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Research Paper

New Interaction in Nature and its Use in the Form of Traction

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Abstract: *Results of experimental investigations on the use of an assumed new force of nature as thrust of an engine model placed in a bathyscaphe and in a spherical ship model are presented. The new force was detected earlier when acting on the process of formation of masses of elementary particles by means of potentials of physical fields in experiments with high-current magnets, during measurements of the β-decay rate of radioactive elements, asf. The observed movements of the bathyscaphe and the ship model in water can't be explained in the framework of traditional physics. An explanation is given for the movement of objects through the action of the new force and the new principle of motion. It is shown the feasibility for an effective use of the new force of nature in the form of thrust for spacecrafts.*

Keywords: New force of nature, anisotropy, byuon, thrust, spacecraft.

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1. Introduction:

The search for new interactions has always been one of the most actual trends for research in physics (the models with a macroscopic radius of confinement [1]; gravitation with the violation of parity [2]; looking for the spin-gravitation interaction – the review in [3]).

In papers [4-6] the results of experimental investigations are described, in which, with the aid of high-current magnets, torsion and piezoresonance balances, an interaction of the objects of nature, different from the known ones – the strong, weak, electromagnetic and gravitational – was first detected.

The value of the detected force was around (0.01-0.08) g in a magnetic field of magnitude ≈ (10-13) T with aperture of the coils in the range (40-53) mm and loads' weight (26-30) g.

Further experimental studies of the new proposed interaction by means of gravimeters with magnets arranged nearby [7-9], as well as studies of changes in the rate of β-decay of radioactive elements [8-13], confirmed the results obtained in [4-6].

The key feature of the new interaction is its anisotropy, shown in a wide range of sizes, from the characteristic length scale of 10^{-17} cm of the weak interactions [8-13] up to the size of our Galaxy (10^{22} cm) [14,15]. However, the new interaction shows as well isotropic properties [8,9]. It is noticeable that in [16], on the basis of a new interaction, an explanation is given about the origin of dark energy as a cause of receding galaxies with acceleration (scale 10^{28} cm).

The physical nature of the new force, in accordance with the Byuon theory [8,9] (non-gauge theory of the formation of physical space and the world of elementary particles on the basis of unobservable objects named "byuons"), appears to affect the formation of masses of elementary particles by means of potentials of physical fields because the fraction of the mass of elementary particles associated with the formation of their internal physical space in the framework of the Byuon theory is proportional to the modulus of some summary potential $\mathbf{A_\Sigma}$, which magnitude can't be greater than the modulus of the cosmological vector potential $\mathbf{A_g}$ which is the new fundamental constant, introduced in [8,9] (module of $\mathbf{A_g}$ is equal to $1.9 \cdot 10^{11}$ Gs·cm). Hence the new force will push out any material body from the region of the decreased modulus of $\mathbf{A}_\Sigma$, because a defect of energy $\Delta E = \Delta m \cdot c^2$ will arise and the corresponding force will point to the region with undisturbed value of $\mathbf{A_\Sigma}$.

The most accurate results to determine the anisotropic properties of the new force were found in studies using plasma devices [9,17,18], which showed that the new force rejects substance out of the region of weakened summary potential $\mathbf{A_\Sigma}$ along the generatrix of a cone with an opening of 100°-110° around the vector $\mathbf{A}_g$ that sets the global spatial anisotropy of physical space and has the coordinates $\alpha \approx 293° \pm 10°$ (right ascension) and $\delta \approx 36° \pm 10°$(declination) in the second equatorial coordinate system.

The finding of the anisotropic properties of physical space is supported by many astrophysical observations: the anisotropy of the motion of the pulsars in the plane of the sky [9,14,15], the anisotropy of the distribution of solar flares on the Sun's surface [8,9], the anisotropy of the distribution of earthquakes on the Earth [9,19] with respect to the stars (the most powerful earthquakes in the northern hemisphere occur when the vector potential of the Earth magnetic field during the planet's rotation is directed antiparallel to the vector $\mathbf{A}_g$).

The present article is devoted to a new manifestation of the proposed interaction in mechanical experiments designed to use the new force in the form of traction of objects, in particular for applications in space technology.

2. The New Force and Rationale of the Search for New Principles of Motion in Space; Results of the First Experiments:

In [8,9,20-22], is described a new principle of motion of natural objects using the physical space - quantum medium (in [16], this medium is identified with "hot" and "cold" dark matter in the framework of the Byuon theory [8,9]) as an environment supporting the motion of an object. According to this principle of motion, the same object using such principle can move in any environment, particularly under the water, on the water and through the air, because it will exchange momentum not with these environments but with the *physical space*, which in framework of the Byuon theory is not just some mathematical fiction, but is a physical object which density of matter without ordinary substance is around 10^{-29} g/cm^3 ("cold" dark matter). Close to material bodies the density of matter is much bigger ("warm" dark matter).

In [8, 9] is shown that the above mentioned density of 10^{-29} g/cm^3 is due to quantum matter: objects, that arise in the four-contact interaction of byuons (with self-energy mc^2_{4b} = 33 eV), having an Heisenberg interval of uncertainty equal to about 10^{28} cm (that is, the size of the Universe), because they arise and form – according to the theory of byuons [8, 9] – in the three-dimensional physical space.

In [8] is shown that our star, the Sun, is moving towards the constellation of Hercules not randomly, but following the above mentioned principle of motion and the new force of nature in the form of traction by means of the action of the potential of its magnetic field on the process of formation of the internal physical space of the elementary particles, of which it is composed.
In space technology [23] for long-distance flights in space (for example, a flight to Mars) are considered most promising various plasma electro-jet engines, the best of which have specific characteristics at the level of 130 W/g, that is in order to produce one gram of traction it is constantly needed to spend 130 W of electrical power onboard of the object; such energy costs badly complicate the implementation of space missions.
In this article is outlined a new principle of motion, and the below described experimental results that confirm such principle show that the energy consumption in space technology for long-distance flights implementing the new principle of motion can be reduced by tens to hundreds of times.

3. Technical Implementation of the New Principle of Motion:

In [8, 9] is shown that any material body by means of the set of all its physical potentials can only decrease the summary potential $\mathbf{A_\Sigma}$. In the physical space a sort of "potential hole" arises with a reduced module of $\mathbf{A_\Sigma}$ (information image, also called “IO” in the following, of the given body in the physical space). In the subsequent experiments with a physical pendulum, which description is an original contribution to this article, was investigated for the first time the existence of the IO in the physical space.
In Fig.1 are shown the experimental devices, consisting of a base plate (1), to which is fixed a clock mechanism (2), serving the pendulum suspension in turn crafted in bronze and steel arm (mass of the pendulum is 28 g (3), shoulder length is 250 mm), as well the sensor elements of the strain gauge balance (4) (0.01 g accuracy) with a plate having a hole through which the electromagnet (5) with a special rod could hit the body (3).

We used the following methodology to carry out the experiments.
The electromagnet is supplied with a current pulse with a precisely given energy (accuracy 0.01). The rod hits the suspended body, which is therefore rejected and, during the return movement, hits the plate fixed to the strain gauge balance. The magnitude of the impact force is recorded on the computer. The flight of the load in space is recorded by a movie camera and is characterized by the magnitude of its deviation from the equilibrium position. After carrying out 100 to 200 strokes the expected value for the average deviation of the pendulum is computed.
Further, the load is fixed to an additional support using the plasticine, located at a distance exactly equal to the above expected value for the average deviation of the pendulum, and is held in such position for about 5 seconds. Further, the experimenter observes the time of separation of the load from the plasticine and records it. Typically, the time of separation ranged from 2 to 30 seconds. The experiments with plasticine to determine the average deviation of the load were also performed 100 to 200 times. The impact force was again recorded on a computer.
The two series of recorded impact forces of the pendulum hitting the balance are then compared: the average of the impact force after the action of the electromagnet on the pendulum and the average of the impact force after the departure of the pendulum from the support provided with plasticine.
If the IO exists in space more than the period of oscillation of the pendulum (0.3 seconds), but less than 7 seconds, then the value of the impact force in the experiments with plasticine will always be greater than the impact force on the tensometric weights after the action of the electromagnet, because the IO will throw out the loads from the IO region, located in the place of rest of the pendulum in the free position, as a result of the action of the new force of nature.
The experimental results are represented in Table I, which lists the serial number of experiments (N), the dates of the experiments in 2010 (the experiments with plasticine are designated with "pl"), the number of tests of the series, the value of the average deviation of the pendulum (R_{sr}), the difference between the average force in the experiments with plasticine (F_{pl}) and the average force in the experiments with the electromagnet (F_{em}), in grams.

In Table I are shown as well the absolute errors in the experiments (Δ), in grams.
In all cases, the impact force in experiments with plasticine was greater than the impact force in the experiments with the pendulum pushed by the electromagnet, yet it should be noted that such differences of forces don't exceed the respective experimental errors.
However, as is said in physics, if a pattern is often repeated, then maybe there's something! Methods to extract results out of errors can be found in [24].
From the analysis of the received results it can be pointed out that when the average deviation of the pendulum is 5.38 cm, the result is significantly closer to the experimental error, suggesting that the effect of the IO increases with deviation of the load greater than 5 cm, which fully matches with theoretical predictions of the existence, around any elementary particle, of the information field of "4b objects" in a volume with a typical size of 10 cm [8, 9, 25]. In engineering, for example, such size explains the choice of the internal diameter of the pipes of thermal installations designed to heat liquids after harnessing the above mentioned new force of nature [26].
Thus, we can conclude that, if the mass of the load is 28 g, with the time of return of the load to the equilibrium position equal to 0.3 seconds, the magnitude of the force can be expected at the level of 0.5 g.
In [21] are shown the results of the first experiments on the application of the new force of nature and the new principle of motion to the spacecrafts. In these experiments (year 2006), a reduction in the weight of the rotor with the axis of rotation in the horizontal plane (diameter ≈ 0.5 m, weight around 10 kg) is recorded at the level of 15 g during 2 minutes.
In [27] are shown the experiments on the movement of an autonomous bathyscaphe in water (weight 36 kg), on board of which was installed a system of two rotating bodies, while the power was supplied to the bathyscaphe through a wire.
The shape of the bathyscaphe was close to an ideal sphere with a deviation from sphericity smaller than 0.001 that almost completely eliminates the effects of inertia while moving in space due to the difference of friction forces in different directions. The weight of one of the rotating bodies is equal to 43.5 g, of the other 53.5 g. The choice of two rotating bodies with the indicated masses practically excludes visible vibrations of the sphere as well as, consequently, the effects of inertia because the friction force of the water and its difference in opposite directions are minimized.
The bodies rotated in a vertical plane: in this case, the body with greater mass was fastened to the device, allowing to slow down its motion when the same body was placed in the lower position.
A traction was detected at the level of 0.01 g under the action of the new force of nature. The main systematic error of this experience was due to the currents in the basin (diameter around 3 m, depth 0.5 m). In spite of the above mentioned error, in many cases the bathyscaphe moved against the water current previously detected in the pool.
Then, the bathyscaphe was placed in a barrel, in which there were virtually no currents, since the room and the barrel water temperatures did not differ more than 0.01 degrees; however, in this experiment, the tension of the wires didn't allow the bathyscaphe to move around by more than 4-5 cm. Nevertheless, in these experiments as well it was possible to detect the effect of motion of the bathyscaphe by the action of the new force.
The study of the systematic errors in the described experiments led to the development of a new experimental setup to further demonstrate the use of the new force of nature in the form of traction: by means of experiments carried out in the spring and summer of year 2012, which results are shown below for the first time.
To avoid the effects of water currents on the motion of the object under study, as well as the influence of the wires, it was decided to create a greater scale model of a spherical ship, the traction force of which would largely override the effect of currents, thus allowing a clearer visualization of the action of the new force in the form of traction.
In order to accomplish this task, a model of almost perfectly spherical ship (deviation from sphericity at the level of 0.001) was created, as shown in Fig. 2., which consisted of an hemispherical body (1) in polycarbonate (inner radius of the sphere equal to 0.45 m), a steel deck (2) to which is fixed a stepper motor (3) on the axis of which is mounted the device with the metal eccentric load (4) (weight of the load equal to 718 g, with the shape of a cylinder having the axis of rotation parallel to the axis

of rotation of the engine, the distance between such axes being 5 cm), an autonomous power supply systems (5) based on a battery (12 V) and the additional weight (6). During the rotation of the eccentric load in the vertical plane, the stepper motor executes a program stopping the load at the bottom position, at which the new force of nature arises with horizontal direction of the thrust vector, under the action of which the ship model was forced to move on the water (7, water surface 8).

The experiments have shown (June, 2012) that for the period of rotation of the load around 0.6 s and its cyclic stops at the bottom position lasting 0.1 s, the ship, with small swinging (fluctuations in the level of the deck around 1 cm), began to move in any direction, according to the mentioned thrust vector, due to the action of the new force of nature.

The symmetrical arrangement of the bodies around the rotating cylindrical load, the absence of wind, as well as the parallelism of the axis of the rotating load and the axis of rotation of the motor, practically eliminate the influence of the room air on the motion of the ship model. The angle of deviation from parallelism of the above mentioned axes was experimentally investigated. At a deviation from parallelism by 5 degrees, a jet effect arose, which resulted in a motion of the model along the axis of rotation of the motor.

A thin thread, a needle to change the direction of the thread tension, a special support and a system of calibration weights were used to measure the traction force, which ranged from 10 to 20 g. In order to carry out the research, a stepper motor model FL110STH201-8004A was used, allowing to realize the specified program of rotation of the load with an input current of 8.2 A and power consumption not exceeding 100 W during the experiments.

Therefore, the ship model received a specific thrust around 6 W/g, which is more than 20 times better than the most efficient plasma engines used in the space technology for the propulsion of spacecrafts.

Before carrying out the experiments with the model of spherical ship, experimental studies were carried out at the facilities of the company TENZO-M (Russian Federation) aimed at measuring the expected traction by means of high-precision strain gauge balances.

By means of a special pedestal, the stepper motor with horizontal axis of rotation and equipped with the aforementioned eccentric load was mounted on the strain gauge balance. Cyclically repeating the above described program of rotation the load, we performed the measurements of the weight of the whole system including the stepper motor while stopping the rotating load, which gives the force, directed either vertically upwards or vertically downwards.

In Fig. 3 the result of one of such experiments is shown, where the expected force should be directed upwards, thereby reducing the weight of the whole system. As can be seen in the diagram, the weight reduction is observed in every cycle, but directly detecting the new force in such measurements isn't likely because the same measurements are significantly affected by the centrifugal force arising from the rotation of the load. Nevertheless, by means of calculation (the frequency of measurements in the experiments was 400 to 800 measurements per second) allowed to clearly reveal that over a period (one motor revolution) was always observed an excess of force in the direction of action of the expected force, with magnitude around 300 g.

In order to determine the region of occurrence of the new force along the trajectory of rotation, a special strain gauge balance was created, allowing to measure the new force during the rotation of the load in the horizontal plane. In this case, a tensometric element was fixed to the axis of rotation of the motor, along with the usual eccentric load. Information about the readings of the tensometric element were transmitted by an antenna to a receiving device and to the computer.

The experiment was performed according to the above work program of the stepper motor.

In Fig. 4 the results of one of a series of experiments are shown. In this case, we succeeded to clearly capture the new force of nature. Its time domains of action at the approach of the eccentric load to the IO (stop position) are clearly visible in the diagram: in such areas, outlined by circles, the maximum deviation is observed, corresponding to angular intervals of width around 30° until about 27° before the completion of a full revolution (that is, approximately the angular range from 57° to 27° before the stop position). The value of the maximum deviation was around 250 g.

Therefore, if the received force is averaged over the full period of rotation, its value is about 20 g, which falls in the same range experienced during the above described tests with the thrust of the ship model.

Therefore, the whole set of results presented in this article demonstrates the feasibility of using the new force of nature in the form of traction for various mechanical systems.

4. Tables and Figures:

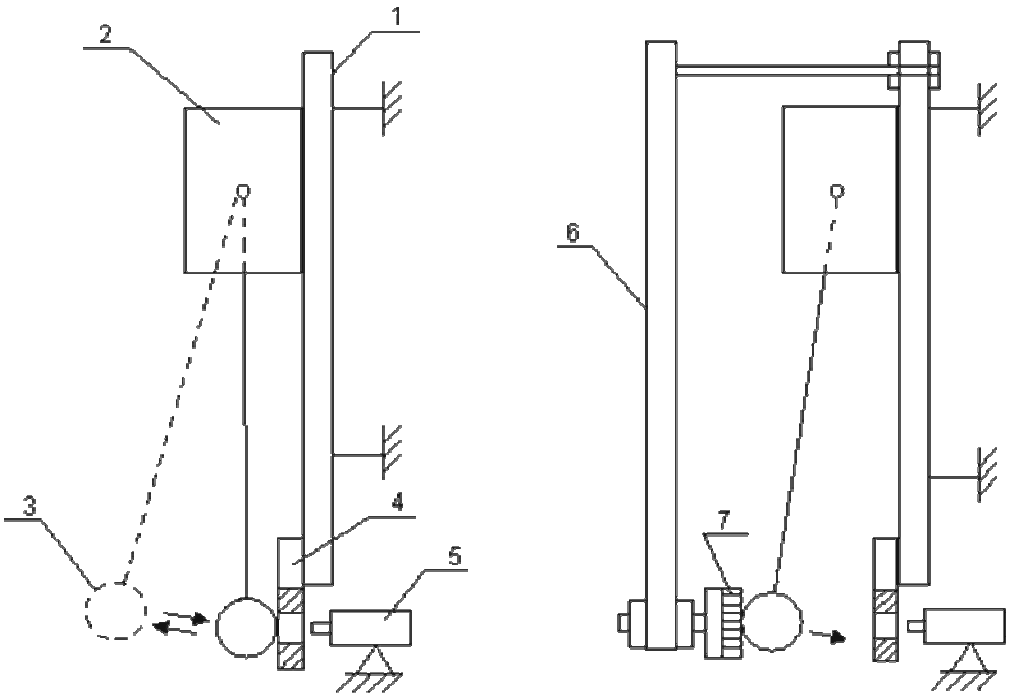

Fig. 1: Scheme of measurement of the new force on the basis of the pendulum system

1 – base plate; 2 – clock mechanism for pendulum suspension; 3 – pendulum (load of weight 28 g); 4 – strain gauge balance; 5 – electromagnet with pusher; 6 – additional support; 7- plasticine.

Table I: Results of five series of experiments with the pendulum

N	Date	Number of tests	R_{sr}, cm	$F = F_{pl}–F_{em}$, g	±Δ, g
1	28.05 31.05 pl.	100	4.1	0.32	0.87
2	02.06 03.06 pl.	100	4.02	0.20	0.51
3	04.06 04.06 pl.	100	5.38	0.47	0.73
4	18.08 24.08 pl.	100	2.92	0.13	0.48
5	25.08 01.09 pl.	200	5.1	0.22	0.75

N – serial number of experiments; dates of the experiments in 2010 (with "pl" are designated the experiments with plasticine); the number of tests of the series; the value of the average deviation of the pendulum (R_{sr}); F – the difference between the average force in the experiments with plasticine

(F_{pl}) and the average force in the experiments with the electromagnet (F_{em}), in grams; Δ – absolute errors in the experiments, in grams.

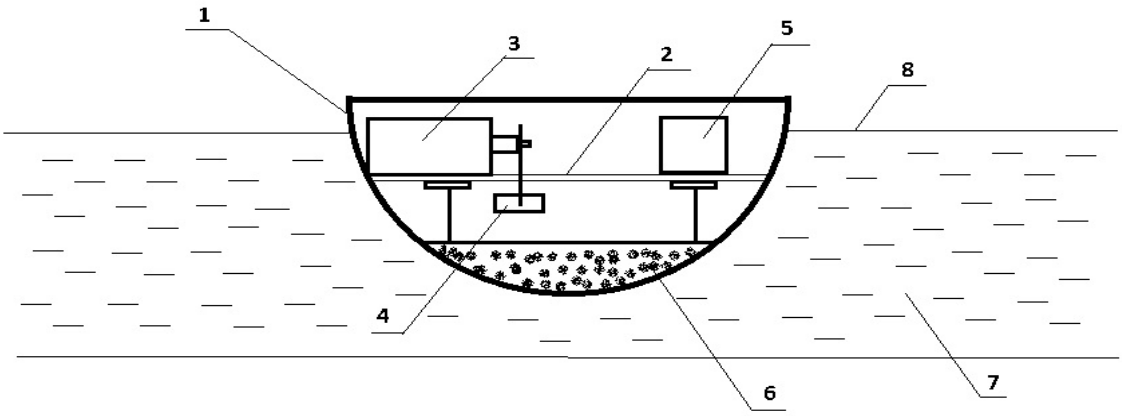

Fig. 2: Scheme of the model of hemispherical ship with traction generated by the new force of nature.

1 – hemispherical housing; 2 – steel deck; 3 – stepper motor; 4 – rotating load; 5 – power supply system with battery; 6 – additional load; 7 – water; 8 – water surface.

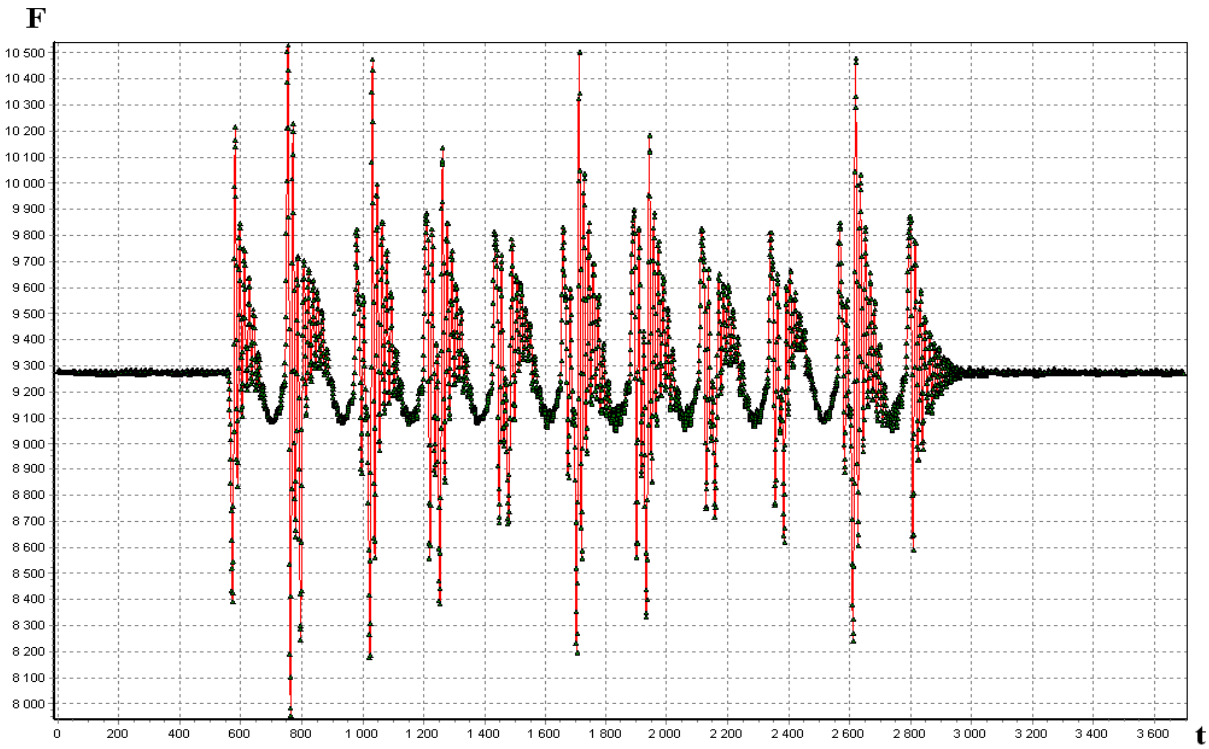

Fig. 3: Results of the experiments to measure the force F (in arbitrary units: 1 division = 10 g), arising from the rotation of the steel load with mass 718 g with a radius of 10 cm in the vertical plane at its cyclical stop after a complete rotation around 360° and start from the position (IO location), when the new force F will be directed vertically upwards at the approach of the body to the IO. The delay of the body at the IO location is 0.1 seconds.

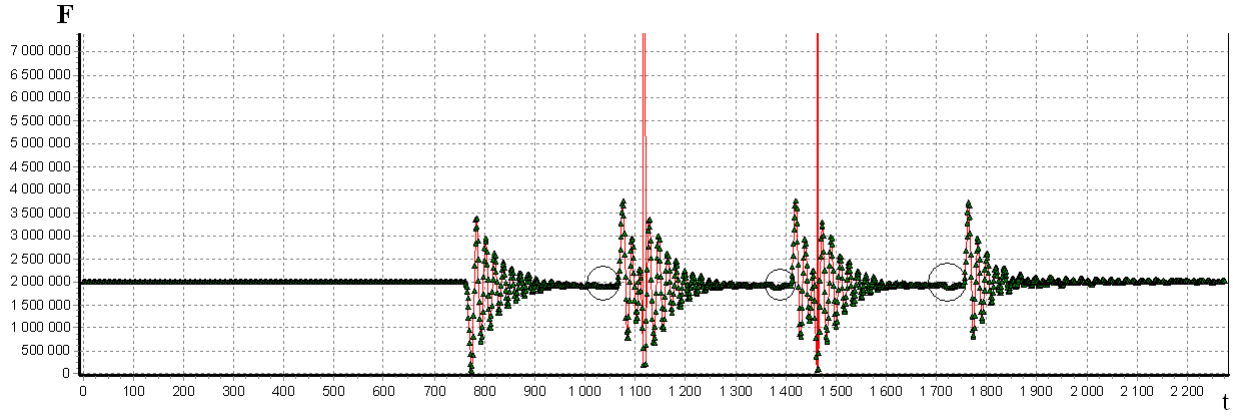

Fig. 4: Results of the experiments to measure the force F (in arbitrary units 30 000 division = 100g), resulting from rotation of the steel load with mass 718 g with a radius of 10 cm in the horizontal plane at its cyclical stop after a complete rotation around 360°, and the start from an arbitrary position (IO location). The delay of the body at the IO location is 0.1 seconds. Circles outline the time periods of occurrence of the new force.

5. Conclusions:

The results of experiments with a pendulum system, the tensometric balances and a demonstration model of a spherical ship show, in the first place, the presence of a physical effect (existence of a previously unknown factor affecting the movement of bodies, which can't be explained within the framework of existing physics – the presence of the new force of nature).
Secondly, the same experiments demonstrate a significant advantage, in terms of specific characteristics, exhibited by the new principle of movement over jet systems used in the best possible plasma engines used in the space industry, which can be estimated on the order of at least ten times.
It is noteworthy as well that under the new principle of motion it is not required to have on board of spacecrafts any fuel or working fluid (xenon or argon), which is necessary for plasma engines.
The new principle of motion under consideration can be used in any other transportation system for the movement of aircrafts, ships as well as ground vehicles.

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