducting solenoid. It is in the last experiences, when pairing the constant currents of electric \mathbf{J}_e and magnetic charges \mathbf{J}_g in the static superconducting solenoid, **experimental FGF** was obtained (Sizov, 2015). The equation of the formation of the last field has the form: $k(\mathbf{J}_e - \mathbf{J}_g) = \text{rot}[\mathbf{E} - \mathbf{H}]$ (1). Thus, the main problem associated with obtaining a stable technical FGF is the creation of a stable direct current source of the magnetic charges, which can then be multiplied with using such new technology developed by the author as magnetoelectric induction. It is should be added that magnetic charges exit in the conduction band of conductors exclusively under conditions of superconductivity.

3.2 The Electromagnetic and Magnetoelectric Inductions with Real Magnetic Charges

The complex of physical processes in result of which is obtained of linear current of the electric charges (\mathbf{J}_e) in the conductor is called the electromagnetic induction (EMI). In general view a sequence of processes EMI with the magnetic charges has the form: $\text{rot}\mathbf{H}^0 \rightarrow \text{rot}\mathbf{J}_g \rightarrow \text{rot}\mathbf{H}_d \rightarrow \mathbf{J}_e$. In the above sequence, the expression $\text{rot}\mathbf{H}^0$ corresponds to the process of rotation of the source of the vortex magnetic field $\text{rot}\mathbf{H}$ around the conductor, and the expression $\text{rot}\mathbf{J}_g$ represents the vortex motion of magnetic dipoles, which was initiated as a result of previous process. It is through the vortex motion of magnetic dipoles in the conductor that a vortex dipole magnetic field is realized which is described by the expression $\text{rot}\mathbf{H}_d$, where d is from the word dipole. We note that the dipoles in the latter process rotate with small angular velocity, however, it is this slowly rotating magnetic dipole field in the conductor creates the electromotive force (EMF), which leads to the formation of a constant electric current \mathbf{J}_e in conductor. Thus, within the framework of the considered inductions, it is should distinguish between the so-called slow and fast vortex (dipole) fields realized in their processes, since these fields lead to various physical effects. The concept of a fast dipole field refers to the well-known vortex magnetic field $\text{rot}\mathbf{H}$ which is induced by an electric current.

As already noted, slow vortex fields lead to the formation of electromotive and magnetomotive forces. As for fast vortex fields, they lead to polarization of magnetic or electric dipoles in the conductor. In detail, the processes of the formation of a linear electric current \mathbf{J}_e in the framework of EMI with

magnetic charges are described in the article of author (Sizov, 2017).

The sequence of processes that determine magnetoelectric induction (MEI), the result of which is the linear current of magnetic charges \mathbf{J}_g in a conductor or, more precisely, in a superconductor, has the following form: $\text{rot}\mathbf{E}^0 \rightarrow \text{rot}\mathbf{J}_e \rightarrow \text{rot}\mathbf{E}_d \rightarrow \mathbf{J}_g$. Since this technology is brand new, we consider in the detail of its stages. When the superconducting frame rotates in external vortex electric field $\text{rot}\mathbf{E}$ or if the electric poles S_E and N_E rotate around the superconductor, a system of rotating electric dipoles is formed in it, i.e., eddy electric (dipole) currents determined by the eddy vector $\text{rot}\mathbf{J}_e$. Rotating electric dipoles form a vortex electric (dipole) field in the superconductor which is determined by the expression $\text{rot}\mathbf{E}_d$. This last field is an electrical analogue of the vortex magnetic (dipole) field $\text{rot}\mathbf{H}_d$ realized in EMI processes. It is the vortex electric field $\text{rot}\mathbf{E}_d$ that forms the magnetomotive force (MMF) in the superconductor and creates the current of magnetic charges. The situation noted above with slow and fast vortex dipole fields fully applies and to processes within the MEI. Thus, MEI is the magnetic analogue of EMI and, in terms of the fundamental conditions for their implementation, there is the complete antisymmetry (electrical and magnetic) in the constituent processes.

Note 3. It is important to note that the vortex electric field $\text{rot}\mathbf{E}$, which is formed by direct current of magnetic charges in superconductors, unfortunately (author's note), is not related to such physical states in substance as ferroelectricity. Just as the vortex magnetic field $\text{rot}\mathbf{H}$ is generated by the electric current \mathbf{J}_e , a constant current of magnetic charges is required to obtain the vortex field $\text{rot}\mathbf{E}$.

However, as noted above, there are some differences in the technical part of the processes of the described inductions, which are associated with differences in the physics of confinement of magnetic charges and electrons in the compositions of the physical mass, i.e., in atoms and substance. So the implementation of MEI processes is possible exclusively in superconductors. Of course, this last condition substantially complicates both the obtaining of currents of magnetic charges and their switching in various current systems. But this is Nature, and this must be reckoned with.

To the above in this section, it should be noted that in order to start of the magnetoelectric induction it is necessary to have a primary vortex electric field $\text{rot}\mathbf{E}$ which is obtained, again, with help the current of magnetic charges as a result of sequence processes: $\mathbf{J}_g \rightarrow \text{rot}\mathbf{J}_e \rightarrow \text{rot}\mathbf{E}$. It may seem that there is the vicious circle.

In reality the current of magnetic charges, needed to start the MEI system, can be obtained through the technology developed by the author for separating magnetic charges in pairs + and - with subsequent enrichment of the obtained magnetic charge. The difference of magnetic charged potential obtained in the framework of the author's technology and, therefore, the currents of magnetic charges can be used to start the MEI system. In the future, during the operation of MEI, problems with providing processes with currents of magnetic charges are not expected.

3.3 Technical Generators of FGF (FG-generators)

The results of many years of research on magnetic charges and their currents (period 1968 - present) allowed the author to propose for practical implementation three design schemes of technical FGF

generators:

- 1) solenoidal generator of FGF.
- 2) solenoidal generator of FGF with a gravito-soft core, i.e., ferrogravity analogue of electromagnet;
- 3) permanent ferrogravitonics - ferrogravity analogue of permanent magnet.

This article provides a brief description of each type of FG - generator. A detailed description of these devices can be found in (see Sizov, 2015).

The solenoidal FG-generator (see Figure 3) is a coil 1 with a winding 2 made of a wire in which the superconducting state can be realized. From electric 3 and magnetic 4 source the constant currents of electric and magnetic charges, coordinated by physical parameters, are supplied to the winding.

The parts of the generator that must be superconducting under the conditions of FGF generation are outlined in Figure 3 by a dashed circle. By analogy with the magnetic field that forms around a solenoid with a constant electric current in Figure 3 shows the poles $N_H(S_E)$ and $S_H(N_E)$ related to the FGF emitted by the solenoidal FG-generator.

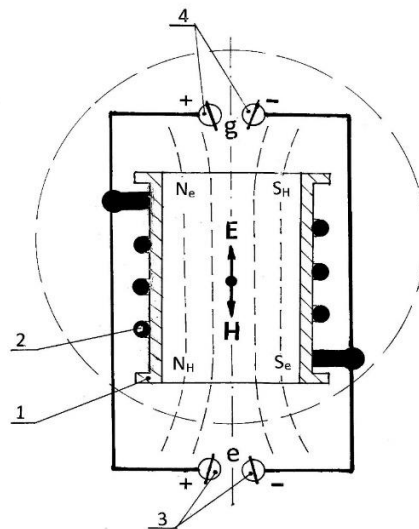


Figure 3. Schematic Diagram of the Device Solenoidal Generator FGF

The letters H and e with the symbols of north (N) and south (S) poles of the solenoid on Figure 3 refer to the vortex magnetic (**H**) and electric (**E**) fields in composition the FGF. Recall that the last field at each point is described by the vortex vector $\text{rot}[\mathbf{E} - \mathbf{H}]$.

The solenoidal FG-generator with gravity-soft core is the ferrogravity analogue of electromagnet. Unlike the generator described above, this device uses a core made of a soft-gravity material in which, under the influence FGF of solenoid, the polarization of the vortex vectors $\text{rot}[\mathbf{E} - \mathbf{H}]$ is realized. At the same time, similar to what happens in an electromagnet, the multiple increase in density of the **FGF** emitted by it can be realized.

The permanent ferrogravitonic (PFG), i.e., The ferrogravity analogue of the permanent magnet is a

monocompact FGF source with stable polarization of the vortex vectors $\text{rot}[\mathbf{E} - \mathbf{H}]$ of atomic S - Gravitons in its composition. The creation and practical use of PFG is an extremely promising direction in ferrogravity technology. The creation of such sources is capable of producing an energy revolution since it will allow directly and without much cost to use the huge energy potential associated with the Earth's gravitational field.

Of course, PFG_s are ideal generators of FGF, but their presentation in this article takes place at the idea level. Much work needs to be done to only evaluate the real possibilities of creating such generators. As for the solenoidal generators, the experiments performed by the author allow us to evaluate them as working devices.

3.4 Estimation of the Possible Magnitude of the Forces Gravitational Levitation Realizing in the Technologies under Consideration

The questions related to the participation of "Dark energy" in the processes of Gravitational levitation have not received thorough theoretical development due to the vicious disregard of existing physics real magnetic charges, as well as true antielectrons in structures of atoms and substance. In the absence of serious theoretical providing the author was forced to use the principle of analogy taking as the source parameter of force the interaction of FGF emitted by one S-graviton, i.e., atomic shell of the atom of light hydrogen (protium) with of gravitational field Earth. Since the mass of protium is 1.67×10^{-24} gr. this value was taken as a unit of the magnitude force GL acting on one S-Graviton on the Earth's surface.

It is also important to note that according to the results of the author's research, the effect of complete gravitational shielding of the PGF of the nucleus-proton by the electromagnetic shell is realized in the protium atom. As a result of the latter circumstance the manifestation external of the force activity by protium atom are determined exclusively by the FGF emitted by its shell, i.e., the S-Graviton (Sizov, 2019).

The second important provision of the author, based on the results of its research, is his original concept of electromagnetic current in a superconductor according to which the joint current of electric and magnetic charges is the current of S-gravitons which should be denoted as \mathbf{J}_{SG} , where SG from S-Graviton. In other words, when passing constant currents \mathbf{J}_e and \mathbf{J}_g through a superconductor these currents in it do not remain linear but in the process of movement form the joint and coordinated circulation of electric and magnetic charges around the axis of the conductor, i.e., forms stable system of S-Gravitons or S-Graviton's currents. Namely as result of current of S-Gravitons around the superconductor and the is formed FGF.

Thus, the above equation (1), describing the process of formation of the gravitational field, can be written, in the case of an electromagnetic current in a superconductor, in a more compact form, combining the linear currents \mathbf{J}_e and \mathbf{J}_g in a single S-Gravitons's current $k \mathbf{J}_{SG} = \text{rot}[\mathbf{E} - \mathbf{H}]$. Moreover, in this situation, instead of the concept of electromagnetic current \mathbf{J}_{SG} it is possible to use a simple number of S-Gravitons n_{SG} that are involved in the composition of the such current.

The maximum possible number of S-gravitons involved with current composition J_{SG} , i.e., n_{SG} is determined by the number of free electrons involved in of the conditional electric current. Such a number, for example, for lead is estimated as $\sim 10^{22}$ electrons in 1 cm^3 , i.e., one free electron per atom of lead. The linking of the number of S-Gravitons with the number of free electrons participating in the composition of the EM-current is a well-founded, since the Union of an electron with three unrecognized particles to form S-Gravitons is of the energetically advantageous and very common process. Such union of charges is realized in the shells of atoms and, apparently, takes place in other stationary EM-processes.

Using the noted number n_{SG} as the value of S-Gravitons current in superconductor and applying standard formulas used to estimate the induction in multilayer solenoid the author obtained of the value maximum possible force of $GL \sim 36.3 \text{ kg}$. Which acts on the solenoid element comprising 500 turns of lead wire with a diameter of 1.4 mm, a cross-sectional area of coil 0.03 m^2 and it length of 0.1 m. It is Important to note that the own weight of such lead solenoid is 3.3 kg.

It should be noted that the value of the force GL , which is given in this calculation, is the maximum possible and corresponds to the maximum possible current $J_{SG}(n_{SG})$ in winding of superconducting lead.

Of course, the real value of the force GL may differ significantly from that given in this calculation, which is primarily due to the lack of data on about the ratio of amount of free electric and magnetic charges in the electromagnetic current in a superconductor. At the same time, the value given here gives General information about the approximate values of the forces that can be involved in the processes under consideration.

Thus, if in general composition of FG-generators of the spacecraft uses 10 modules of 10 generating solenoids in each, then with a total lead weight of 0.33 tons, the maximum useful of the force GL can be 3.42 tons. It is such useful load what can to push into the space the block of FG-generators, described above, out of the Earth's gravitational field.

It should be added to the above calculation that all the details of the estimates were related to a pure solenoidal FG-generator, i.e., without the use of a ferrogravity cores in it composition. At the same time, it is known from classical electrical engineering that the use of cores in solenoids greatly increases their inductance. In this regard, a cautious assumption can be made that the use of ferrogravity cores in the composition of solenoidal FG-generators can increase the density of the FGF of the solenoidal FG-generator by 2-3 times and provide a corresponding increase of the force GL .

4. Gravity Levitation and Its Application in Aerospace Engineering

4.1 The Technique of Going out into Space and Returning to Earth by the Forces of Gravitational Levitation

The Figure 4 gives general idea by mechanism action of the forces of gravitational levitation in the process of a spacecraft leaving the Earth's gravitational field. Shown here is an apparatus equipped

with FGF generators, which is in the PGF of Earth. Block FG-generators 1 is located in the lower part of the apparatus under the passenger compartment 2.

In the spacewalk mode, the FGF_s vectors emitted by the FG-generators in block 1 are polarized that creates the maximum FGF tension and provides the maximum force (**F**) that pushes the spacecraft out of the Earth's gravitational field. As noted above, between the physical masses emitting PGF and FGF, a zone of increased pressure P_e is formed which and determines the formation of the "Dark energy" forces pushed the spacecraft out of the Earth's PGF.

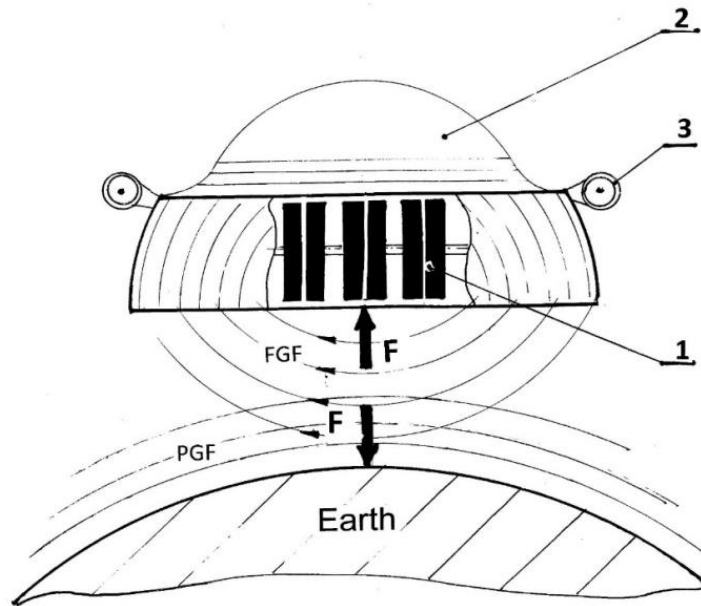


Figure 4. Schematic Diagram of a Spacecraft Device that Uses Gravitational Levitation Forces (Exit Mode from the Earth's Gravitational Field)

It is these forces of "Dark Energy" that determine the effect of Gravitational levitation. The density of the Energo-phase between the Earth and the spacecraft under the influence of their gravitational fields is increase sharply in relation to the rearward regions of the pair under consideration, which leads to the formation of repulsive forces **F** (shown by thick arrows in the diagram). By varying the directions of the gravitational fields emitted by individual modules of the FG-generators in block 1 can changed of force **F** that will ensure a safe landing of spacecraft.

Note 4. Given the design features of a space vehicle using technical gravitational levitation, its most rational form is the shape of an inverted dinner plate (see Figure 4).

Attention should be paid to the fact that the buoyant forces initiated by the FG-generators, in the process of the apparatus leaving the Earth's gravitational field, will exert pressure on the crew members and passengers, pushing them away from the Earth. This will certainly take place, since the person is a source of PGF. In such conditions it is necessary to secure passengers in the seats. However, the magnitude of the overloads that people will experience during the spacecraft's exit from the Earth's GF

will not exceed what modern astronauts experience when they enter into space on the jet thrust.

It is also important to note that the forces of gravitational levitation, which push the spacecraft out of the planet's gravitational field, are forces of rectilinear action. They are directed strictly along the earth's vertical and exclude any movement of the body in other directions. For the movement of the apparatus in horizontal directions relative to the surface of the Earth, it is necessary to use traditional engines. In addition, it is important to be aware that technically significant GL forces are manifested exclusively in the conditions of PGF_s of planets and stars. In the absence of PGF_s , the GL effect does not work, and for the movement of the spacecraft in space it is necessary to use traditional pushers and, first of all, reactive ones. In Figure 4 shows jet engines 3 located along the sides of the spacecraft.

4.2 The Method of Creating Artificial Gravity on Board Spacecraft

As you know, a very serious problem for human health in the implementation of long space travel is a condition such as weightlessness. In order to overcome the negative impact of weightlessness on the human body, the existing cosmonautics carefully selects candidates for the ranks of astronauts, as well as carries out special serious training. In the context of the implementation of space technologies using gravitational levitation, there is a real opportunity to eliminate the negative impact of weightlessness on the human body by creating on board normal gravitational conditions. For these purposes, the same block of FG-generators is used, which was used at the stage of the device's exit from the Earth's gravitational field.

Varying the directions of the vortex vectors $\text{rot}[\mathbf{E} - \mathbf{H}]$ of elementary gravitational fields, i.e., rotated the FG-generators in the common block 1 (see Figure 4) in such a way as to ensure the condition $\langle \text{rot}[\mathbf{E} - \mathbf{H}] \rangle = 0$, we can obtain PGF. As already noted above between the masses (bodies) emitting PGF "DE" forces are realized which press them against each other. It is these forces that will ensure the normal gravitational "climate" on board spacecraft.

The article has repeatedly emphasized that the generation of FGF by solenoidal generators is realized under the conditions of the superconducting state of the current-carrying elements of their solenoids. However, the last condition applies only to the stay of the spacecraft in the atmosphere. When the spacecraft goes into space, the requirements for cooling the solenoid windings are significantly reduced, which will save refrigerants and use them only at the stages of going out into space and returning to Earth, as well as when visiting other large cosmic masses (bodies) with atmosphere.

In addition, in his publication (see Sizov, 2015, 2008) the author showed that it is possible to create solid-state sources of FGF, i.e., the ferrogravity analogues of permanent magnets. In such materials is realizing stabilization of the polarization state of the vortex vectors $\text{rot}[\mathbf{E} - \mathbf{H}]$ emitted by atoms which turns such materials (bodies) into stable FGF sources. In this case, the so-called the gravitational attraction of such bodies is replaced replaced by pushing them out by the forces of GL, and such an interesting problem as their retention on Earth may appear, because gravitational levitation forces can throw such bodies into space.

5. Conclusion

The most important areas of practical use of FG-generators and gravitational-levitation forces, in addition to the aerospace technologies described in the article, are:

1. Passenger and cargo transportation in near-Earth space;
2. Gravito-lifting technologies;
3. Gravito-pumping technologies;
4. Gravity-chemical technologies;
5. Industrial and household gravitational power engineering.

It is important to note that the reason that closed all the reasonable approaches of science to real physics of the gravitational field and, therefore, to its states such as para- and ferrogravity, is the unintentional ignoring in physical science, for almost 150 years, of real magnetic spinor particles (magnetic charges). This is precisely the reason why the technical levitation forces were not mastered and, consequently, the energy opportunities associated with the gravitational field of our planet were not used in practice. It should be noted that currently used energy sources such as wind, sun and even hydroelectric power stations are significantly inferior to the energy potential associated with the Earth's gravitational field.

The main reason, which has delayed the official recognition of real magnetic charges by more than 140 years is the physics of its confinement in substance that is radically different from confinement of electrons. In addition, the vicious concept of Maxwell's electric magnetism was a significant negative factor in the problem of recognizing real magnetic charges. Within the framework of this concept, the great physicist, in the absence of any real knowledge of the physical processes occurring in conductor with an electric current and being guided exclusively by the superficial impression of the famous Oersted Experience "deprived" the magnetic field of its own source, i.e., of the magnetic pole or magnetic charge. In many ways "thanks" to this vicious concept the magnetic charges turned out to be "buried alive", and the magnetic field emitted by them turned into kind of "miscarriage" of electricity.

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