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Some lines of investigations on properties of natural self-luminous formations using model of non-homogeneous physical vacuum

The functional possibilities of natural self-luminous formations (NSLF) in space and in planetary environments on the basis of the developed model of the non-homogeneous physical vacuum and vacuum domain are studied. The planetophysical role of NSLF is traced in their influence on geophysical fields and the seismic regime of the Earth. The new scheme of a global circulation of energy and matter connected with NSLF is considered. The physical features of NSLF are listed and explained and on this basis the mechanisms of weak and strong explosions of these formations are proposed. The new classification of states and qualities of the non-homogeneous physical vacuum is introduced.

1. Vacuum domain as physical model of natural self-luminous formations

The study of NSLF was carried out in various fields of knowledge of sciences concerned with the Earth. More often these phenomena were investigated in relation to geomagnetic disturbances and electromagnetic forerunners of earthquakes; less often these formations were registered as the unusual meteorological phenomena or storm discharge processes during development of tornadoes. Up to the present this natural experimental material despite of its variety and numerosity has no reliable explanation.

The research of physical properties of natural self-luminous formations on the basis of models of the united electrogravodynamics and non-homogeneous physical vacuum (PV) is originated in the works [1,2,3]. According to the version being developed, the energy of gravispin waves incident on vacuum domain (VD) from absolute physical vacuum (APV), is transformed inside VD to the energy of electromagnetic waves. In contrast, the energy of electromagnetic waves incident on VD from APV is transformed inside VD to the energy of gravispin waves. The volume of VD is filled with the physical vacuum of matter (PVM) or with the physical vacuum of antimatter (PVA). In these works it is also shown that in the gravitational field VD becomes an electrical and gravitational dipole, i.e. in this case VD creates inside and outside itself the electrical and gravitational fields additional to those of the Earth. In the magnetic field VD becomes a magnetic and spin dipole, i.e. creates inside and outside itself the magnetic and spin fields. In the electrical field VD becomes an electrical and gravitational dipole, i.e. creates the electrical and gravitational fields additional to those of the Earth, and in the spin field VD becomes a magnetic and spin dipole, i.e. creates the magnetic and spin fields additional to those of the Earth. Thus VD acts simultaneously as the energy transformer for two kinds of waves (gravispin and electromagnetic) and four fields (magnetic, electrical, gravitational and spin).

The considered physical properties of VD as the model of NSLF, which physical properties were described in [4], allow to find the approaches to the explanation of a number of their characteristic properties, in

particular those of ball lightning. These properties are the following:

1. Wide-band emission of electromagnetic waves as a result of transformation of the gravispin waves to the electromagnetic waves within the limits of VD.

2. Initiation of electric discharges caused by the electrical dipole. The electrical dipole appears in VD by the action on VD of the electrical and gravitational fields of the Earth.

3. Local change of the Earth magnetic field nearby NSLF caused by initiation of a magnetic dipole within VD's limits by the action on VD of the Earth magnetic and spin fields.

4. Change of the gravitational field of the Earth nearby NSLF (weighting and levitation) caused by initiation of a gravitational dipole within VD's limits by the action of the electrical and gravitational fields on VD.

5. Rotation of gas and dust inside NSLF caused by the change of the spin polarization of VD due to the action of the Earth magnetic and spin fields on VD (analogue of Einstein-de Haas effect [5]).

6. Capture of particles of substance by NSLF caused by the action of gravitational, electrical, magnetic and spin fields of VD as a four-dipole.

7. Penetration of NSLF through a gas, liquids and solid bodies, which is possible because PVM or PVA in VD are the forms of PV. They interact with substance only through macroscopic fields.

Since VD becomes a four-dipole in four fields, it undergoes in the same fields the action of four forces of a dipole character: electrical, magnetic, gravitational and spin. Since VD captures substance, it undergoes the action of two forces in the Earth atmosphere: the usual gravitational force, which is proportional to the mass of the captured substance, and the aerodynamic force, which depends on the geometrical form of VD and also on the speed of the air flow in the considered location of VD.

A simultaneous action of the six specified forces on VD is associated with one known feature of NSLF in the Earth atmosphere:

8. "Unpredictable" motion of NSLF, including a motion "against the wind".

VD is devoid of its own mass. The acceleration of VD's motion is determined by the captured mass. Since a part of forces (dipole) acts directly upon VD, and a part of forces (gravitational and aerodynamic) acts upon VD through the captured mass, there is a possibility of a partial escape of the captured mass of VD, that may cause one more known property of NSLF:

9. "Unexpected, inexplicably large" change of acceleration of NSLF's motion.

The physical conditions of VD passing through liquid and solid bodies do not differ much from the conditions of VD passing through gases. The four dipole forces act on VD both in liquid and solid bodies. But in these dense media the processes of depolarization of two dipoles, electric and magnetic, should be much more intense. The depolarization of VD's electrical dipole is caused by the conduction currents. The depolarization of a magnetic dipole of VD is caused by change of the magnetization of a magnetic substance. The partial depolarization of electric and magnetic dipoles results in reduction of dipole forces acting on VD.

Let us note that VD introduces the four additional fields into a solid body. Four gorge stress tensors [5,6,7] correspond them. These stresses change the initial intense state of a solid body. It is characterized by tensor

of initial mechanical stress [8]. The gorge and initial mechanical stress (all normal and all tangent) algebraically are summarized. The summation of these stresses can result in many inexplicable "anomalous" phenomena.

2. About relation between NSLF and geophysical fields, seismicity

It was shown in [4] that the rate of NSLF occurrence at the Earth surface grows significantly in the years of the active Sun. In this connection may be concluded that one of the basic sources of NSLF in space is the Sun and other stars. Just inside stars it is possible to find a high density energy, which is sufficient for decomposition of APV into the physical vacuum of matter (PVM) and physical vacuum of antimatter (PVA). The structure of APV, PVM and PVA will be considered below (fig.3).

Apparently, together with the flows of particles of a solar wind in geospace move also both local formations of PVM and PVA -the vacuum domains of matter and antimatter (MVD and AVD). In this connection arise the problems on capturing of two kinds of vacuum domains by the Earth fields and fields of other planets of the Solar System.

One can see certain distinctions between the mechanisms of capturing of MVD and AVD, but nevertheless, a capture by the Earth both MVD and AVD is possible. Therefore it is possible to proceed from the assumption that the internal volume of the Earth is filled with both M-vacuum domains and A-vacuum domains. It is possible also to assume that some integrated vacuum domain is formed inside the Earth. In the case when amount of PVM dominates over that of PVA this integrated vacuum domain is characterized by the equations of the united electrogravodynamics with the average parameters of the electrogravitational relation $\varepsilon_1 > 0$ and magnetospin relation $\mu_1 > 0$. The excess of PVA over PVM gives parameters $\varepsilon_1 < 0$ and $\mu_1 < 0$.

In the internal gravitational field of the Earth the integrated vacuum domain forms at $\varepsilon_1 > 0$ a latent polarizational electric charge of one sign, and at $\varepsilon_1 < 0$ - of opposite sign. In the internal spin field of the Earth (caused by the rotation of the Earth) the integrated VD forms at $\mu_1 > 0$ a polarizing magnetic moment with one direction along the rotation axis of the Earth and at $\mu_1 < 0$ - with the opposite direction. The Earth electrical field can be connected with a polarizing electric charge, while "dipole" magnetic field of the Earth is connected with a polarizing magnetic moment.

In connection with a frequent inversion of the Earth magnetic field (22 for last 5 mln. years [9,10]), it is reasonable to assume that at one polarity of the electrical and magnetic field the amount of PVM exceeds the amount of PVA and at the opposite polarity - the amount of PVA exceeds that of PVM.

It is well known [9,10,11] that the problem of the Earth magnetic and electrical field is one of the most difficult problems of the modern geophysics. The model of these fields proposed within the frame of the model of the non-homogeneous PV does not claim to give a solution of the problem. At the same time the model of the Earth electrical and magnetic fields follows from the model of the non-homogeneous PV in a natural way and should be considered along with other models.

The waves of mechanical oscillations inside the Earth at $\varepsilon_1 \neq 0$ and $\mu_1 \neq 0$ should be accompanied by electromagnetic waves. Indeed, mechanical fluctuations are fluctuations of masses, i.e. they are connected with a change of gravitational and spin fields. And these fields in a medium with $\varepsilon_1 \neq 0$ and $\mu_1 \neq 0$ should partially be transformed in the electrical and magnetic fields.

First of all it is necessary to note the opportunity of a VD's capture in some places of a heterogeneous strongly intense "solid body", i.e. in rocks of the Earth and also in various constructions created by a man: houses, bridges, ships, planes etc. As VD is an original "antenna" for electromagnetic fields, all those attributes should be connected with the captured VDs, which characterize the phenomenon of poltergeist. The unexpected destructions and fires can be connected with the "captured" VDs.

It is necessary to pay attention to connection of NSLF with earthquakes. The passing of VD through the intense and heterogeneous in mining rock structure regions of the Earth's crust should result in dump of the large mechanical stresses, i.e. in earthquakes. Such a mechanism of the start of seismic events is possible especially in the tectonically intense zones. At the same time this connection is ambiguous. In the places where VD passes often through the rocks of the seismically loaded areas, the strong earthquakes are absent, because VD do not allow to accumulate the large mechanical stresses. Conceivably it might explain aseismicity of Terektino-Katunskaya dynamo-panorama on Altai [4]. On the contrary, in the places where VDs occur rare inside the rocks, the large internal mechanical stresses can be accumulated.

It is obvious that a beginning of an earthquake can be connected not with VD but with the known reasons, which are widely covered in seismology [9,10]. But even in this case the preliminarily located VDs can "emerge" over the Earth surface, causing narrowly directed earthquakes.

It is possible to note one more property of NSLF caused by gorge stresses in the rocks of the Earth, inside and around VD: interrelation between the rate of NSLF and earthquakes' occurrence .

The interrelation of the rate of NSLF and strong earthquakes' occurrence, as it is appeared, has the certain orientation. According to the archival data on earthquakes, the annual integrated energy of seismicity of the large world earthquakes was calculated [12]. The study of NSLF, earthquakes occurrence rate (with $M_i \geq 7$) and values of Wolf numbers has revealed that in the years of a high frequency of supervision of NSLF the rate of large earthquakes is reduced. It is also typical that the rate of NSLF grows in the years of the active Sun. This interrelation opens the property of NSLF of particular value: influence on the large-scale geological geophysical processes.

The significant interest with the respect to the establishment of a role of vacuum domains is represented by the work on the elucidation of physics of an electromagnetic signal, originating from the excited seismic center [25]. In an attempt to create a simple model of generation of an electromagnetic signal from a seismic center under conditions of the main break of the Earth's crust it was established that in a seismic center a dipole magnetic moment is excited synchronously to the main break, whereas under condition of asymmetry of breaking coasts (that occurs more often) the electrical dipole moment is excited. Taking into account a complete feature of the vacuum domain's activity, it is necessary to take also into account another pair of the polarization, namely gravitational and spin ones. But these effects are practically not recovered partly also for the lack of the registering apparatus.

From the discussed above possibilities of the physical characteristic of NSLF in a form of VD it follows that the model allows to reflect the most important properties of the natural self-luminous formations.

3. About circulation of energy and generation of gravispin waves in the Universe

It was told above that to explain the electromagnetic radiation and, in particular, the self-luminescence of NSLF, it is necessary to assume that the space is filled with the gravispin waves with high density of a power flow in any pre-chosen direction (according to B.M.Smirnov [13,14], the typical spherical ball lightning with a diameter about

0,20 m shines as an electrical bulb with power of more than 100 W). The question appears in this connection: what represent by themselves and where are located the sources of the gravispin waves? In the work [1] this question is partially considered on the basis of the closed chains of energy transformations, which enter in a natural way in the model of the united electrogravodynamics and non-homogeneous PV, namely, of the mutual convertible transformations: the electromagnetic energy converts into heat (ЕМБН); the electromagnetic energy - in the mechanical energy (ЕМБМ); the electromagnetic energy in the gravispin energy (ЕМБГС); heat - in the gravispin energy (НБГС); the gravispin energy - in the mechanical energy (ГСБМ); the mechanical energy - in heat (МБН). All these six transformations of energy are schematically shown in fig.2.

Three energy transformations of those shown in fig.2, ЕМБМ; ЕМБН, МБН, are well investigated. The transformation of the gravitational energy to the kinetic energy of body's motion and the reverse

transformation are also well known. However under GS- energy one should understand three energies: energy of the gravitational field, energy of the spin field and energy of the gravispin waves (as well as under EM-energy it is necessary to understand three energies: energy of the electrical field, energy of the magnetic field and energy of the electromagnetic waves).

Thus the model of the non-homogeneous PV puts forward the problems of study of little-known energy transformations: EMBI GS; GSBH; and of two particular transformations GSBIM, the spin energy - in the mechanical one and reverse, and the gravispin wave energy - in the mechanical energy and reverse.

In the work [2] a part from the additional energy transformations mentioned above is considered:

- Transformation of the gravispin waves' energy to the mechanical energy;
- Transformation of heat to energy of the gravispin waves;
- Convertible transformation of energy of the electromagnetic waves to energy of gravispin waves.

An unexpected character and even a paradoxicality of these three energy transformations are connected with

the reverse signs before "sources", density of masses and gravitational density of a current, ρ_G , $\vec{J}_G$ in the equations of Heaviside in comparison with signs before "sources", density of electrical charges and density

of an electrical current, ρ , $\vec{J}$ in the equations of Maxwell and with factors ε_1 , μ_1 in the model of the united electrogravodynamics.

First of all it should be told that the considered energy transformations reject the principle of entropy increase and the second law of thermodynamics. At the same time these transformations do not touch the first law of thermodynamics and the principle of causality (a cause precedes an effect).

The analysis of the first additional energy transformation has shown [2] that the gravitational antenna in a form of moving with acceleration a point body is not an emitter but it is an energy absorber of gravispin waves. Hence, a mass moving accelerated is not responsible for the occurrence of the gravispin waves' energy. On the contrary, the energy of off-site gravispin waves goes on the increase of the kinetic energy of a body moving with acceleration.

The absorbers of gravispin waves can describe only the so-called "advanced" (instead of "delayed") solutions of the wave equations of Heaviside [1,2,3]. It is known from the electrodynamics [6] that advanced solutions will not contradict the principle of causality only in one case: when in the environment of an absorber there are the sources of the off-site waves.

Thus a paradoxical situation is connected with transformation of the gravispin waves energy to the mechanical energy. Instead of the expected source of gravispin waves we have received their absorber. To describe the energy absorber not contradicting with the principle of causality, one needs again the off-site sources of gravispin waves.

The analysis of the second transformation - transformation of heat to energy of the gravispin waves has shown [2] that there is the amplification of gravispin waves, which pass through substance at the expense of heat in substance. It is obvious that when the gravispin waves pass through substance its temperature should be decreased. However in this case the off-site sources of gravispin waves are again necessary for an explanation of the process of energy transformation.

Only in the third transformation, i.e. in the transformation of electromagnetic waves energy to energy of the gravispin waves and reverse, the sources of the gravispin waves appear. The sources and simultaneously the converters of these energies are VD. The analysis of the third transformation of energy has shown [1,2] that in VD, located outside of substance, there is a periodic 100% energy transformation of the electromagnetic waves to energy of the gravispin waves and reverse. This transformation occurs separately at each wave frequency. Therefore the frequency spectrum of the gravispin waves should be close to the frequency spectrum of the electromagnetic waves.

Thus, according to the model of the non-homogeneous PV, the sources of gravispin waves in the Universe are VD - NSLF. It turns out so, that the gravispin waves are necessary for an explanation of "self-luminescence" of NSLF. It appears that these waves again occur due to VD - NSLF. The necessary condition of such a process is the existence of the large number of NSLF scattered in the Universe and contacted with the electromagnetic radiation of stars.

The role and importance of gravispin energy can be understood from the consideration of energy transformations shown in the scheme of fig.2. If gravispin energy and all three additional transformations connected with gravispin energy are excluded, then we obtain the scheme of energy flows, well-known from the classical thermodynamics [15]. Despite of the partial convertibility of transformations $M \leftrightarrow EM$, $EM \leftrightarrow H$, $M \leftrightarrow H$, the primary total energy flows point towards the thermal energy (they are shown in fig.2 by separate arrows), i.e. $MEIMYH$; $MYIH$. A continuous increase of the thermal energy at the expense of the mechanical and electromagnetic energy takes place. This scheme includes naturally transformations of chemical and nuclear energies. The part of these energies is converted instantaneously into heat, whereas the mechanical and electromagnetic energy due to transformations of chemical and nuclear energies turn finally to the heat.

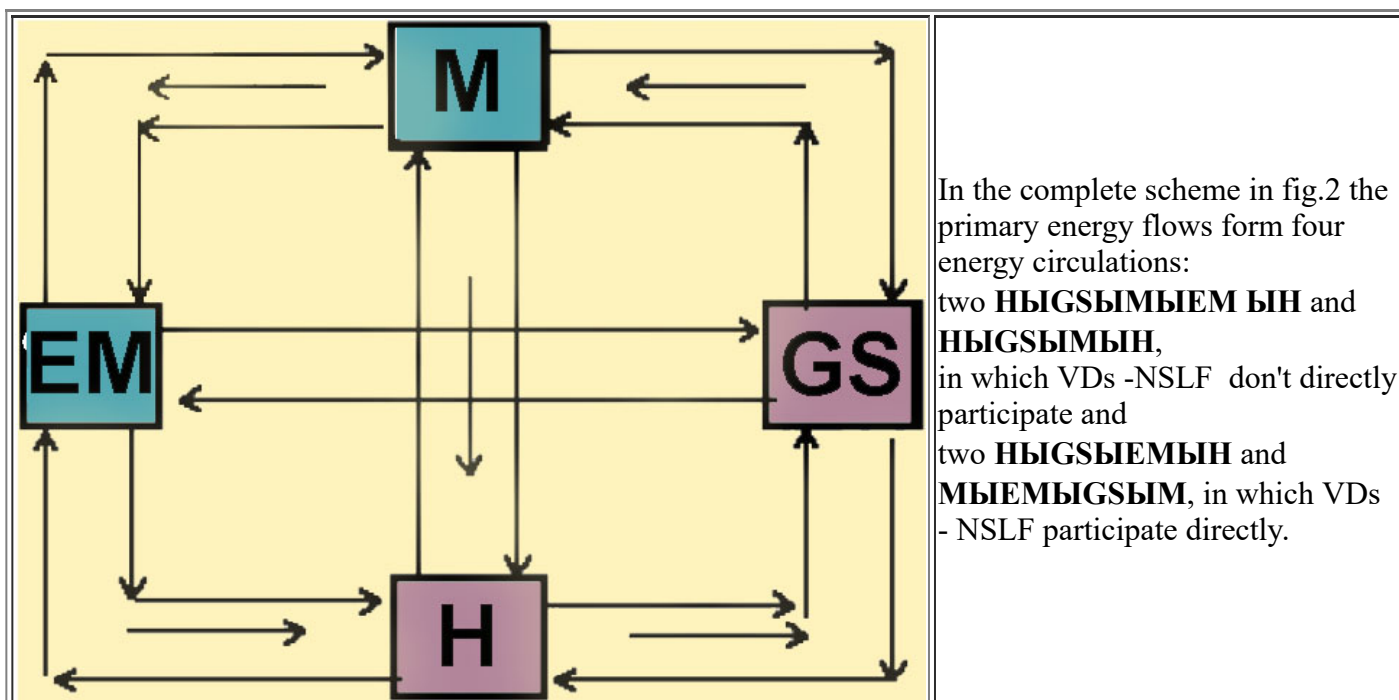


Fig.2 The principal scheme of world energy circulation

According to the estimations [2], energy transformation of $H \leftrightarrow GS$ and $GS \leftrightarrow M$ are weak. It means that in the places of the Universe where there are the intensive power processes with the appreciable increase of entropy, the reverse transformations, connected with entropy reduction may remain unnoticed. However the reverse energy transformations of $H \leftrightarrow GS$ and $GS \leftrightarrow M$ have a wide circulation in the universe, in particular, due to the extremely high permeability of GS-waves in a substance. Therefore these transformations can play the main role in the absence of "thermal death" signs in the Universe.

So, apparently, the particular question on a "self-luminescence" of NSLF in the model of the non-homogeneous PV has appeared to be connected with the large circle of fundamental questions of the energy circulation in the Universe.

4. Problem of explosions of natural self-luminous formations

The numerous reports on the explosions of self-luminous formations allow to divide them into weak and strong events. This classification is rather conditional, but nevertheless it reflects a specificity of phenomena. A closer look at the problem shows that the weak explosions are frequently connected with spherical ball lightnings, while the strong explosions (up to first tens megatons) are connected with specificity of solar-

terrestrial interrelations and happen in the years of the active Sun. The attempt to improve the physics of NSLF explosions has resulted in the allocation of two explosion mechanisms.

4.1. Problem of weak explosions

Considering the problem of weak NSLF explosions, we may initially restrict ourselves to the observant data on ball lightning (BL) as to the most investigated objects from the family of NSLF. It is necessary to pay attention to energy values of BL explosions with a diameter about 0,2 m: the average value is 10^4 J, the maximal value is 10^7 - 10^8 J [13,14]. We believe that the weak explosions of a ball lightning are characterized by the energy of the order 10^4 J at its size mentioned above, i.e. at "energy density of the explosion" of the order 10^6 J/m³.

Just the small average value of energy of BL explosion is taken as a basis in the well-known theories of a ball lightning: in the plasma-fractal theory of B.M. Smirnov [13,14] and in the theory of plasma-dust crystals, drops, clouds of V.N. Zytovich [16]. In the theory of Smirnov the BL energy results from reorganization of parts of the BL's frame from fractal strings (charry particles of a usual dust) at its more dense packing and in fact it is energy of a molecular coupling. In the BL theory of Zytovich a "unique source of energy...- is the mechanical energy of the sound fluctuations. The mechanical energy is either seized initially in a volume, or is captured continuously in a volume of a sphere" [16].

The theories of B.M. Smirnov and V.N. Zytovich explain well the properties of the luminous spherical formations, outwardly resembling ball lightning, which were experimentally received in various electric discharges at the presence of combustible gases and particles of sprayed electrodes [13,14,17]. However they do not explain any of the properties of NSLF-ball lightning considered above (they explain a luminance of formations, but can not explain the electromagnetic radiation, for example, in a decimeter range; they give a reserved energy of the order 10^4 J, but can not explain the explosions with the much greater energy).

The BL theories, based on the usual physical concepts, can not explain qualitative features of BL explosions, which are well-known from the observant data: in many cases after "explosion of a ball lightning" in the open space it does not disappear and continues its movement [13,18]; at disappearance of a ball lightning after explosion, the explosive wave mechanically interacts only with metal subjects, freely passes through isolators [18]; some explosions of a ball lightning are connected with a destruction of the large sites of electrical and telephone networks by the electrical current [13,14].

One should refine the physical model of VD in order to explain the mechanism of BL explosions on the basis of the model of the non-homogeneous PV, taking into account the observant data mentioned above and the value of energy explosions. First of all it is necessary to pay more attention to mechanical properties of the physical vacuum of matter (PVM) or physical vacuum of antimatter (PVA) within the limits of VD volume [1]. In the Earth fields VD becomes a four-dipole. The mechanical stresses inside VD are connected with the fields of these dipoles.

The sole opportunity to explain the observant fact of the long existence of the invariable form of a ball lightning under action of internal stresses lies in the fact that PVM at PVA inside VD-ball lightning have properties of a solid body (of a vacuum crystal). At the same time it is necessary to give to PVM or PVA inside VD the properties of a fast change of internal structure and properties of a fast dispersion at some maximal stresses inside VD, because account must be taken of the facts of the change of ball lightning's form (down to division) and the facts of the complete disappearance of a ball lightning (at the mentioned above strange behavior of the explosive wave).

It is not difficult to see, that to explain the explosions of a ball lightning within the model of the non-homogeneous PV, the problems of three kinds need to be posed: the explosions when a form of VD is preserved; the explosions when VD's form changes; the explosions at dispersion of VD.

In the work [1] within the limits of the model of the non-homogeneous PV the explosions of a ball lightning are considered during a fast change of the VD's form. It is shown that in this case the observable energy values of BL explosions of the order 10^4 J can be connected with a fast change of an electrical energy of VD. Meanwhile in the indicated work a simultaneous fast change of the gravitational energy of VD has been missed. Hence, in the considered problem the value of energy of the ball lightning explosions was

underestimated. In this connection it becomes clear that the observable values of energy of BL explosions (order 10^4 J) can be described not considering a change of the VD's form. In this case it is possible to find a more natural mechanism of the detonation of explosions connected not with the change of the VD's form but with the electric discharge inside VD.

Thus it is possible to associate with the fast change of the dipole electrical and gravitational fields of VD one more known property of NSLF-ball lightning: the weak explosions of a ball lightning with a released energy of the order 10^4 J.

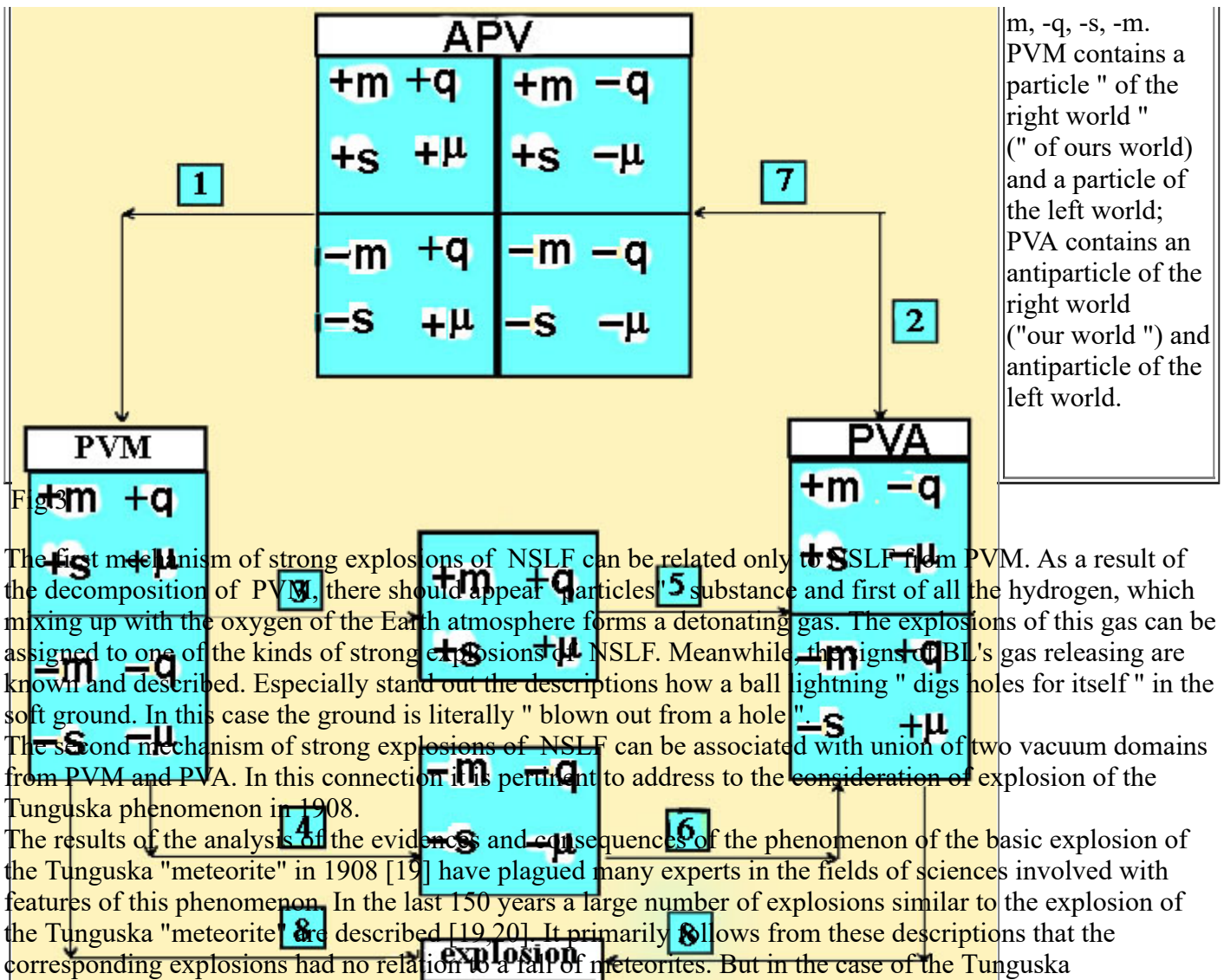
The strong explosions of a ball lightning with a released energy of the order 10^8 J exceed a trotyl equivalent in recalculation on the volume of a ball lightning [18]. The explosions of large NSLFs such as the "Tunguska meteorite", have the signs of explosions of hydrogen bombs [19]. In this connection one may tell with all definiteness that the strong explosions of NSLF can not be described by the equations of the macroscopic model of the non-homogeneous PV.

To elucidate a physical nature of strong explosions of NSLF, the study on internal microscopic physical properties of PVM and PVA needs to be performed. This problem goes far beyond the considered model. In the present work we shall restrict ourselves to most general assumptions of a hypothetical character about the physical properties of PVM and PVA, proceeding from the attempt to receive the logically coordinated ideas about the movement of matter and energy in the universe.

4.2. The problem of strong explosions

The analysis of observant data of phenomenological researches of NSLF based on the macroscopic model of the non-homogeneous PV shows that the strong explosions of NSLF can not be explained by fast processes of electrical and gravitational fields change. At the same time there is an assumption that the reason of strong explosions of NSLF can be associated with the processes of the internal reorganization of PV structure, i.e. with the processes of a microscopic character.

	Some ideas about mechanisms of strong explosions of NSLF can be received on the basis of a schematic model of a matter circulation in the universe shown in fig.3. According to this model [1] elements of APV consist of Terlezky 's quadrigues : a particle + m (mass), + q (electrical charge), + s (spin), + m (magnetic moment); an antiparticle + m, -q, + s, -m and particle - antiparticle " of the left world " -m, + q, -s, + m; -
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m, -q, -s, -m.
PVM contains a particle " of the right world " (" of ours world) and a particle of the left world;
PVA contains an antiparticle of the right world ("our world ") and antiparticle of the left world.

Fig.3

The first mechanism of strong explosions of NSLF can be related only to NSLF from PVM. As a result of the decomposition of PVM, there should appear particles' substance and first of all the hydrogen, which mixing up with the oxygen of the Earth atmosphere forms a detonating gas. The explosions of this gas can be assigned to one of the kinds of strong explosions of NSLF. Meanwhile, the signs of BL's gas releasing are known and described. Especially stand out the descriptions how a ball lightning " digs holes for itself " in the soft ground. In this case the ground is literally " blown out from a hole ". The second mechanism of strong explosions of NSLF can be associated with union of two vacuum domains from PVM and PVA. In this connection it is pertinent to address to the consideration of explosion of the Tunguska phenomenon in 1908.

The results of the analysis of the evidences and consequences of the phenomenon of the basic explosion of the Tunguska "meteorite" in 1908 [19] have plagued many experts in the fields of sciences involved with features of this phenomenon. In the last 150 years a large number of explosions similar to the explosion of the Tunguska "meteorite" are described [19, 20]. It primarily follows from these descriptions that the corresponding explosions had no relation to a fall of meteorites. But in the case of the Tunguska phenomenon, probably, for the first time the systematic researches of genetic consequences on the vegetation, isotope structure, thermoluminescence, magnetization of rocks in the field of explosion were carried. The indicated researches have shown that the most powerful flare of γ -radiation took place. The force of this explosion, which may be named as the photon explosion, is estimated at the value in some tens megatons of a trotyl equivalent.

Under the evidences of the eyewitnesses the explosion of the Tunguska "meteorite" was preceded by a long and complex motion of the several self-luminous bodies [19]. In this connection it should be noted that a group motion of NSLF is the usual phenomenon [20, 21].

Tornadoes frequently move in groups with the rotation in the neighbouring columns in the opposite directions [23]. Meanwhile the direction of gas and dust rotation in NSLF - VD is a strong evidence of its composition from PVM or PVA. Hence, NSLF from different PVs (in one of them - PVM, in another- PVA) can be present in the neighbouring columns of a tornado.

In this connection one may assume that the second mechanism of strong explosions of NSLF - VD is associated with a direct contact of two NSLFs: one - from PVM and another - from PVA, and with annihilation of vacuum particles of PVM and PVA with formation of particles of absolute PV.

In the considered case of strong explosions of NSLF - VD the complete cycle of transformations of vacuum particles is realized, escaping the formation of substance, shown in fig.3, where the arrows mark the following transformations:

- 1, 2 - Release of particles of PVM and PVA from the Terlerzky's quadrigue;
- 3 - Release of particles of a substance from dyads of PVM;

4- Release of particles of the left world from dyads of PVM;

5,6 - Union of particles of a substance with particles of the left world with particles of PVA in the Terletzky's quadrigue;

7 - Termination of a cycle of the matter transformation;

8 - Exoenergetic collision of PVM and PVA, which creates a strong explosion.

The complete cycle of transformations of vacuum particles can occur due to different physical conditions in a place of fission of absolute PV on PVM and PVA, in stars and in a place of coupling of PVM and PVA in the absolute PV, on the Earth and other planets. The energy released at the annihilation of PVM and PVA is the energy received by particles of PVM and PVA at the fission of absolute PV. Thus, it is established one more channel of the transfer of energy from stars to the surrounding space, besides the direct electromagnetic radiation and expiration of particles of a substance.

In the connection with the considered hypothesis of strong explosions of NSLF - VD as a result of annihilation of PVM and PVA some important remarks should be made.

The reaction of fission of absolute PV on PVM and PVA in stars should play a role of an autoregulator of nuclear reactions in plasma. This reaction results in the outflow of energy and particles (photons) from the zone of reaction in plasma, it prevents nuclear reaction processes from being overgrowing into explosion of a star.

Inside the Earth PVM and PVA occupy the separate areas of its internal space, they do not mix up with each other. Conceivably, the deep world magnetic anomalies of the Earth might be associated not with the large local masses of ferromagnetic substance but with internal areas of the Earth filled by PVMs (Brazilian magnetic anomaly) and PVA (Canadian, Siberian and Antarctic magnetic anomalies) [10, 11]. It is possible also that some large earthquakes result from the underground explosions connected with the reaction of annihilation of the limited amounts of PVM and PVA. It is possible that the puzzle of the explosion of Phaeton planet (with the formation of the zone of asteroids in the Solar system) is connected with the same reaction but with the interaction of great amounts of PVM and PVA.

To substantiate the fission reactions of absolute PV on PVM and PVA and annihilation of PVM and PVA as well as the fission reactions of PVM with generation of a substance, it is necessary a further development of the theory of elementary particles. The example of such a development is the model of elementary particles of V.G. Schulgin [22].

5. Natural self-luminous formations - a possible reason of some accidents

The previous section about explosions of NSLF (especially strong) gives an occasion to consider these phenomena as the reasons for some kinds of natural and technogenous accidents. The mechanisms of occurrence of a catastrophic process is rather different due to the influence of these formations. In this final section we give only general provisions and we list some episodes of a catastrophic character.

On the Earth surface the strong physical phenomena are associated with NSLF - VD, in ordinary comprehension - accidents, for example: tornadoes, a frustration of high-voltage electrical systems of power supply, collisions of airplanes and ships against NSLF.

At first sight some features of the tornado phenomenon are in the contradiction with the well-studied laws of the hydromechanics [22,23]. The idea to associate the tornado phenomenon with the phenomenon of NSLF - VD has arisen from the observations of a vortical motion of gas and dust inside and around NSLF - VD (in particular, ball lightning). Observing NSLF - VD, first of all, one sees " NSLF itself", i.e. its form, its self-luminescence and only later one sees a vortical movement of the air and dust inside and around NSLF. On the contrary, when observing a tornado, at first one sees " tornado ", i.e. its form, a vortical movement of the air, its monstrous mechanical actions on the houses etc. and only then one sees the lightnings and self-luminescence inside a column of a tornado. The latter of the specified properties of tornado are the features

of NSLF - VD. If to proceed further, one should take into account the magnetic and spin polarizations of NSLF - VD. Just with the spin polarization of VD it is possible to associate some hardly-explainable properties of tornado: the intensive rotation of the air even in the absence of a contact of tornado's column with the Earth surface; stability of the form of the tornado's column etc.

The electrical power systems include many transmissions lines and have a refined protection system. Therefore the failure of power systems during geomagnetic storms (for example, breaking of the power system of Hydro-Quebec in Northern Canada for 9 hours during a magnetic storm in March 13-14, 1989) is perceived as a casual concurrence (in 1991 there was a second maximum of solar activity) [11]. Really, a small change of the Earth magnetic field and even the strong electromagnetic radiation (radiointerference), accompanying the magnetic storms, can not become the reason of breaking of the power systems of the whole megapolities.

But it is possible to attack the problem of the " influence of the active Sun " on the power systems from another side. The analysis of the equations of the non-homogeneous PV shows that when NSLF - VD are introduced in a power system, the distributed interphase reactive and active resistances of transmission lines should change. The travelling current and the stress waves will inevitably appear under a fast movement of NSLF-VD and, accordingly, under a fast change of lines' parameters. The overvoltages, a corona discharge, the additional losses of capacity and, finally, the disconnection of the "struck" lines from generators up to the point of the complete breaking of the whole power system are associated with these waves.

On the basis of the model of the non-homogeneous physical vacuum it is possible also to consider the consequences of approach and collision of airplanes, ships etc. against NSLF - VD. From the consideration of VD properties it is clear that these consequences should have a catastrophic character.

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