

# New Fuelless Space Power Engineering

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## Abstract

Nowadays civilization cannot effectively obtain and transform energy. The imperfection of technologies and technics causes the progressing pollution of the environment, and, moreover, impending global ecocatastrophe. Power engineering and transport (partially cosmonautics) produce the most ecological damage to the planet. There is a limited amount of fuel on the planet; however, for energy generation more and more fuel is required. Since that the power engineering and transport are low-effective then the amount of poison toxic matters increases.

The only way out of the energy and ecological crisis lies in the research and creation of new pollution-free power engineering and qualitatively new pollution-free nonwaste technologies for obtaining and transformation of energy. The Nature is the best teacher for the civilization since it is ecologically and energy-wise perfect. In point of fact, the humanity always learns from the Nature. As first we learnt to obtain fire so now we learn to obtain pollution-free energy and electricity. This will be repeated forever. The deeper we penetrate into the essence of the Nature of our planet, the more possibilities to create better energy sources are opened. In particular, many possibilities to create new energy sources for cosmonautics appear.

## Natural Electricity of Planet

The investigations made by some scientists, and in particular by the author of this article, helped to disclose the secrets of natural electricity and some other natural phenomena. It is clear that super-power natural generators of electric energy and engines have been effectively working in the near-planet space and on the surface of the planet for millions of years. Natural electricity comes to our planet from the Sun through geomagnetic polar cusps. (The cusps are intersection points of magnetic force lines, which are located at 30-40 kilometers height above the poles of the planet). The natural plasma is caught by geomagnetic force lines, and then supplied in the ionosphere and radiation belts of the planet. Since the flow of solar wind interacts with the geomagnetosphere of the Earth then a near-planet magnetogasdynamic generator continuously works around the planet. This generator has huge power, which is inconceivable for a human mind. It generates powerful electric currents in all conductive spheres around the Earth and inside the planet. These currents interact with the geomagnetic field and generate

electromechanical rotation force of the planet and its movable mediums, for example, oceanic currents, molten magma motion inside the Earth. Therefore, our planet is not only a huge electrically charged cosmic sphere or a huge magnet but a cosmic ecologically perfect natural electric transformer (engine-generator) of solar energy. All the processes which occur on the planet and around it, i.e. northern lights, seasons change, the continuous round of all the natural phenomena, and even the rotation of the planet, are in their essence the continuous, cyclic processes of transformation of the solar power into the electromechanical and heat types of energy of natural phenomena. This mechanism of our planet is viewed in the article [1], and the physical base of fuelless cosmonautics is represented in [2].

## Physical Base, Methodology, and Prerequisites of Generation of Fuelless Space Power Engineering and Cosmonautics

Let us learn from the Nature to competently obtain and transform energy. The author of the article proposes new nonwaste pollution-free power engineering. In other words, the energy and ecological problem of the civilization is proposed to solve by means of rational technical using of a small part of the energy of natural electricity and magnetism, i.e. we should learn to connect our load units to these natural generators. This is the basic idea of the new fuelless power engineering and cosmonautics. The simplest ways of realization of this idea into practice are viewed in this article. Technical realization of nontraditional transformers of free electric energy of the near-Earth space aboard orbital apparatus is quite possible in the nearest years. It is not Utopia but the quite near reality. This new cosmonautics and new space power engineering are first proposed in Russia. The essence of this new scientific-technical branch lies in the working out and investigation of new methods and devices for using of the renewed energy of the near-Earth space (natural plasma of the ionosphere, electric and magnetic fields of the planet) to obtain propulsion force and electric energy aboard fuelless orbital space apparatus. The author of this article has already made the basic scientific-technical investigations in this area of cosmonautics. This article is devoted to the technical possibility and prospects of future applying of renewed energy of the near-Earth space for creation of the perspective fuelless orbital cosmonautics in XXI century.

## Basic Engineering Solutions of Fuelless Power Engineering

The constructions of nontraditional airborne transformers of the energy of near-Earth space differ from each other due to their types. The types depend on the types of the applied renewed energy and the aim of its applying. In this article the basic nontraditional methods and devices for obtaining of energy from the near-planet natural electricity and magnetism are enumerated and clarified by numerous figures and illustrations (See Fig. 1-5, and Fig. A-F on the cover page).

Fig. A (see the cover page) shows the reductive general structure of the energy bands of the near-planet cosmic space (view from the outer space). The ionosphere toroid located around the planet is in blue color, and the geomagnetosphere is shown as geomagnetic force lines (yellow lines). The flow of charged particles of natural solar and cosmic plasma continuously comes to the magnetosphere of the planet. It is reductively shown as light cones situated above the magnetic poles of the planet. Against this background some devices of fuelless orbital cosmonautics are shown to be around our planet, i.e. in its ionosphere and magnetosphere. In the same Fig. A the basic devices of the fuelless orbital cosmonautics are demonstrated. Up to the left from the planet a hollow magnetogasdynamic transformer of the natural plasma is shown in the ionosphere of the planet. Up to the right a conductive circuit is demonstrated in the magnetosphere of the planet, and, at last, down to the right airborne solenoid is represented. All these and other devices of the fuelless orbital cosmonautics are demonstrated in details in the individual figures (see Fig. 1-5 and the cover page).

The construction of a fuelless cable energetic system is reductively demonstrated in Fig. 1. The basic elements of this system are an outside insulating cable (4) of necessary length, chargecombining inflatable electrodes (6, 7), a board source of electric energy, for example, a solar battery (1) and/or an electric load unit (5). Position (8) is a transformer of parameters of electric energy, (9) is a satellite body, and (10) is a sphere of recombination of electric charges.

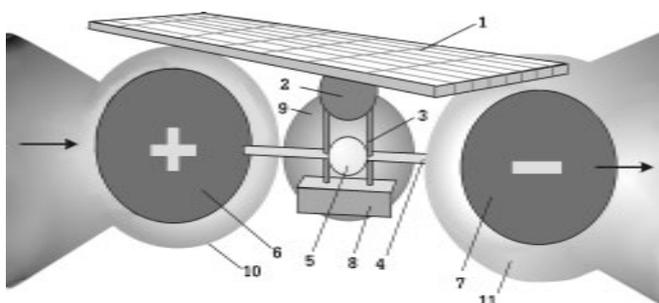


Fig.1  
Orbital Cable Electromechanical System

In Fig. 2 the simplest device of magnetogasdynamic type is shown. It works on the near-planet natural plasma of the ionosphere of the planet. This device transforms the plasma into propulsion force and electric energy aboard an orbital satellite. The basic elements of this nontraditional energetic system are a solar battery (1), a hollow chamber with magnets (5), which are located at the input of the chamber in the same flat with the chamber as well as chargecombining plates (6), (7), placed in the same quadrature with magnetic force lines. Cleats (4) join electric load unit. There are also a solenoid (3), which is a concentrator of the natural plasma, a system of orientation of the hollow chamber along geomagnetic lines (it is not shown), and the very near-planet plasma (8).

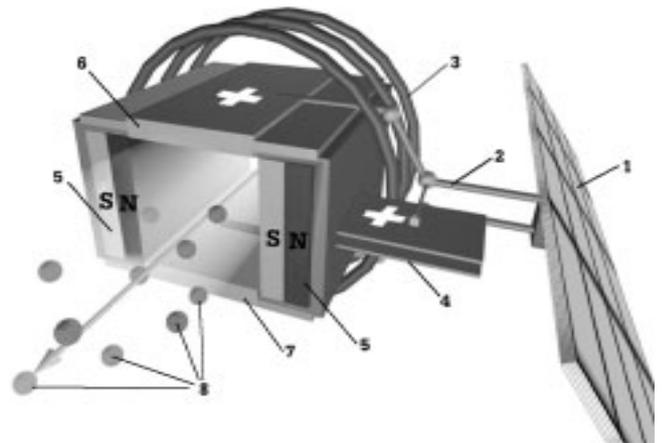


Fig.2  
Magnetogasdynamic Transformer of Energy

A board solenoid, which works on the energy of geomagnetic field of the Earth, is shown in Fig. 3. It contains a solar battery (1), a transformer of parameters of electric energy (2), a solenoid coil (3), and a magnetic circuit (4). A new fuelless magnetic generator-propulsor is shown in Fig. 4. Its simplest variant is a load closed conductive circuit, which is insulated from outside. It can be designed, for example, as a metal ring (1), which is serially connected with electric load unit (2). Moreover, the device includes stiffening ribs of the construction (3) and the very orbital satellite (4). This is the simplest device for transformation of the energy of the Earth geomagnetic field into electric energy and (or) into propulsion force of a space apparatus in the near-Earth space.

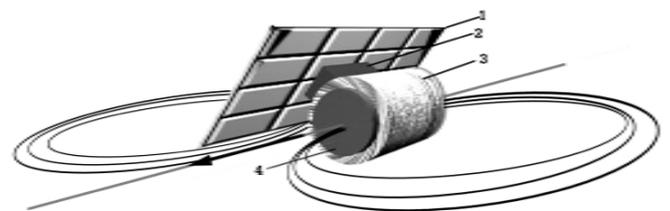


Fig.3  
Airborne Solenoid in Magnetosphere of the Earth

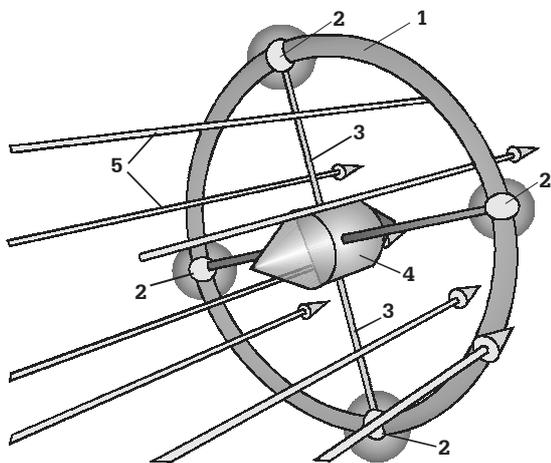


Fig.4  
Closed Ring Current Circuit

In Fig. 5 it is shown a device, which uses electric discharge, current of a natural near-planet capacitor "ionosphere-The Earth" for electric energy generation from the ionosphere of the planet. The device, i.e. its land variant, includes an ionizer (6), which is placed on an electric isolator (7). Chargecombining toroidal electrodes (4) are located above it. They are connected to an electric load unit (3) and a grounding electrode (5), which is recessed into moist ground (2). The ionosphere is represented by the position (1). The cone of discharge of the ionosphere current at the load unit (3) is represented by the position (8). This land-ionosphere device is demonstrated in real conditions on the spot (see Fig. D, E at the cover page). In these figures separate working elements of the device can be seen in the real conditions of uninhabited highlands. (i.e. the ionizer, the load system as electric light, a power line designed for electricity transmission to remote consumers, the relative position of these elements, and discharge current which is generated by the ionosphere, and acts upon the electrodes and the load unit; at the same time the ionosphere is curved above the ionizer).

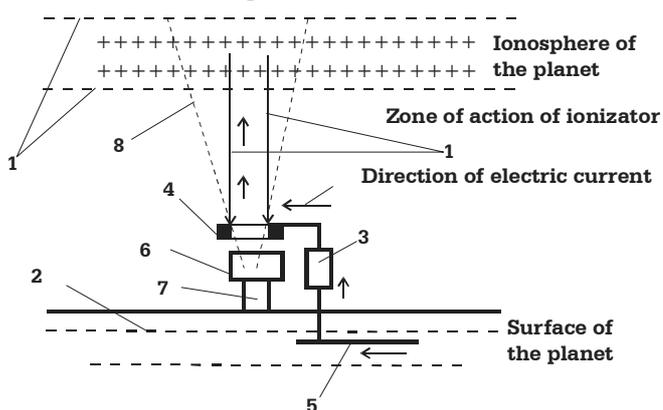


Fig.5  
The Device of Discharging of Natural Capacitor  
"ionosphere-the Earth"

1. ionosphere (upper plate of the capacitor)
2. lower plate of the capacitor
3. useful electric load unit
4. ring electrode

5. grounding electrode
6. device, which generates ionizing emanation
7. insulator
8. band of discharge current of the natural ionosphere capacitor

In Fig. D (see the cover page) it is demonstrated the construction of a land-ionosphere electric energy station, which has one ionizer. Fig. E shows the construction of a land-ionosphere electric energy station, which has two ionizers. The general notes for Fig. D, E are given below:

1. The ionosphere of the planet represented in the band of its electric discharge;
2. The beam of the ionizer;
3. The band of electric discharge of the ionosphere capacitor, which runs by the beam of the ionizer into the conducting envelopes of the planet;
4. Ring electrodes made of high-temperature alloys;
5. The ionizer (xaser);
6. The insulating plate designed for fastening of the construction (i.e. the electrodes (4) and the ionizer (5));
7. The high-tension transformer, which is a tension distributor;
8. The insulator of the transmission line;
9. The electric cable designed for connecting of the electrode (4) to the electric load unit;
10. The mast of the high-tension transmission line;
11. The high-tension transmission line (i.e. high-tension wires);
12. The device designed for regulation of parameters of the ionizer (5) (of the incidence and power of the ionizing beam (2) of the ionizer (5));
13. The remote mast of the high-tension transmission line;
14. The insulating rods designed for fastening the electrode (4) to the basement (6);
15. The electric load unit placed in the zone of the electric energy station (for example it is shown as a system of electric lighting).

In Fig. F (see the cover page) a prospective system of global wire-free Internet is represented, which operates on cheap fuelless orbital satellites. This line of wire-free connection works at about 10-20 GHz frequencies and directs electromagnetic radiation between two remote personal computers. In a similar way a global telephone connection between two satellite telephones may be organized.

### Energy Parameters and Methodology of Natural Electricity Using

Concrete data about the natural electricity (i.e. about the concentration and intensity of the natural plasma, about intensity values of the electric and magnetic fields in the near-Earth magnetosphere of the planet,

depending on a season, time of day and some other factors) are collected and generalized by scientists and can be found in either Russian or foreign reference books, for example, [3], [4]. Panoramic vision of the essence of this mechanism was required. Nowadays this new comprehension of the processes of functioning of the natural electricity has appeared. The natural plasma should be used for energy obtaining. The natural near-Earth plasma has not been used in orbital fuelless cosmonautics until now. On the contrary, space apparatus have been prevented from it. Paradox of fuelless cosmonautics development lies in the fact that the natural near-Earth plasma has until now stood in the way of orbital cosmonautics. Nevertheless, the progressing of energy and ecological crisis, the same way as the listed shortcomings of the known orbital space engines, which are based on plasma technologies, confirm that the new ways of the plasma applying are expedient and necessary. Using of the natural near-Earth plasma as a working body in jet space propulsors would be most effective. The plasma can be most beneficially used in the near-Earth ionosphere and in the radiation belts of the planet. For example, the nearest maxima of electrons concentration are at a height of 300-1000 km. Using of the natural near-Earth plasma in space thrusters and in some other space electric technologies is prospective since it is ecologically harmless. Here are some causes why the technologies are harmless.

- The resource of the natural plasma energy and its concentration in the near-Earth space are so great that using of one thousandth of a percent of its power would meet the electric energy demands of the humanity for thousand years ( $10^{20}$  J/year). At the same time the plasma envelope of the Earth is stable even if its 10% are perturbed as at the time of magnetic storms which are caused by solar flares [4].
- The natural near-Earth plasma is continuously renewed with charged cosmic particles (mainly of solar wind), which are entrapped by the magnetic field of the Earth mainly through polar cusps (chaps). Then the plasma is speeded up to  $10^5 \pm 10^7$  m/sec by natural space accelerators.

Let us consider the basic devices of the future fuelless power engineering, which are designed for beneficial using of the renewed energy of the near-Earth space.

### **FUELLES ORBITAL COSMONAUTICS**

It is known that cosmonautics is quite necessary for the civilization; however, it demands great expenditures and is an ecologically dangerous branch of technics. There is low resource of work of near-Earth orbital satellites; therefore, it is often needed to launch carrier rockets again and again. Since that modern cosmonautics make great damage to the nature, in particular, it damages the atmosphere and ionosphere of the planet, provokes hurricanes appearance, and

wastes the near-planet space with numerous out-of-work devices and their fragments. How is it possible to increase technical and ecological effectiveness of orbital cosmonautics? How is it possible to solve the problems of cosmonautics and the energetic problem of the civilization by means of the near-planet space? This topic is discussed below.

### **Orbital Cable Electromechanical System**

Orbital cable electromechanical system (Fig.1 and Fig. B at the cover page) is placed into the ionosphere of the planet. It is directed by the radius to the Earth and located on the Earth orbit. The system contains concentrators of the natural plasma made in the form of open-worked inflatable conducting spheres (6, 7) and conducting cable (4), which has an electric load (5) (generator mode) or an external airborne electric energy source (a solar battery (1)). The essence and the principle of operating of this cable energy system are based on the effects of the natural electricity generation and the laws of electrotechnology, i.e. on Ohm's law. It is known that in the near-Earth space an ionosphere plasma magnetogasdynamic generator continuously works on the solar plasma. Its operating is based on Hall Effect, i.e. force interaction of the solar plasma, which flows around the magnetosphere of the planet, with the geomagnetic field. As a result, opposite charges are divided in all the near-planet spheres and huge natural capacitors appear. This very mechanism produces the great natural difference of electric potentials above the planet. This intensity is very high and comes to 300-500 kilovolts at 50-100 kilometer height above the surface of our planet. The electric intensity of the natural electricity decreases depending on height increase. Nevertheless, it can still be observed in the ionosphere of the planet. Therefore electric energy can be obtained by the following way. A cable, which is conducting inside and insulating outside, can be drawn beyond an orbital satellite. Then it should be directed (centered) mainly by the radius to the planet. At the same time the difference of electric potentials, which is already existent in ionosphere or in radiation plasma of near-Earth space, would be extracted at the ends of the cable.

### **Generator Mode of Cable System Operating**

Electric energy obtaining becomes possible if an electric load unit (5) is connected to the gap of this outside insulating cable (4). Electric current of the particles of the natural plasma runs in this circuit through the chargecombining electrodes (6, 7), which concentrate plasma, and through the cable (4), which has the load unit (5). This current runs due to the extracted difference of the electric potentials of the near-Earth natural electricity and to high conductivity of the cable and the ionosphere plasma. In its essence the cable system (Fig. 1) is a concentrator and a "pass" for the natural plasma. The essential of obtaining of the maximal useful effect lie in the co-ordination of the plasma resistance and the cable resistance. In Fig.1 arrows

indicate the direction, which the current runs in the cable.

### ***Moving Mode of Cable System Operating***

If instead of the load such an electric energy source as a solar battery is connected to the gap of the outside insulating cable (4) then it will become possible to change the direction and strength of the current by means of the cable (4). According to electromechanics, current strength appears when current runs in a conductor, which is placed into static magnetic field. At the same time the conductor with electric current begins to move in the magnetic field in such a way as to stand parallel to the force lines of the magnetic field. Therefore this cable can be used to produce electromechanical propulsion force. In cosmonautics it is often necessary to maintain the orbit of a satellite at maneuvering. It is very prospective to fasten this cable hardly to a space apparatus for obtaining of electromechanical propulsion force of an orbital satellite. To achieve this aim it is necessary to connect airborne fuelless source of electric energy to the gap of the cable. For example, if the potentials of a solar battery are connected to the gap of the cable then electromechanical propulsion force can be obtained aboard the orbital satellite by means of this cable (Ampere force).

It is quite possible in the ionosphere of the planet since the great resource of the natural plasma exists in the ionosphere, and, moreover, there is the difference of electric potentials in the plasma.

### **Calculations and Experiments Made on Cable System**

The made calculations of the orbital cable electromechanical system and the experiments, which were made on working models, prove the possibility of generation of electromechanical propulsion force of the cable that is caused by the interaction of the current conductor with the Earth geomagnetic field. The possible length of the cable is from tens of meters to 2-4 kilometers. The intensity of the Earth geomagnetic field is enough to compensate frictional force and to greatly accelerate the orbital fuelless apparatus, which is located at the height of from 200 to 3000 kilometers. Operating at the generator mode this cable system can ensure electric energy generation aboard an artificial Earth satellite (AES). If the several-kilometer cable is placed at the shadow side of the orbit, which is situated at about 300-500 kilometers above the Earth surface, then the generated energy may come to 30-50 kWt. The particular advantage of this nontraditional orbital cable engine-generator is its relative simplicity and cheapness. In the start state the cable and the inflatable electrodes are compactly rolled up and placed in the capsule of the orbital space satellite. It is quite easy and handy to unroll the cable at the orbit if a device for

its unrolling (i.e. the device should be like a fixed-spool reel) and inflatable constructions of chargecombining electrodes are available aboard the satellite. Moreover, the materials having rod memory should be used to produce the cable.

### ***Hollow Magnetogasdynamic Transformer of Energy of Near-Planet Natural Plasma***

The invention of this method of the fuelless cosmonautics is based on using of the near-Earth natural plasma as a working body in hollow magnetogasdynamic (MGD) transformers of energy. Methods of using of **artificial** plasma in orbital cosmonautics are known for a long time. It is used to obtain low jet thrust aboard a satellite by means of accelerating of the artificial plasma, which is produced of primary raw materials (see the analogous example in [5]). However, fuel supply is limited aboard a satellite. In the case of using of the ionosphere plasma such an engine-generator would work without time limitation. The magnetogasdynamic transformer of energy of the renewed natural plasma of the ionosphere is reductively demonstrated in Fig.2 and Fig. C (see the cover page). The device operates in the following way.

### ***Generator Mode of Operating of Magnetogasdynamic Transformer of Energy***

First the hollow chamber of this nontraditional transformer of energy of natural plasma should be placed in the ionosphere of the planet and directed along force geomagnetic lines. Permanent magnets (5), which are placed at the input of the hollow chamber, would assort the particles of the plasma according to their charge, i.e. they divert the opposite electric charges of the flow of the natural plasma (8). Then the charges deposit on the opposite chargecombining plates (6, 7). The electric load unit (it is not shown) is connected to the plates by cleats (4). As a result, the natural electricity is accumulated on the plates (6, 7), and the difference of potentials appears between them. At connecting of these plates (6, 7) to the electric load unit continuous current of these charges recombination occurs. As a result a new effective type of airborne fuelless source of energy will be obtained. Airborne electromagnet (3) will provide the hollow chamber for the concentration of the natural plasma (8). This source (Fig. 2) can be especially useful for obtaining of energy in the shady side of orbits of the Earth satellites.

### ***Moving Mode of Operating of Magnetogasdynamic Transformer of Energy***

In this variant of applying of the device electric potentials of an independent source are connected to the cleats (4). For example, these potentials can belong to a solar battery (1). Electric current runs between the plates (6, 7) and magnet force lines which are generated by the magnets (5), and passes

through the flow of the natural plasma to the hollow chamber. At the time of this process Lorentz-Ampere force appears and accelerates this plasma in the chamber. The strength and direction of this acceleration of the plasma depends on the strength and direction of this current. As a result the hollow chamber obtains the required impulse of propulsion force. The value of this impulse of propulsion force is variable and depends on the current strength, parameters of the natural plasma and the magnet field.

In prospects the applying of this system will allow cosmonautics solve the energy and ecological problems and precipitate the creation of mobile fuelless space orbital transport.

This hollow MGD-system was tested by means of working physical and mathematical models of real operating of the system. The tests were made at different height points in the ionosphere of the near-Earth space. There were made calculations of concentration and intensity of the ionosphere natural plasma as well as parameters of such a compact airborne MGD-transformer. Laboratory experiments were made on working models. All these demonstrate working capacity of the device. Moreover, it appears to be possible to compensate frictional force of an orbital apparatus by using of the ionosphere natural plasma in the wide interval of altitudes of orbital space apparatus (i.e. in the interval from 200 km up to 36000 km above the planet where there is the geostationary orbit of the apparatus). At generator mode it is possible to obtain electric energy aboard a fuelless satellite. The amount of this obtained electric energy can come to the interval from some watts to many tens and hundreds of kilowatts. It depends on the design parameters of the device and presence of concentrators of the natural plasma.

#### **WAYS OF USING OF RENEWED ENERGY OF GEOMAGNETIC FIELD OF THE PLANET**

As it has been already proved, the planet geomagnetic field, i.e. the magnetosphere of the planet, extends in the outer space for the distance, which is more than 10 radiuses of the Earth. The density of this field energy on the busiest routs of the near-planet space is quite enough for beneficial using of the energy. Electromechanical propulsion force and electric energy can be obtained by an electromechanical method aboard such fuelless electromagnetic orbital satellites. Two basic methods for using of great energy of the magnetosphere of the planet by the fuelless orbital cosmonautics are clarified below.

##### ***Airborne Solenoid in Magnetosphere of the Earth***

There are proposed new methods and device for fuelless maintaining and change of the mechanical trajectory of an AES, which is located at the near-polar near-Earth orbits. The method lies in force interaction between

airborne electromagnet and the geomagnetic field of the planet (Fig.3). The device contains the airborne electromagnet (3, 4), a fuelless source of electric energy, for example, a board solar battery (1), and a switch-regulator (2) of electric current which runs through the winding of this electromagnet. A system of orientation of the satellite in the Earth geomagnetic field is also necessary for effective control of the trajectory of this satellite. The essence of the effective force interaction between the orbital airborne electromagnet and the magnetic poles of the planet lies in heterogeneity of the geomagnetic field by latitude and longitude round the planet. The main point of the invention is the producing of cyclic electromagnetic force interaction of this AES with the Earth geomagnetic field. This interaction is obtained by means of cyclic switching of polarity and by change of current strength in the windings of the airborne electromagnet, which is powered by aircraft solar photo battery.

The advantage of this device consists in designing of a new fuelless near-polar space propulsor by means of using of the renewed energy of the Sun and the electromagnetic energy of the geomagnetic field of the planet that generates the impulse of propulsion force of the orbital satellite. This electromagnetic energy of the geomagnetic field of the Earth is enough to compensate the frictional force of the AES on this orbit. It is also enough to continuously maintain this AES on the polar orbit and other orbits, which are close to this one. The device can also be used either to do a fuelless maneuver of the AES on the polar orbits of our planet (as well as near other planets, which have their own magnetic fields) or to be an accelerating propulsor for interplanetary apparatus.

It is possible to maintain the trajectory of such a nontraditional orbital AES and regulate it in relatively wide limits due to using of the renewed electromagnetic energy of the geomagnetic field and solar energy. In this case the process will not demand any consumed fuel or electric energy of aircraft storage battery.

Such a fuelless orbital propulsor will allow realize in practice the cyclic electromagnetic force interaction of this airborne magnet, i.e. electromagnet (solenoid), with the geomagnetic field of the planet. As a result it becomes possible to design a long living "perpetual polar Earth satellite" which polar orbit height can be changed. The solenoid could be powered with electric energy by different nontraditional ways, for example, with free electricity generated by a solar battery. Since current direction is cyclically changed in the solenoid then it is possible to ensure the acceleration of the orbital satellite on its primary orbit, i.e. to realize in practice a fuelless maneuver in the outer space. It becomes possible since airborne solenoid generates monodirected electromagnetic force, which is directed in turn to each of the magnetic fields of the planet. The power of the electromagnet should be switched off when the satellite passes through the band of the planet poles. Then it should be switched on again after some

period of time or at the period when the satellite makes angular motion on the orbit.

This device allows accelerate the orbital speed and change the polar orbit of the satellite. Thus it can be possible to overcome the Earth's attraction and go to the outer space. Basically, such a solenoidal propulsor can be used at men-tended landing of a space apparatus in the zone of the magnetic fields and magnetic anomalies of the planet. In these conditions it will work as a device for electromagnetic deceleration of speed of the space apparatus. Calculations made according to mathematical models of such devices and laboratory tests of working models prove that this technical proposal is realizable and prospective in almost every part of the near-Earth geomagnetosphere.

### **Closed Ring Current Circuit in Magnetosphere of Planet**

The closed ring current circuit is reductively shown in Fig. 4. The device is rather simple and consists of a closed wire circuit (1), which has an electric load unit (2). Some elements of the construction are demonstrated in Fig 4, in particular, stiffening ribs (3) and a transformer of electric energy (4). The principle of operating of the device is based on using of the renewed energy of the geomagnetic field within the limits of the magnetosphere of the planet. The movable circuit should be placed within the limits of the magnetosphere of the planet and fastened aboard a fuelless orbital propulsor. This simplest device operates as a reversible electromechanical transformer of magnetic energy of the planet into electric energy or even into break rod that depends on its purpose. When the circuit crosses geomagnetic force lines electromagnetic induction appears inside it and causes electric current appearance inside the circuit. This circuit also allows realize moving mode, which can be used, for example, for fuelless correction of the space apparatus position. Moreover, electric energy can be obtained by the interaction of this current circuit with the magnetic field of the planet. If the circuit is superconductive then the generated current may be rather strong and run for a long time. This current circuit may be most beneficially used to obtain electric energy in the shady side of the orbit of fuelless space AES.

### **OTHER PROSPECTIVE COMBINATIONS OF DEVICES OF NONTRADITIONAL FUELLESS POWER ENGINEERING**

It should be noted that if these above-listed devices are rationally combined, i.e. some of them are used at moving mode and the others are used at generator mode, then cosmonautics can be maneuverable without any fuel aboard. It is in future prospects to refuse expensive bulky and unreliable solar batteries. It is expedient to combine these above-listed methods and devices in real fuelless orbital propulsors. For example, it is expedient to use airborne solenoid for obtaining of the impulse of propulsion force; at the same time it is

expedient to use MGD-transformer of energy of the Near-Earth natural plasma.

It is quite advisable to combine these devices in the other way for making an accelerated and (or) large-scale maneuver from one orbit to the other one, and for quick orientation of a fuelless orbital space station. For example, it is quite useful if the airborne solenoid, the cable and the hollow MGD-propulsor running on the natural plasma, would be combined and simultaneously operate aboard a space apparatus. In this case the airborne solenoid and the hollow MGD-transformer of natural plasma will work as engines that are powered by the cable energy device, at the time of a maneuver. At the same time the cable and the solenoid can be used as propulsors, and the MGD-transformer can be used as a generator of electric energy. In this case the life ability and maneuverability of a satellite increase.

### **Using of Great Renewed Energy of Natural Near-Earth Electric Capacitors in Orbital Cosmonautics**

There are two near-Earth capacitors near the planet. The first one is located between the ionosphere and the surface of the planet, and the other one is between the radiation belts of the planet.

#### **Method of using of the energy of the natural electrocapacitors between the plates of the radiation belts of the planet**

The aim of the proposal is beneficial using of a small part of the great discharge electric energy of this near-planet capacitor, which is aboard a fuelless orbital satellite. The satellite is placed at the height of about tens of thousands of kilometers above the planet. This aim can be achieved by the following way:

- First it should be made the circuit of electric discharge of the capacitor plates. Unlike charges of current of discharge of the capacitor plates run by an ionizing ray, which comes from the ionosphere and the electronosphere of the Earth radiation belts (ERB). These charges concentrate current of discharge by means of directed irradiation of these plates. The irradiation is generated by airborne ionizer, which is placed aboard a space power station (SPS) located inside the ERB. The ionizer is powered by solar batteries;
- The electric circuit of concentrated charges of the ionosphere and electronosphere of the ERB should be closed by conductive ray of the ionizer on the airborne load unit, for example, on ohmic resistance;
- The difference of potentials of this natural capacitor, is transformed on special electrodes into, for example, electromagnetic waves of required frequency and phase by means of an electromagnetic oscillator, an ionizing xaser, and microwave generator;
- Electromagnetic waves of the mentioned intervals are directly emanated by transmission devices onto

certain objects, for example, land receiving antennas.

- Then on the Earth this energy of electromagnetic emanation of the outer space is transformed into electric energy of required parameters;
- The electric energy of the ERB discharge is transmitted as a directed electromagnetic emanation onto space and other objects, which are located out of the direct electromagnetic connection with SPS. For example, the energy can be transmitted by means of three geostationary energy retransmitters, which provide covering of almost 100% of the Earth surface.

In conditions of generation of electric energy aboard an orbital AES it is rational to supplement this device with a transmitting antenna, which is designed for transformation of the difference of potentials extracted on the mentioned electrodes into electric energy of continuous and alternating current of required parameters. It can be realized aboard the SPS by means of a low-frequency inverter (i.e. a sort of electromagnetic oscillator) and transforming-rectifying device. The concentration of electric charges in the zones of the ERB discharging can be additionally realized in practice by airborne magnetic traps. (It is shown in Fig.2)

### **Powerful Space Energetic Complexes**

Since the concentration of energy obtained aboard SPS is limited by the size of the constructions then the above-listed fuelless space power stations do not allow design powerful energy complexes, which would be able to meet electric energy demands of the civilization on the Earth. It is quite another matter if land-ionosphere energy complexes are designed. In this case a fuelless power station can be of great size, and the concentration of energy removal from the ionosphere to the Earth that is realized by means of the ionosphere discharging by an ionizing ray, can come to thousands of megawatt. This project is viewed in more details below.

### **Method of Using of Energy Generated by Ionosphere Capacitor**

A great natural "reservoir" of natural electricity exists in the near-Earth space. It is produced around the planet as a powerful electric capacitor with plates of "ionosphere-Earth surface". This near-Earth capacitor is naturally powered by solar plasma. A natural MGD-generator running on natural plasma operates in this space and recharges the plates of the capacitor. The power of this generator is huge and many times exceeds the total power of all the power stations in the world. Paradox lies in the fact that sometimes this natural near-planet electric capacitor is simultaneously discharged at the time of anomalous natural phenomena, which occur in different parts of the planet, for example, at numerous thunderstorms, cyclones, hurricanes, and

earthquakes. This discharging is useless and sometimes even dangerous. Nevertheless, it turned out that this great renewed energy can be used more beneficial. Simple and effective methods of its discharge by a useful load are proposed. Electric energy can be generated either on the Earth or in the outer space by these methods. It is necessary to organize a regulated discharge of the plates of this capacitor by a useful electric load to achieve this aim. The proposed method of using of the renewed energy of this generator to meet the demands of world power engineering is based on the simplest principles of electrical engineering and electrical power engineering. These are the principles of connecting of parallel load units to a source of electric energy. The partial regulated discharge of this ionosphere capacitor is ecologically safe since it constantly occurs in real nature. Since that a part of the discharge energy of this natural capacitor can be used to obtain electric energy in a land load unit.

### **Powerful Fuelless Land-Ionosphere Power Station**

New energy sources of this type, which are proposed by the author of this article, are reductively demonstrated in Fig. 5 and Fig. D, E on the cover page. The land-ionosphere variant of the device (Fig.5) contains an ionizer (6), which is placed on an electrical insulator (7). Tore-shaped chargecombining electrodes (4) are placed above the ionizer. They are connected to an electric load unit (3) and a grounding electrode (5), which is recessed into moist ground (2). The ionosphere is represented by a position (1). The cone of current discharge of the ionosphere at the load unit (3) is represented by the position (8). It is expedient to use a xaser as a source of ionizing emanation.

To realize such a powerful fuelless land-ionosphere EPS (Fig. 5, D, E) in practice on the Earth it is necessary to connect one end of a useful electric load to the ionosphere by an ionizing ray and safely ground the other end of the load or place it into a natural electrolyte, for example, into the World Ocean. At the same time the ionosphere is positively charged relatively to the planet surface. The ionizing ray is either directed from the Earth surface to the ionosphere or, quite the contrary, from the outer space to the Earth.

Let us describe this device operating according to the reductive scheme (Fig.5), i.e. its land-space variant. First the directed ionization of the atmosphere is generated by the ionizer (6) from the Earth surface. The atmosphere is ionized up to its upper stratus and ionosphere periphery (i.e. about 20-30 kilometers above the planet surface). The intensity value of these natural plates (1) of the ionosphere capacitor is huge relatively to the intensity value of the planet surface (i.e. about 300-400 kilovolts). Since that the process of ionization of the atmosphere is finished soon by a still glow or corona discharge of the ionosphere potential, which runs to the electrodes (4) and to the grounding electrode (5) by the ionizing ray. The ionization source may be switched off after a reliable electric breakdown of the ionosphere

onto the load unit and after generating of the cone (8) of current discharge of the ionosphere onto the Earth. Then, depending on the increase of the discharge current of the ionosphere capacitor, the electric load unit (3) should be connected in parallel to the electrodes (4). The required load current is gradually extracted due to regulating of the load parameters. At the same time the load unit has maximal resistance. Thus, the ionizing ray generated by the ionizer (6) produces a conducting canal (8) of the ionosphere (1) discharge, which leads to the conducting stratum of the Earth (2). The conducting canal passes through the grounding electrode (5), the electrode (4) and the useful electric load unit (3). It is possible to create such a nontraditional power station due to the great resource of electric energy of the natural near-Earth capacitor, which is continuously naturally renewed by the natural ionosphere plasma and the solar wind.

This method and device can provide with electric power a separate power consumer (of hundreds of megawatts power). Power removing can be regulated by regulable load unit. The whole civilization can be also supplied with electric power on condition that these devices would be placed in deserted uninhabited places and do no damage to the environment. The intensity of electric power, which is removed from the ionosphere, is maximal in winter since the flow of solar wind directed to our planet is maximal in this period.

### **Methods of Using of Ionosphere Natural Electricity**

It is most expedient to transform current discharge energy into heat by electrical heating of water reservoirs. Super-power steam generators should be used as load units to obtain heat energy of steam from discharge energy of the ionosphere capacitor (Fig. 5, D, E). Powerful currents of the ionosphere discharge are passed through these steam generators. The obtained steam can be used according to a certain purpose, i.e. for heat supply of cities, for obtaining of electric power by means of traditional steam turbines and heat power stations. The more rational method is to transform electric energy, which is at a load unit, into electric energy of standard parameters. It can be realized, for example, by means of powerful high-voltage frequency transformers (inverters); however this method is technically more complicated.

The method and devices have yet been examined only in laboratory environment. This type of devices of useful discharge of the capacitor has already been investigated by the author of this article on working and mathematical models. The calculations and experiments show that this method of electric energy obtaining from the natural electricity is ecologically appropriate and can be an alternative to the existent methods of traditional electric energy obtaining. Moreover, in prospects this method can be effectively used to control the weather and the climate of the planet.

### **Weather and Natural Phenomena Control**

It is useful to revise the physical essence of anomalous natural phenomena to understand the way, which can be used by the new nontraditional power engineering to control these natural phenomena [1].

Earlier it was investigated and proved that the physical essence of many anomalous natural phenomena lies in electromechanical transformation of energy excess of natural electricity into mechanical or heat energy of cyclones, hurricanes and earthquakes [1]. The ionosphere of the planet is arranged in such a way that it can hold just a certain amount of charged particles of the natural plasma. Therefore, it disposes of energy excess through the atmosphere and (or) transmits its electric and electromagnetic energy into the Earth at the time of magnetic storms. Thus, the excess of the natural electricity is a starter of these anomalous natural phenomena and, at the same time, it serves as an energy source for them. Underground capacitors become excessively pumped with natural electricity; and it causes earthquake. It occurs at the moment of an electric breakdown of plates of natural underground capacitors that is accompanied with huge energy release as an electrohydraulic underground shock. A powerful and wide breakdown of the ionosphere directed to the Area of water of the World Ocean causes hurricane. The breakdown causes the strong vortex of ionized air and ionized sea-water which, according to the laws of electromechanics, is produced by Ampere force. Therefore the aim of the new power engineering lies in the necessity to usefully remove the energy excess of the near-Earth space into a useful load unit. The process must occur under human control. For example, according to the scheme of the device (Fig.5, D, E), by using a part of energy of the natural electricity and magnetism, especially the excess of this energy, it is possible to control the weather of the planet in order to achieve beneficial aims rather than destructive ones. It is needed to artificially provoke the breakdowns of the ionosphere for the appearance of cyclones and precipitations in certain points of the World Ocean of the planet. The climate of the planet can be regulated and many anomalous phenomena can be prevented by this method [2]. For example, magnetic storms, earthquakes, hurricanes and other anomalous phenomena can be prevented.

In brief, it would be enough for natural phenomena control to stabilize the strength and value of the resource of the natural energy in the Earth magnetosphere, which is continuously renewed by the Sun. This aim can be achieved by means of transmission of the energy excess of natural geoelectricity and geomagnetism of the near-planet space to the Earth. This energy can be transmitted as directed electromagnetic emanation by the described above special energy systems. For example, the climate control can be realized in practice by means of transmission of electric energy of the natural near-planet generator from special space

transmitting antennas of satellites-transformers (Fig. 1-5, Fig. D, E) directly to receiving antennas of the Earth.

### Basic Areas of Applying and Advantages of New Space Energy Systems

1. **Fuelless cosmonautics and familiarization of the outer space.** It is ascertained that the great renewed electric energy of the moving charged particles of the natural plasma is concentrated in the magnetosphere of many planets, i.e. Mars, Saturn, Jupiter, Io, and renewed by the Sun. This energy has not been used until now. Since that it is really possible to use the devices, which are described above, in the ionospheres of other planets and the ionosphere of their satellites. This new power engineering is quite realizable; and this fuelless manned orbital cosmonautics would greatly reduce the expenditures for the familiarization of the outer space.

#### About the author



Valeriy D. Dudyshev was graduated from Samara Technical University in 1974, where he studied electromechanics. He successfully finished post-graduate course, defended his thesis for Doctor's degree on the subject of nontraditional power engineering. Nowadays Valeriy D. Dudyshev is a Professor of Samara Technical University and a Corresponding Member of Russian Academy of Science (Ecology).

He has already published more than 300 articles and reports. He is the author of a great number of interesting inventions of different spheres of technics; about 200 of them are registered (i.e. he has copyrights and patents).

Valeriy D. Dudyshev is the founder of new scientific branches in **Global Ecology**. It is a new theory, which explains all the natural phenomena by means of electromagnetism and natural electromechanics. Moreover, the interrelation of these phenomena has been discovered. The methods of natural phenomena control (in particular, of prevent of hurricanes, earthquakes, volcanic eruptions), new ways in cosmonautics (fuelless orbital cosmonautics) are proposed. A new electric fiery technology of pollution-free burning of matters in blame, methods of burning control and contactless extinguishing of flame are worked out.

2. **Solution of Global ecological problems** . Applying of renewed energy of the natural electricity and magnetism to meet the demands of cosmonautics and power engineering would greatly amend the global ecology of the Earth. Since it is not necessary to often launch rockets and to burn rough materials

and fuel on the planet then the harmful effect of cosmonautics and the whole planetary power engineering will be decreased.

3. **Cheap and fast-acting world-wide space communication.** The fuelless orbital cosmonautics allows greatly reduce expenditures for all the systems of space communication and telecommunications and increase fast-acting of the systems. For example, the simplest wire-less fast-acting system of communication, which can be realized in practice by two or more fuelless orbital satellites, is demonstrated in Fig. F (see the cover page). It is possible to produce wire-less two-way Internet, which can operate without telephone cables, and satellite telephone connection. Such communication has direct access for customers and is realized due to the "perpetual" Earth satellites.
4. **Weather and many natural planetary phenomena control.** It is possible to eliminate or decrease strength of many planetary natural phenomena. (See the part of the article cited above).

It becomes possible and prospective to create the new pollution-free fuelless power engineering and the fuelless orbital cosmonautics due to beneficial using of small part of energy of the natural sources of electric energy of the near-Earth space, which is renewed by the Sun. As a result the ecology of the Earth would be amended. Basing on this space power engineering and fuelless cosmonautics a revolution will occur in all the systems of information transmission. The systems will become wire-less and cheap to use. In other words, using of these systems will become cheaper, and their fast-acting and carrying capacity will increase. Nowadays just telephone lines impede the progress of development of the systems of communication. The fuelless space power engineering will allow prevent many anomalous natural phenomena and cataclysms. Thus, the new space power engineering and fuelless cosmonautics clear new ways for the humanity progress.

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