

New Energy Technologies



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Research on advanced aerospace systems
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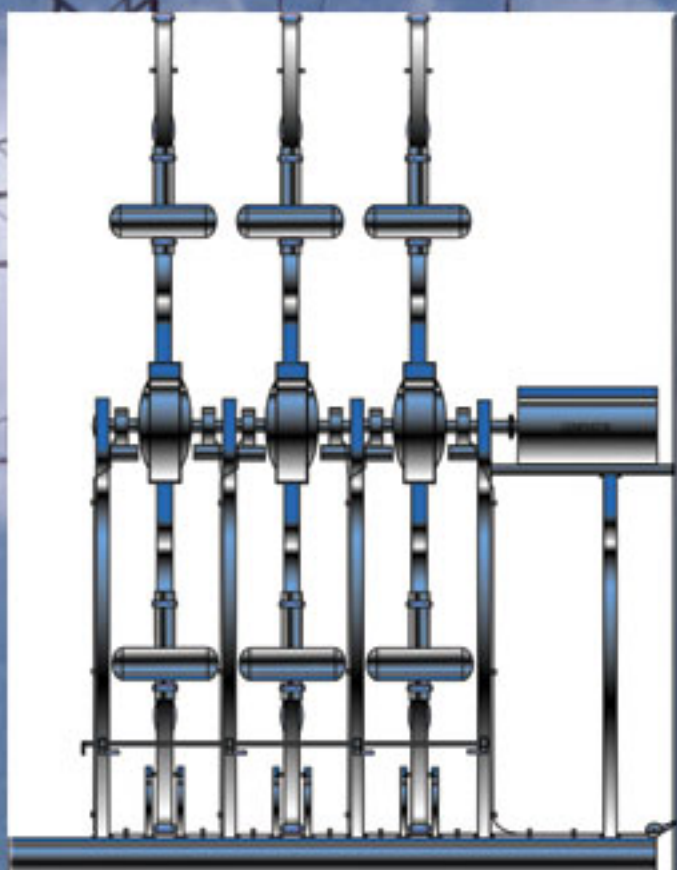
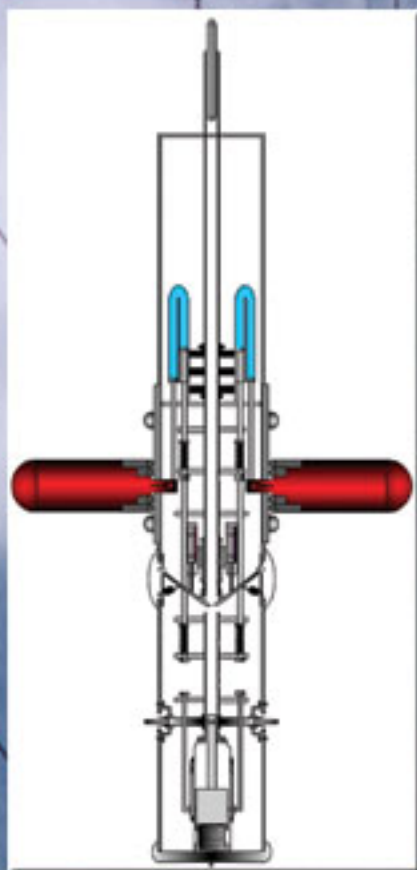
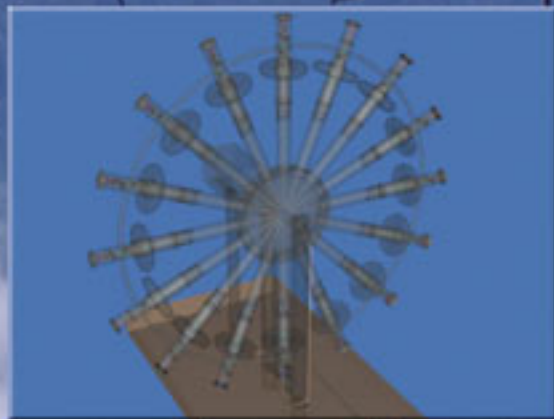
Issue №1(20), 2005

*New experiments
by V. Roschin and
S. Godin*

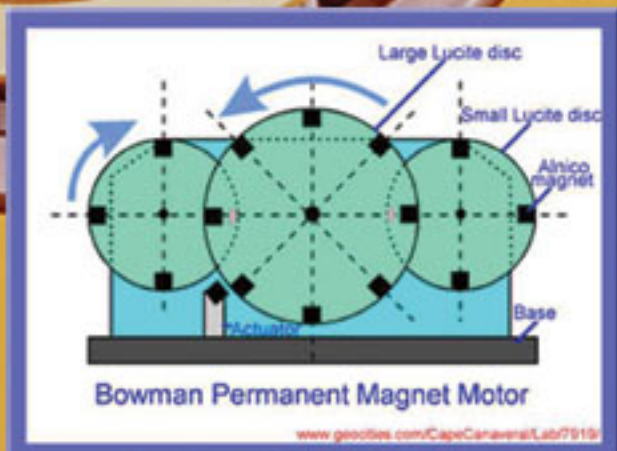
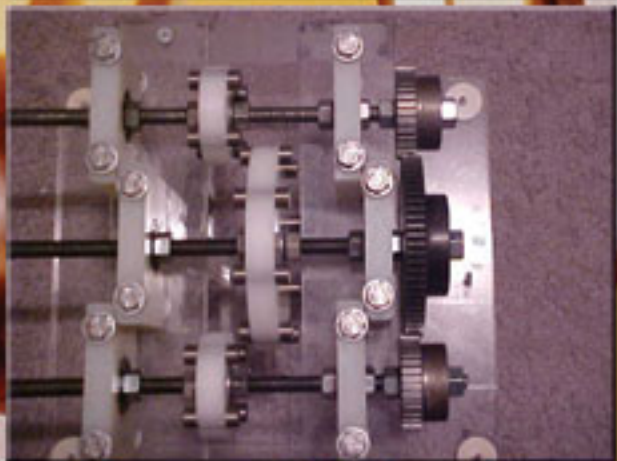
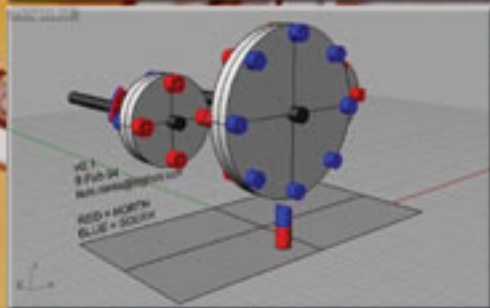
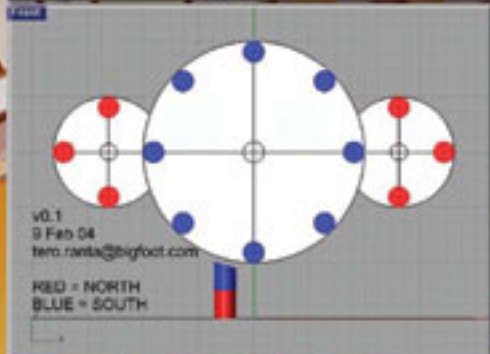
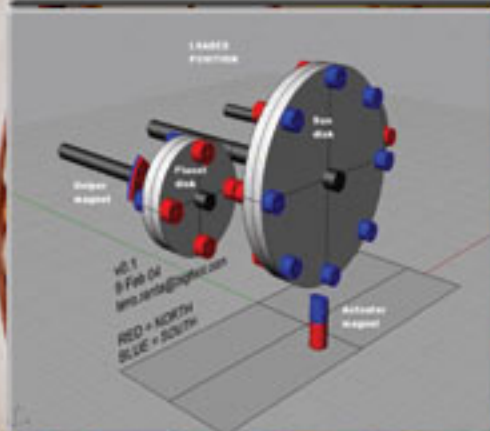
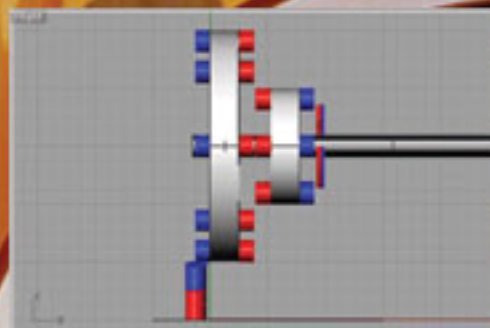
Also in this issue:

- Heat generators made in AKOIL Company
- Electric capacitors as space propulsion drive
- New experiments on torsion fields
- Bowman permanent magnet motor

Fuel less engine ENVIRON

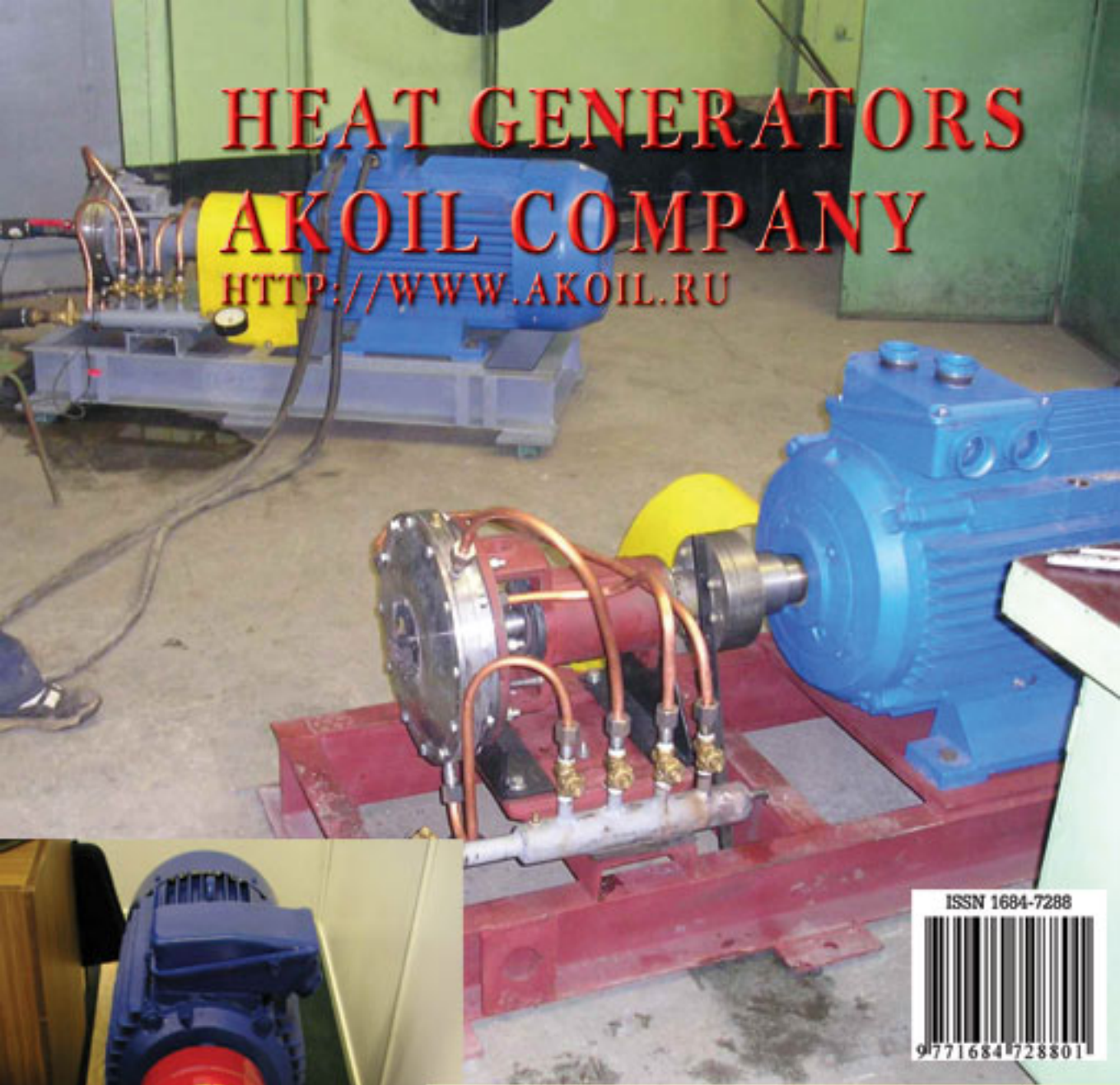


Bowman Permanent Magnet Motor



HEAT GENERATORS AKOIL COMPANY

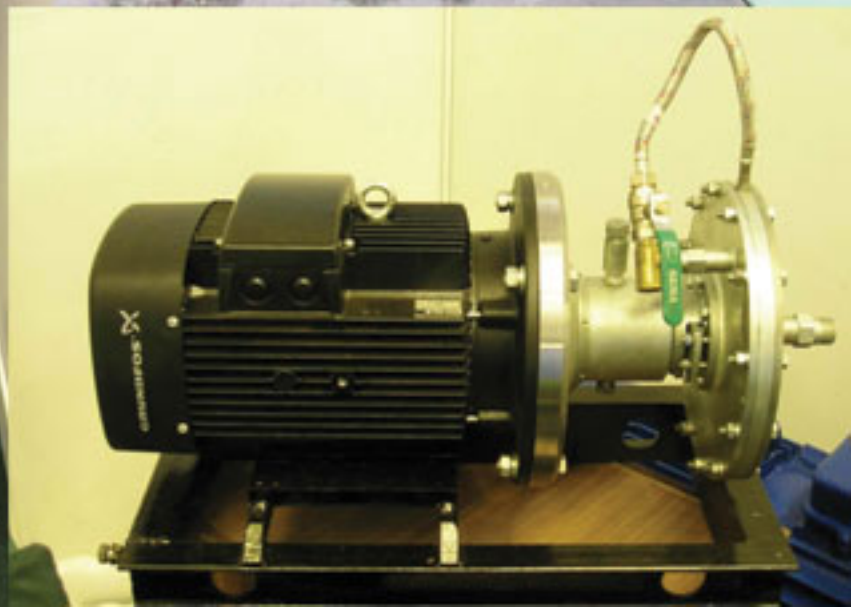
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New Energy Technologies

Magazine

Scientific news on advanced propulsion systems for aerospace industry and new energy technologies

Issue #1 (20) 2005

CONTENTS

• Vortex heatgenerators. Yu.S. Potapov, Russia	2
• Methods of hydroelectric blow and cavitation conversion into heat and other types of energy, V. D. Dudyshev, Russia	4
• Energy saving, D. Dudyshev, Russia	17
• Methods of electric energy getting from natural atmospheric electricity, V. D. Dudyshev, Russia	18
• New methods of extraction and use of self-energy of matter, V. D. Dudyshev, Russia	19
• Revolutionary discoveries, inventions and technologies designed by Professor Dudyshev, V.D. Dudyshev, Russia	26
• News from Integrity Research Institute, Thomas Valone, USA	30
• Four-dimensional resonance, A.V.Frolov, Russia	40
• Multi-Rotor Homopolar Device, S. Godin and V. Roschin, Russia	45
• Akoil company products, Russia	48
• Environ Energy Company	52
• Half-ton levitating ring is key to work, MIT, Columbia begin new energy experiment	53
• Perendev Magnetic Motor update	54
• Thermolevitation, S.A. Gerasimov, Russia	55
• Remote influence of rotating objects on semiconductor gamma-ray detector, I.A.Melnik, Russia	58
• The Bowman permanent magnet motor, Eric Vogels, Denmark	70
• Possible electric propulsion Systems for flying triangles, R.Alexander, A.Whaley, UK	75
• Bioelectromagnetics program	78
• Energy inventions advocated by Integrity Research Institute	79
• An ether-based engine as the best way of space sailing, G.P.Ivanov, Russia	81
• The Evolution of Lifter Technology, T.Ventura, USA	84

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Water Vortex Heat Generators

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Mankind knows about vortex motion for thousands years but practical use of gas and water vortex streams began not long ago. One of the tendencies is using air and gas vortex streams for heat and cold generation in vortex Ranke tubes. An incoming gas stream is divided into a cold stream (app. 40%) and a hot one (app. 60%) but no reliable theory of this process exists so far. As water is a low compression liquid comparing with air, it has not been actually used in vortex tubes and the theory of vortex processes in liquid has not existed. First attempts to generate a vortex liquid stream in a tube were made in the USA by Koanda academician in the thirties in order to find out life origin on Earth. These experiments have shown that the vortex stream in liquid has considerable amount of energy and can generate static electric high stress. This data allowed suggesting that vortex liquid stream in a closed vessel should be heated. In order to test this, a vortex heatgenerator was made. It consists of a cyclone, a tube, and a hydraulic brake. The vortex heatgenerator was located in the closed vessel with an electric pump. The electric pump has reached water height up to 80 m.

Testing of this water heating system shown that current strength of the electric engine does not change along with water temperature rising up to + 60 C. After + 60 C-temperature is reached, current consumption volume decreases almost by two times. This effect can be easily explained by the schedule of water viscosity according to heating temperature. Thus, with temperature higher than + 60 C, the heatgenerator works the most efficiently. Amount of electric energy consumed by the pump's electric engine can be lowered by directing a vapor-gas mixture, which exits the vortex heatgenerator, to enter of the electric pump. An attempt to get the needed temperature (+55 C) at vortex heatgenerator's exit, however, was not successful. New vortex

heatgenerators were designed to heat water to + 55 C and higher during one circle (Fig. 1).

In new vortex heatgenerators, a few hundred vortex streams were generated simultaneously providing for more intense water heating. In laboratory environment, temperature of a special liquid has reached + 500 C allowing steam generation using small amount of energy.

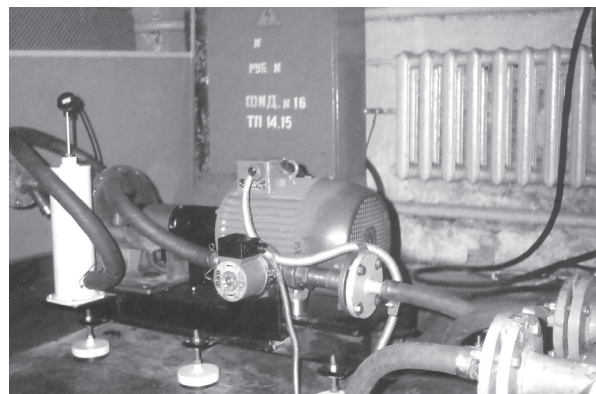


Fig. 1.

The vortex heatgenerator uses any types of liquid as a heat carrier including antifreeze. Vortex process in liquid is used as heat energy source. It is formed between quickly rotating rotor and stator. Rotor and stator have many sells where water is pressed and expanded. In order to rotate rotor, various engines are used including electric and diesel ones. During rotor's rotation, from 500000 to 1,500,000 vortexes and passing water with temperature +15 C is heated up to + 100 C during one circle. There is no need to spend money for building and repair heat pipes. Cabling costs 10 times less than piping. Electric cable's use costs 25 times less comparing with expenses for maintenance and repair of heat pipes.

Three-years experience of use of the vortex heatgenerator with 75-kilowatt electric engine's power has shown that heating of 1 m² costs less per year than heating of 1 m² by electric boilers. For example, a hothouse farm "Zavialovskiy" in Udmurtia set the vortex heatgenerator with a 15-kilowatt power electric engine in order to heat a dining-room sized 1910 m³, ~ 636 m². Tests were carried out in February at temperature from – 5 to - 15 C. Actual electric energy consumption during this month was only 3 kilowatt per hour. Pilot units were installed. They are successfully working in many farms and companies; more than thousand of new vortex heatgenerators are used.

As a rule, all customers point to environment-friendly heat energy generation, simple design and high efficiency of the new method of heat generation in comparison with traditional heating methods. The vortex heatgenerator uses synergy effect consisting of three known physical processes. Water is heated by friction, cavitation and combination of water molecules in clusters during rotation. Each process taken separately does not give the needed effect and water heating speed. This heating method is a high molecular technology.

Priority of Russia is confirmed by patents.

Applications of the new heating method:

- heat and electric energy generation;
- medical purposes;
- spacecraft engines;
- food industry;
- steam production.

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Yuri S. Potapov

METHODS OF HYDROELECTRIC BLOW AND CAVITATION CONVERSION INTO HEAT AND OTHER TYPES OF ENERGY

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This article is dedicated to analysis and substantiation of a new available trend of power engineering based on a concept which allows generating cheap heat, mechanical and electric energy using hydroelectric Yutkin effect and cavitation. New original effective no fuel electrohydrodynamic turbines, motors, pumps, heat-generators and electrogenerators using minimal quantity of electric energy are presented. They use self-energy of liquids, air and energy of environment. Using these devices will lead to abrupt reduction of cost of heat, mechanical and electric energy generating technologies. This will allow improving and simplifying the existing heat-power devices and motors for all types of transport. The technologies are patented.

HOW CAN WE GET CHEAP HEAT?

Cavitation effect in liquid is used for heat energy generation [3-6]. There are well known cavitation, vortex, rotor etc. heat generators by Potapov, Larionov, Petrakov etc. They are based on using abnormal heat energy generation during cavitation in liquid. However, they have a powerful electric motor which is a disadvantage. Meanwhile, such cavitation heaters based on hydrodynamic method of liquid heating are widely used because they lack for many essential defects of standard electric heaters. Particularly, they can heat almost all liquids while electric heaters have high water quality requirements. Efficiency of cavitation generators is high because electric energy losses of pump (efficiency is ~70 %) are used for hydraulic fluid heating. According to the

researchers, there are cavitation generators having exergy coefficient more than 1 [3-6].

A design of a no fuel device for heat energy generation using cavitation effect is simple. The device (Fig. 1) consists of electromotor, pump, piping, which forms closed contour of heat-supply, cavitator (Laval nozzle), adding device.

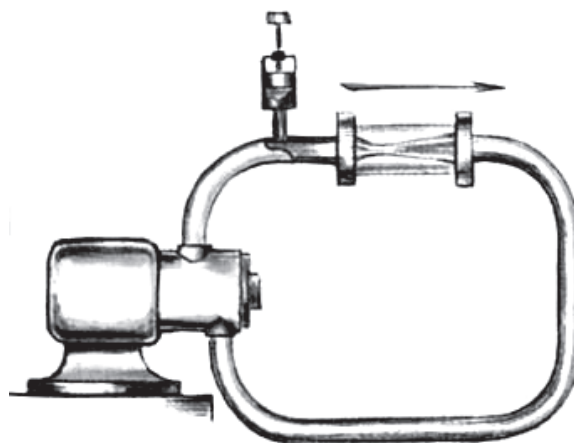


Fig. 1

Working principle of this machine is simple. Water flow (or other liquid) runs under pressure through cavitator's tube, which has a canal with variable cross-section. Running through cavitator, the flow breaks, bursts, forms fast splitting cavities (gas, air bubbles). This is cavitation.

According to numerous experiments, the abnormal heat energy is generated during the process of bubble bursting. The more liquid

pressure is at the cavitator's entrance, the stronger cavitation is, the more heat is released, and the more effective heatgenerator.

Cavitation effect in the tube can be produced in different ways though the better one is an advanced Laval nozzle.

The point is that, unlike other types of cavitators, such nozzle never get blind, even there are mechanical particles in the flow. In order to heat the liquid for cavitation, an electric pump with power corresponding to heat generated is necessary.

Another essential disadvantage of these truly progressive heat energy cavitation devices is pump rotor, which reduces reliability and efficiency factor of the device and also causes difficulties during exploitation and maintenance, particularly, during sealing-in of the construction.

Complete improvement of cavitation heat generators

In order to implement a technological gap in this industry, it is necessary to eliminate the bulky and gluttonous electric motor of the pump and reduce considerable electric energy losses in known cavitation heatgenerators (CHG).

So, there are some important questions. How to create pressure and cavitation of the liquid without electric pump; how to improve cavitation and heat generation; how to create an autonomous heatgenerator which doesn't use external energy?

A brief answer is that it is necessary to use skillfully and simultaneously Yutkin effect and cavitation one. We will describe the working principle and design of these cavitation generators of new generation below. First, we have to remember what electrodynamic Yutkin effect is.

Physical characteristics of hydroelectric Yutkin effect

This abnormal effect was discovered by a Russian engineer Yutkin L.A. [1]

Hydroelectric blow effect (HEB) takes place in liquids, for example, in water, during electric discharge. HEB is an electric explosion in liquid accompanied by almost immediate energy generation at the given point [1]. Quantity and speed of kinetic and heat energy generated in the electric discharge zone depends on many things including characteristics of electric discharge and liquid. Compression wave, which appears during intense liquid's evaporation in the discharge zone and steam expansion in electric-arc space, can be caused by both single strong pulse electric discharges between electrodes placed in liquid and a consistent series of impulses. Electric charge power can be increased due to electric energy store.

KNOWN APPLICATIONS OF HEE YUTKIN EFFECT

This effect is widely adopted in industry [1].

The hydroelectric pulse technology (HEP), based on the effect, is one of the most up-to-date industrial processes. It allows using electric energy for material processing by hydrodynamic disturbance. Hydroelectric blow is used for cold metal processing, rock failure, intensification of chemical change etc.

Unique possibilities of HEB Yutkin effect application in energy engineering

This effect of abnormal energy generation from liquid during electric discharge, however, has various latent opportunities and new unexpected fields of use due to its multipurposefulness and abnormal energy system.

It can be used, for example, by heat-power engineering for noncontact generation of cheap heat energy, for designing of new economical no fuel motor for all types of transport. It will be described later.

Methods of HEB energy conversion into other types of energy

This effect can be implemented by the following measures:

a) no fuel cheap heat energy generation

United usage of HEB effect and cavitation will allow generating cheap heat energy from internal liquid energy. The simplest design and working principles of the cavitation HEB-heat generator are shown on Fig. 2.

The device was tested on a model in laboratory conditions.

b) no fuel cheap mechanical energy generation

Energy of liquid HEB in a processing chamber can be easily converted into mechanical energy of liquid motion, for instance, in economical no fuel electric-discharge turbine, pumps and other up-to-date rotors (Fig. 3,4,5).

c) no fuel cheap energy generation

First, it can be done by means of an electric pulse water pipe and electric generator placed at its axle. Second, we can generate steam by HEB-generator and then convert its heat energy by a standard turbogenerator.

There are other ways of electric energy generation. It can be done, for instance, by direct electric hydrodynamic method provided with pulse electric charge of neutral liquids or by magnetic hydrodynamic method provided with sufficiently electroconductive liquid.

d) simultaneous no fuel cheap generation of heat, mechanical and electrical energy

This requires a combination of the methods and devices listed above.

e) liquids' burning and steam dissociation; using HEB method, steam transformation into fuel hydrogen-containing gas, which is then burned

h) cheap effective waste treatment and simultaneous fuel gas generation

Effective waste treatment can be carried out using this original electric hydrosystem. Due to cavitation, particles split in liquid flow and liquid is decontaminated. Adding vortex separator, it is possible to remove and convert contaminations, for example, to move hydrocarbon from water to fuel gas. Let's look at these conversion methods using HEB effect.

Methods to control power, pressure and strength of electrohydrodynamic blow and usage of electrohydrodynamic converters

How can we effectively control characteristics of electrohydrodynamic blow and processes of conversion into other energy types? On our opinion, it can be easily done [7].

Electrohydrodynamic blow's power, intensity and frequency control as well as liquid pressure on labour body can be implemented by changing electric discharge's characteristics, for example, amplitude and frequency of electric impulses [2]. According to this method, high-voltage discharges of controlled power take place in liquid, in the processing chamber. Hydraulic steam pressures forming in the discharge zone pass these blows on the labour body located in the processing chamber. The labour body can be a water turbine.

Thus, it is possible to control power, frequency and length of labour body, for instance, electrohydrodynamic pump's or motor's plunger, or control rotation speed and effective capacity of hydroelectric turbine by changing frequency and power of high voltage electric discharges in liquid.

Sometimes a moment of electric discharge's beginning is synchronized with the labour body's position. This synchronization of pressure impulses can be used in water-electric displacement pump and motors. Frequency and power of alternate-reciprocal motion made by plunger is carried out by controlling frequency and power of alternating electro hydraulic blows on either side of the plunger [2]. The synchronization, however, isn't necessary for hydroelectric turbine's design (Fig. 4).

NONCONTACT CAVITATION HEAT GENERATORS (CHG)

Let's look at some of the simplest types of such generators (Fig 2,3).

Constructions of electric blow cavitation heatgenerators. (Fig. 2,3)

Using a cheap noncontact electrohydrodynamic pump based on Yutkin

effect allows complete improvement and simplifying cavitation heatgenerator because it doesn't include electric motor at all. Thus new simplest noncontact effective heatgenerator using fixed and repeated short-term electric discharge taken place in liquid is shown on Fig.2.

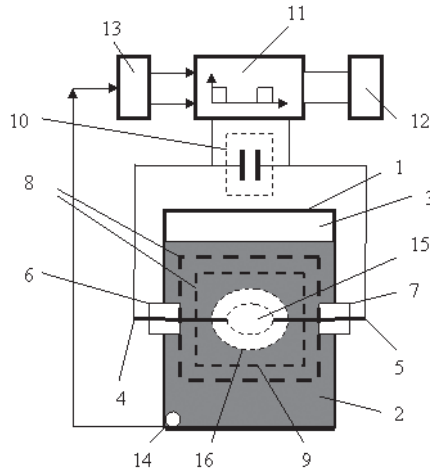


Fig. 2. Flow block of noncontact CHG

- 1 - waterproof capacity with liquid 2; 3 - air cavity;
- 4,5 - electrodes; 6,7 - electric insulator; 8,9 - cavitators;
- 10 - store electric capacity; 11 - pressure transformer;
- 12 - primary electric energy supply; 13 - system of electric discharges' frequency and amplitude control; 14 - temperature and pressure sensing device; 15 - electric discharge zone;
- 16 - zone of liquid evaporation

This simple device consists of only three main simple noncontact elements, which are a capacity with liquid (with an air cavity), an electric discharge switch (a couple of electrodes 4,5 injected in liquid) and a cavitator, for example, a simple perforated board or closed perforated surfaces 8,9 of different diameters and faces forming concentric Laval nozzles. Cavitators are located in the capacity 1. A generator of strong electric impulses 11, supplied with power by a primary electric energy supply, is joined to the electrodes 4, 5 through an electric energy store 10. Amplitude and frequency of voltage impulses is controlled by the control system 13. At the entrance, the impulse generator 12 placed temperature and pressure sensing devices 14.

Working principles and process of heat generation carried out by this CHG is the

following. Liquid is heated due to cavitation caused by electric discharges and following hydroelectric blows. Due to repeating electric discharges, the plasmic zone 15 forms between two electrodes and then, practically momentarily, a high pressure gas-vapor cavity forms, which has much more energy than energy used for discharges. Vapor pressure energy and chemical energy of H_2 power gas, generated during process of electric lightning and electrohydrodynamic blow, cause high pressure waves in liquid and intensive heating by cavitation and H_2 vapor gas burning. As each impulse electric discharge leads to a new H_2 vapor cavity formation, H_2 burns, a new blow and a new wave follows. As this wave moves, strong cavitation takes place on perforated cavitators 8, 9. Due to intense cavitation bubbles' splitting and H_2 vapor gas burning, considerable amount of heat is generated in liquid. Cavitation is more intense in this method than in rotor and vortex heat generators while the quantity of electric energy spent is the same. The heat generator controls heat generation intensity by frequency, amplitude and length of voltage impulses. The generator can also run continuously. With use of this heating method, energy effectiveness and heat generation intensity depends both on electric discharges' characteristics, liquid's characteristics and a design of the impulse heat generator [2].

Electric-blow cavitation heatgenerator with rotating electric arch (Fig. 3)

We suggest a more efficient vortex electrohydrodynamic magnetic heatgenerator with rotating electric arc 9 in liquid 2, which generates electrohydrodynamic air-blast due to cavitation and intense heat energy. This original heat generator's design is shown on Fig. 3. In case one electrode or two electrodes 1, 3 are ring (cylindrical), direct voltage is led to them through nonmagnetic walls of a cylindrical electric-discharge chamber 1. A strong ring or disc constant magnet 7, located across the ring electrode's surface, generates external magnetic field, which allows rotating the electric arc with high speed, up to acoustic speed and higher. Using this method, electrohydrodynamic blow can be intensified causing constant air-blast generating and cavitation taken place in cavitators 8, which adjoin perforation of the

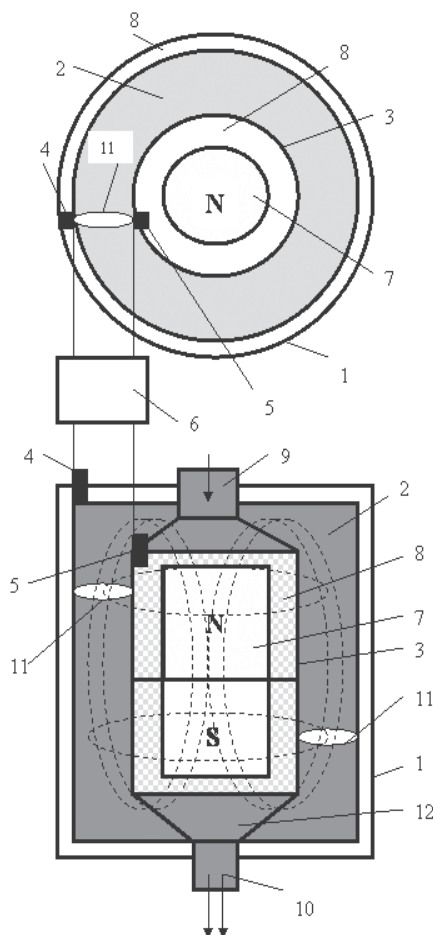


Fig. 3 Vortex heatgenerator

a) view from above
 1 - body - first ring electrode; 2 - liquid (water); 3 - internal ring electrode (perforated); 4,5 - leading-in electrodes;
 6 - reversing energy source with electric voltage controller;
 7 - constant magnet; 8 - cavitators – perforation on ring electrodes 1,3; 9 - lead-in nipple; 10 - lead-out nipple;
 11 - electric arc; 12 - lead-out nozzle; N-S - magnetic poles; dotted line – magnetic flux and rotation path of electric arc

b) front view

internal walls 1, 3. This will allow simplifying the heat generator construction and getting intense cavitation during air-blast and electric arch rotation. As a result of electric arc rotation, the liquid will rotate itself. That will allow improving heat generation due to both electrohydrodynamic air-blast of liquid and intense cavitation during liquid's contact with the perforated wall 3. In case the electric discharge chamber has a cone construction, it is possible to get a combined electrohydrodynamic reversionary pump-heatgenerator. In order to backspace a direction of the liquid's rotation, backspacing of voltage

sign of electrodes 1, 3 should be implemented by voltage sign switching from the electric energy source.

SIMPLEST ELECTROHYDROCAVITATION HEATGENERATOR

Combining electrohydrodynamic blow effect and cavitation one, it is quite possible to create a simple 3-5 kilowatt-heatgenerator using a standard car electric ignition and 200-300 watt energy consumption from a storage battery. The generator is a small electrohydrodynamic-blow device made according to schemes 2, 3. It consists of a cylindrical capacity with water, standard car ignition plugs screwed into the body and electrically connected to a usual car electric ignition system, a storage battery, a car coil and an electrolytic capacitor as energy storage, internal cavitation devices, for example, perforated shields, which present coaxial metal cylinders with surfaces perforated by holes with different diameters. Such combination of electrohydraulic pump and cavitation allows elimination of the electric pump motor and improving efficiency and reliability of the heatgenerator.

BIPHASE EHD HEATGENERATOR (Fig. 4)

In order to improve heat generation efficiency using EHD method in combination with cavitation effect, we suggest various types of cascade cavitation-electrohydroheating devices. A biphasic EHD-heatgenerator consists of two EHD-pumps 1, 2 containing impact chambers 3, 4 with cones 32-35 and perforated cavitators 28-31, a few EHD-accelerators (helix-like swirl blades 9-11) connected with cones 32-35. Tubes 27 connect junctions of this heat-main forming a closed system. Radiators are not shown on Fig. 3 but they are original too, connected with additional cavitators of Laval nozzle type. This EHD heatgenerator can also use the rotating electric arc, in case it is modernized according to the scheme (Fig. 3).

The construction is described in details under the figure.

There are simpler economical methods of cheap heat generation, for instance, ones based on a combination of cavitation effect and gravitation. They are described below.

SIMPLEST CAVITATION- GRAVITATION HEAT HYDROGENERATORS

Having an initial liquid flow, it is easier to get heat.

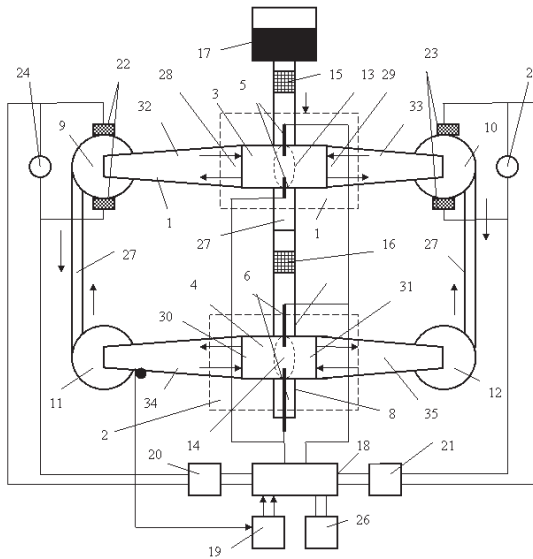


Fig. 4.

1,2 – electrohydrodynamic pumps; 3,4 – impact chambers; 5,6 – electrodes; 7,8 – electric insulators; 9-12 – helix-like swirl blades with tangential admissions; 13,14 – high pressure zones at electric discharge area; 15,16 – clacks; 17 – capacity with liquid; 18 – high controlled voltage block (HCVB); 19 – HCVB controlling system (using voltage frequency and amplitude); 20,21 – voltage changers; 22,23 – inductive winding; 24,25 – electric energy demand; 26 – primary energy source; 27 – tubes; 28-31 – built-in cavitators; 32-35 – cone tubes;

In order to do this, it is only necessary to use simultaneously gravitation and cavitation. This allows generation of cheap electric energy by, for example, ordinary hydroelectric power station.

Cavitation heat HEP stations

Dam HEP stations use a strong water flow given by Nature due to gravitation force. The stream is practically free and constant. We only have to use cavitators. Up to 50% electric power is spent on heating of nearby buildings,

especially in winter. In case a part of falling water will be transformed by cavitation nozzles, we can get directly cavitation heat at HEP stations because it is possible to get $1.5 / 0.84 / 0.6 = 2.8$ kilojoules of heat for each kilo joule of the falling stream's kinetic energy!

Taking into account that cavitator is cheaper than turbogenerator, it becomes clear that such heatgenerators are very profitable.

Cavitation-stream microheatelectrogenerator

The mentioned above principles of cavitation and gravitation effects combination allows easy construction of a simple cavitation micro heat and power plant even in private life. It is possible, for example, to pass an almost free (especially in case there is no water consumption meter) cold water stream under pressure through cavitator, for example, cavitation Laval nozzle and through micro turbine. It will allow generation of heat and electric energy using a micro HEP station. The heated liquid will then circulate in a closed circuit under the influence of gravitation and convection forces. In case there are no initial liquid stream, it is possible to get it almost free using electrohydrodynamic Dudyshev effect [7]. This stream of dielectric liquid can be generated using minimal quantity of electric energy due to explosive electrons' injection in liquid by our electrohydraulic Coulomb method [7]. In case electrohydrodynamic Dudyshev effect is used for cheap heat and electric energy generation, dams and water taps are not required. It is only necessary to place cavitator and micro hydro turbine with electrogenerator on the path to the artificial Coulomb stream. Thus, a closed cycle of liquid's motion under the influence of gravitation force is made. A completely autonomous source of cheap heat and electric energy is ready to work.

Its available heat and electrical powers are determined during designing and production by construction operation characteristics.

Due to cavitation, liquid begins to heat. This warm water can be used in private life for washing, bath, during summer absence of hot water etc. Such mini heat energy device can

have dozens kilowatt of heat power. That's why it can be used even for autonomous heat and electric energy supply of a small cottage.

**NO FUEL CHEAP ELECTRIC MOTORS.
YUTKIN EFFECT AND DIRECT
METHIOD OF GENERATION OF
MECHANICAL ENERGY AND LIQUID'S
REACTIVE TRACTION WITHOUT ANY
FUEL**

Electrohydrodynamic Yutkin effect opens new horizons for designing various super economical no fuel motors using water. They can be used as transport motors of new generation.

Let's examine direct method of electrohydrodynamic blow transformation into pressure and kinetic energy of alternate/reciprocal piston's motion or autonomous electrohydroturbines' rotation.

Electric-hydro-blow piston motor-pump
<http://www.valery12.narod.ru/index1.htm>

Electrihydrodynamic blow effect can be successfully used for no fuel electro hydro motors, for transport and no engine pumps. We'll explain this by the example of the EHD motor (Fig. 5).

Design of this piston electrohydrodynamic motor is shown on Figure 5. Its elements are listed above. This is a rather simple device for generation of kinetic rotation energy by pistons' translation. It is based on using potential energy of electric field and effect of blow electrohydrodynamic pressure in liquid (Yutkin effect). A main upper processing EHD-chamber 1 is filled with liquid 9, for example, water, and has an insulated electrode 11. An electric discharge takes place through liquid to the inner surface of the chamber's body due to a voltage impulse fed from a controlled high voltage block (CHVB), which is supplied from voltage source (a storage battery) and electric condenser 10. As a result, a pressure jump in liquid (EHD blow) occurs. It is passed to a first small strengthened piston 2. Then, electrohydrodynamic pressure in liquid is passed through the piston 2 and a shock absorber 3-air reducer to a main processing

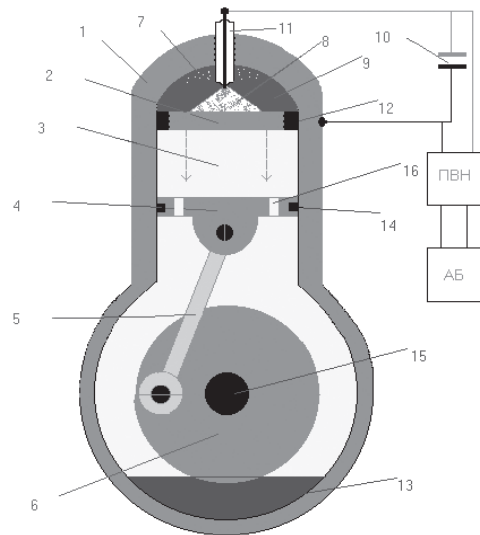


Fig. 5. Electrohydrodynamic motor

piston 4. The piston 4 passes its kinetic energy through a connecting rod 5 and a crankshaft 6 to a motor drive for rotation of economical no fuel electrohydromobile's wheels. After rotation of the crankshaft 6, pistons 2, 4 return to the starting position and the process repeats. The no fuel EHD motor can be dipphase as well as multiphase, for example, a four-phase type of piston hydromotor. In this case, it contains several electric discharge chambers. You can look at an animated image of such motor's work on <http://www.valery12.narod.ru/index1.htm>.

Frequency of pistons' motion is controlled by frequency of high voltage impulses fed by CHV block while power of hydromotor and shaft power is controlled by strength of EHD blow by controlling current strength and long electric discharge in liquid from the block or changing of electric capacity of the condenser C (Fig. 3). The same device can be used as hydro pump for transmission of liquids by the piston 2 through cavity 3 while the piston 4 is fixed. Input-output channels are not shown. In case the inductive winding is placed outside the nonmagnetic body 1 and magnets on the rod or on the piston 4, the device also presents an original magnetic-linear oscillator (it is not shown on Fig. 3). This motor can be used as a pump or a heater, in case the pump circuit is closed. Efficiency of this motor was already tested experimentally. In order to produce a pre-production model, thorough research is needed.

Economical turboprop EHD engines and combined turbine EHD motor-generators by Dudyshev (Fig. 6)

Using Yutkin effect, it is possible to design no fuel vortex or straight flow jet propeller-pump on basis of a new electrohydraulic turbine. We suggest that, first, EHD-blow energy is transformed into cycle changing of liquid pressure in the cylinder 1, in order to rotate an electrowater pump, then, generate a constant (pulse) unidirectional speed liquid flow through a hollow tube located under the bottom of this unusual water transport. Correspondingly, it is possible to design a device for transmission of liquids on basis of this original pump. The turbine rotates by alternate electric discharges from electrodes located on waterturbine blades. They cause electrohydraulic cyclic blows of liquid directed at an original electrohydraulic Dudyshev propeller. Design types of the economical electrohydrodynamic watermotor are described below. Such method is more universal, having more wide scope: along with electro impulse turboprop flow in liquid, it is possible to generate electric energy combining a turbine and an electric machine. This original device can be also used as a pump.

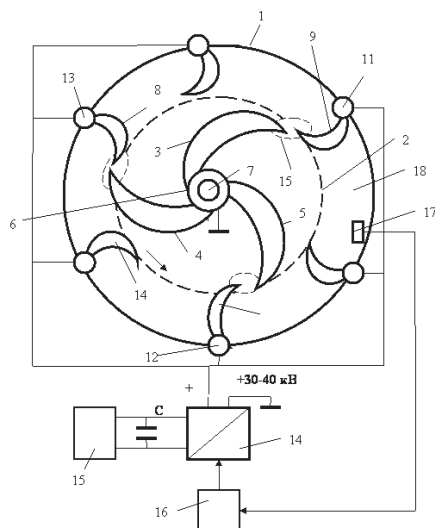


Fig. 6. Combined electrohydrodynamic turbine – heatgenerator

Electrohydraulic turbine (Fig. 6) consists of a hollow or waterproof strengthened cylinder 1, a waterturbine 2 (rotating trajectory of the its blades 3,4,5 is shown by dotted line) with a shaft

6 and a rotational axis 7. Fixed reverse blades-repellers 8,9,10 etc. are located on the inner surface of the processing cylinder (there are 6 blades-repellers on Fig. 6). They are electrically attached to a high voltage block of controlled voltage 14 by electric insulators 11-13. The block 14 is attached to an autonomous energy source (a storage battery) 15 and an electric store – condenser C, while it is connected to a controlling device 16 by the control circuit of the block 12.

Sensors can be attached to the controlling device 16, for example, a sensor 17 of the turbine rotation frequency or liquid temperature. The shaft 6 is electrically earthed. Turbine blades 3,4,5 and repellers' blades 8-10 have a running clearance at convergence points, which allows the turbine rotates feely.

Processing principles of the device are based on generating of cycling waves of liquid pressure caused by EHD-effect directed at the turbine blades. Due to high voltage electric potential fed on motionless repellers'-blades 8-10, an electric discharge occurs in liquid, in extreme positions between the blades. Electrohydrodynamic blow is transferred to the turbine blades and makes the turbine rotate. Pressure and effective capacity of this economical electric discharge turbine depends on power and length of the discharge. In case the hollow cylindrical chamber is used, the device is a water propeller-pump of new generation. It can be used at water transport and for transmission of liquids in trunk pipelines. The device can also be an economical cavitation heatgenerator, due to cavitators 18 fastened to the cylinder 1 by strong perforated diaphragms (they are shown on Fig. 5 at cross-section of the turbine by small squares). Top speed of the turbine is conditioned by design and liquid characteristics.

TECHNOLOGICAL PROPERTIES OF THE DEVICE

Certainly, this electric discharge hydro turbine should be strengthened; all blades should have anti-corrosion protection, because they must be reliable and long-lived during electro chemical metal mass transfer. Material of the blades can

be protected by rational use of alternating high voltage with frequency, which considerably exceeds rotation frequency of the turbine. In order to maintain top rotation speed matching with operating speed of standard electrogenerators, magnetic bearers and magnetic reducers should be used [8]. The same energy efficient process is a basis for designing of a no fuel jet turbine engine, which can be used in aviation. Due to cyclic electro gas dynamic air-blasts in a hollow chamber, effective rotation of a high speed air turbine can be obtained using heat and molecular air expansion. The engine can be used in atmosphere as well as in aviation or space propulsion engines of low and medium speed.

Straight flow no fuel EHD Dudyshev jets

Yutkin effect can be used for straight flow noncontact no fuel EHD jets using straight liquid flow without any turbine. Such electro hydro jets are available for water-jet propellers of new generation used in water or air transport as well as pumps (Fig. 7).

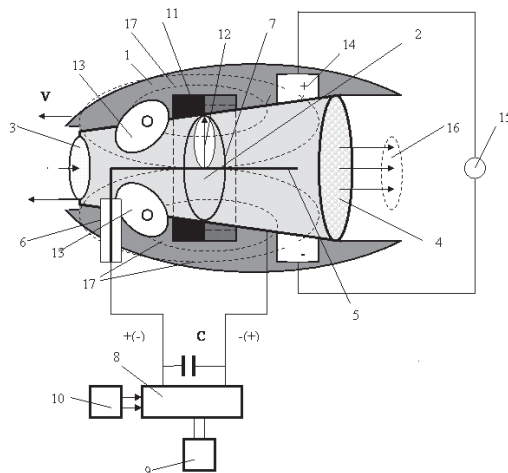


Fig. 7. Straight flow water jet

- 1 - hollow body; 2 - straight flow combined electric discharge chamber; 3 - lead-in nozzle; 4 - lead-out cone nozzle (cavitator); 5 - central axial electrode; 6 - electrical insulator; 7 - magnetic ring electrode; 8 - reversible voltage transformer; 9 - autonomous energy source; 10 - controlling system of the block 8; 11 - constant ring magnet; 12 - rotating arc; 13 - movable diaphragms; 14 - store plates; 15 - electrical load; 16 - reactive liquid flow; 17 - magnetic flux; V - speed of the vessel in liquid; C - store electric condenser

The simplest type of this jet is shown on Fig. 7. It consists of a hollow body 1, which contains a

cone hollow chamber with nozzles 3,4 and an electric discharge chamber 2 containing a central axial electrode 5 injected through an electric insulator 6 and a second ring electrode 7.

A constant ring magnet 11 is located outside the electric discharge chamber. The centre electrode 5 is electrically connected with a reverse transformer of repeated stress 8. Characteristics of electric arc can be controlled by a controlling device 10 attached to a block 8, which works using an autonomous energy source 9. It should be mentioned that the magnet 11 is oriented by its poles according to the ring electrode 7. Thus, its flux is perpendicular to the electric arc 12. Due to this, effect of electric arc rotation takes place at the perimeter of the ring electrode 7. A magnetic field for the electric arc's rotation can be generated in the plane, which is perpendicular to the ring electrode's plane, by a special solenoid in a nonmagnetic waterproof body (it is not shown on Fig. 7). The principle of the electric arc's rotation was explained earlier by the example of vortex EHD heatgenerator and shown on Fig. 3. The device contains movable diaphragms 13, in order to generate repulse and control the liquid flow, and store electrodes 14 attached to an autonomous electrical load 15. Let's discuss how this jet works.

Principle of the jet's processing. After voltage is fed by the block 8 to the electrodes 5 and 7, the electric arc 12 appears between them in the chamber 2. Due to power electromagnetic influence of the electric arch with the flux 17, the arc begins to rotate around the ring electrode 7 with acoustic speed. Its direction and rotation speed is controlled by the controller 8. At the same time, due to constant EHD effect, a strong pressure wave arises around the ring 7. Due to the cone design of the body 1 and presence of diaphragms 13, the electro hydro blow pressure wave in liquid generates a straight flow 16. Actually, the reactive liquid flow appears in the cone nozzle 4 after a constant electric discharge. During rotation of the electric arc 11, a strong constant air-blast appears in the direction, which is perpendicular to the rotation surface. This happens due to electrohydraulic blow effect in liquid and liquid's mechanical reaction, which

influences the body 1. As a result, the vessel moves using a reactive liquid flow 16 at speed V . According to the third Newton's law, the air-blast deflects from the repellers 13 and the body of the cone nozzle. This improves the reactive propulsion. Thus, EHD-blow energy can be right away transformed into the reactive liquid flow, i.e. no fuel electric water jet propeller or new noncontact EHD-pump can be designed. Maximal reactive propulsion of vortex liquid stream in the cone lead-out nozzle is the most effective in case the electric arc rotates in the constant magnetic field under the influence of Ampere's force. In case this device is used in sea water, it also can generate electric energy using magnetic hydrodynamic generator. The device is supplemented with a system of charge store electrodes 14 located at nozzles' sides. Part of this energy is used for the autonomous electric load 15 or recharging of the autonomous source 9. As a result, the device can work completely autonomously.

Other designs of the straight flow EHD motor combined with cavitators are possible. Such cavitator is shown in squares on Pos. 4, Fig. 7. The suggested types of the original no fuel straight flow reactive EHD-motor use small quantity of energy for hydraulic pressure generation. Due to this, they can move water transport, for example, a ship, without any fuel. They can be also used as noncontact pumps in water and oil pipes.

The same economical type of reactive movement, due to electro gas dynamical burst and air expansion, is possible in atmosphere using the new type of motor. It can be used in aviation as well as for space propulsion engines of second and third stages, low and medium power used for orbiting sputniks.

USING YUTKING EFFECT FOR SIMULTANEOUS GENERATION OF KINETIC ENERGY OF ROTATION, HEAT AND ELECTRIC ENERGY

Unique EHD effect combined with the other effects (cavitation, electromagnetic induction, vortex effects etc.) can be used in any kind of autonomous energy system, for instance, for rotation of high-speed turbine with electro

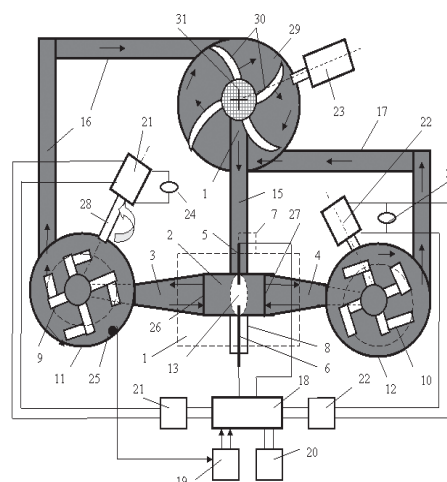


Fig. 8. Combined cavitation heat turbo electro generator

- 1 – EHD pump; 2 – electric discharge chamber of EHD pump;
- 3,4 – cones; 5,6 – electrodes (one of them can be ring);
- 7,8 – electric insulators; 9,10 – reactive turbines;
- 11,12 – vortex helixes with tangential lead-ins; 13 – zone of electric arc and high pressure vapor; 15-17 – pipes; 18 – block of high controlled voltage (BHCV); 19 – controlling system for BHCV (using voltage frequency and amplitude);
- 20 – primary electric energy source (storage battery);
- 21-23 – electro mechanical generators; 24 – electric load at lead-outs of electric generators; 25 – liquid temperature sensor; 26,27 – cavitators (perforated discs); 28 – axle of turbine and generator (arrow shows direction of rotation of axle); 29 – central water helix with two entrances; 30 – water turbine; 31 – central cavitator

generator (Fig. 8) or in a combined hydro turbo electro generator with constant magnets (Fig. 9, 10). Each design has its own merits and demerits, but they all use electric discharge chambers and air-blasts, i.e. EHD Yutkin effect. In order to generate heat energy, cavitators – perforated plates are used. All the designs are important steps in searching the optimal system design of economical heat generator using Yutkin effect. All design elements are described below the figures. As it was mentioned above, in case the electrohydraulic turbine and the standard electro generator are combined at one shaft, a unique possibility to generate simultaneously mechanical, electric and heat energy appears. This design allows generation of electric and heat energy with better efficiency than it was in the previous methods [3, 6], due to removal of the bulk electro motor of the pump. In this case, the electric discharge turbine acts as pump. Main advantages of this new method of heat and electric energy production based on EHD-device are autonomous work, ecological cleanness, safety, simplicity and efficiency. Design of the combined magnetic

electro hydro dynamic turbo generator (Fig. 8) includes vortex helix-like elements, which intensify cavitation processes and heat generation in liquid allowing using standard electro generators. A common advantage of the designs is that they have separate electric discharge chambers 18 moved from a hydro turbine chamber. This improves their reliability and durability.

In a device on Figure 8, the electric discharge chamber 2 of the EHD pump 1 is located in a special strengthened cylinder and connected by cones with two vortex helixes 11, 12.

In a combined device on Figure 9, the electric discharge chamber of the EHD pump 18 is located in a tangential arm of the helix 1.

Only in a design shown on Figure 10, the electric discharge chamber of the EHD pump is combined with a cavity 2 of the hydro turbine. In this case, the inner surface of the cylinder 1 is the first electrode while the second one is strengthened turbine blades 3, 4. As a result, the electric arc rotates with the turbine blades, which allows reducing corrosion deterioration of the electrodes and getting maximal cavitation and heat generation in liquid in the tree designs of the device (Fig. 8-10).

This is the simplest and high-speed electric discharge turbine, which allows generation of maximal power using the device of minimal size.

HOW TO BURN A NONFLAMMABLE FLUID, FOR EXAMPLE, WATER AND ITS VAPOR? ELECTROHYDRAULIC BURST OF WATER VAPOR USED AS FUEL IN BOILERS AND MOTORS OF NEW GENERATION

The idea of using EHD blow in liquid and then transforming the generated self-energy into other types of energy can be improved and used for phases of liquid, for instance, for pulse EHD dissociation of water vapor into H_2 fuel gas. This is described below.

The method suggested is undoubtedly available. It allows generation of not merely pressure on

water motor's piston, but also electric energy from water. We suggest using liquid vapor as fuel for motors of new generation. Heat and electric energy and overpressure caused by electric heat burst of water vapor (mist) is fantastic but real!

It is known that fine air slurry of moles or cotton particles, having certain concentration, tend to burst in the presence of spark.

The reason is that speed chain reactions of ionization and burning occur and quickly develop. A small electric spark can cause a burst. Effect of fine aerosol's burst is already used but not for good purposes, although this effect can be used effectively, for example, in no fuel motors of new generation.

Technology of vapor transformation into burning H_2 -fuel

Method of vapor transformation into H_2 fuel represents electric arc dissociation of vapor into H_2 and O_2 using EHD-effect. It allows generation of heat, electrical and mechanical energy from abnormal energy of electric arc burst of water vapor. The effect can be used in my original electric-burst steamer working on water (according to EHD design on Fig. 4). Do you believe this? If no, learn the suggested technology.

Steam burning is carried out using electric discharge dissociation. During this process, local volume of cheap H_2 is generated from steam and right away burned. H_2 contains gas fuel. So, I suggest transforming heat losses of the standard petrol engine into yield, i.e. evaporating water and then burning steam.

The following simple operations should be carried out:

a) due to heating and evaporating by discharge manifold, water steam (or water-fuel) of high pressure is obtained;

b) this overheated steam is given a little at a time in the special electric discharge burst chamber, for instance, in the combustion chamber of the ordinary internal-combustion engine;

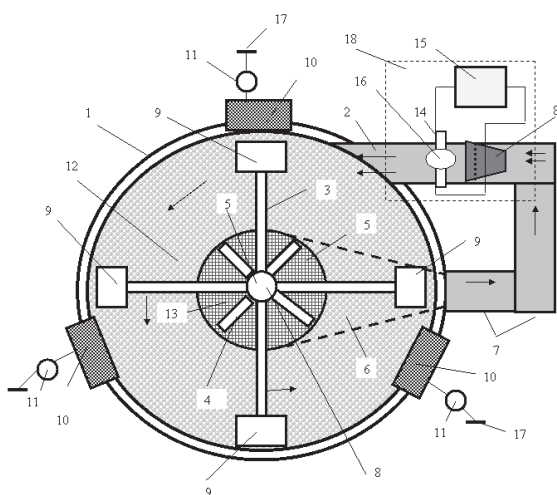


Fig. 9. Combined electro hydro turbine – heat generator with EHD pump set on tangential entrance of water helix

1 - hollow chamber (cylinder or helix); 2 - tangential entrance to camera; 3 - blades of external turbine; 4 - blades of internal turbine; 5 - common hub of turbines; 6 - connecting cone; 7 - pipes; 8 - reflection cone with cavitator (dotted line); 9 - constant magnets; 10 - inductive winding (three phases located in chamber body 1 with 120-shear); 11 - electric loads (attached to phase windings, forming a star); 12 - cavitator-perforator of large diameter; 13 - cavitator-perforator of small diameter; 14 - electrodes (one of them can be ring, like on Fig. 7); 15 - controlled voltage source with store; 16 - zone of electric arc and high pressure vapor; 17 - earthing; 18 - EHD pump

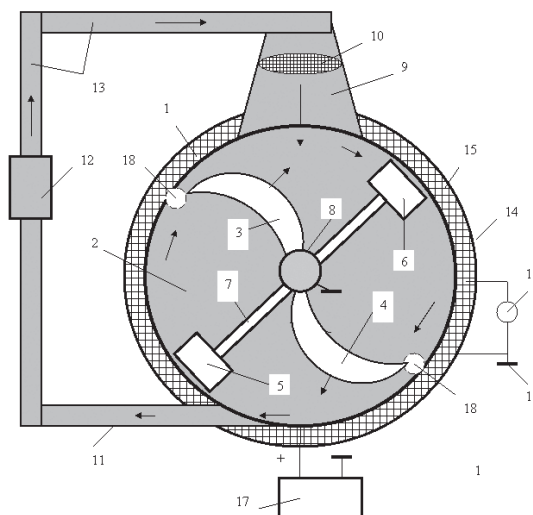


Fig. 10. Combined electric discharge hydro turbo heat generator

1 - body of electric discharge turbine; 2 - liquid (water); 3,4 - turbine blades; 5,6 - constant magnets; 7 - spoke where magnets are attached to rotation axis; 8 - hub; 9 - connecting cone; 10 - perforated cavitator; 11 - tangential nipple; 12 - radiator; 13 - connecting tubes; 14 - cylindrical framework of winding; 15 - inductive winding; 16 - electric load; 17 - controlled voltage source; 18 - zone of electric discharge and high pressure; 19 - earthing

c) high-voltage electric discharge is given through steam by a strengthened system of electric ignition with a spark of controlled length and power;

d) in the electric discharge zone, in some part of steam, an initial sparking portion of H_2 is generated during the discharge, due to steam molecules dissociation into H_2 and O_2 molecules and particularly into atomic parts of H_2 and O_2 ;

e) along with electrical arc appearance, hydrogen almost instantaneously bursts in the spark zone and raise temperature in the starting zone of steam burning;

f) local volume of this portion of steam begins to burn intensely, because burning H_2 hastens the process;

g) as a result of avalanche rise of the process of steam transformation into burning gas, all steam volume transforms into H_2 and O_2 and initiates the strong or faint bursts of water steam according to characteristics of electric arc, steam and electric discharge chamber;

h) blast wave of pressure develops. It is passed through a special dampener on the labour body, for example, through a reducer, which is an elastic piston;

i) burning steam is passed through an exit manifold to electric discharge chambers again, inflamed by electric discharges. So, the process repeats: water transforms into steam, it is burst by electrical discharge, and then it is condensed, heated and burst again. Thus, this type of motor has no exit exhaust.

ENERGY GENERATED DURING EHD-BLOW OF WATER STEAM

This method allows generation of electric energy from burning water steam during electric burst dissociation, in case deflecting field is set at the chamber's sides (constant magnets or electrets). These fields will deflect ionized particles and electrons generated during chain reactions of dissociating electrified steam, especially during burst-dissociation of water steam.

It is necessary to deflect particles by electric and (or) magnetic fields during water steam burning and then precipitate, collect them on electrically insulated electrodes from the electric discharge chamber. After that, these ions-electrons, electric energy carriers, should be recombined by paying electric load located outside the processing chamber. Hence, ions and electrons are transformed into electric energy, like in a standard electric chemical energy source. Steam dissociation process can be considerably intensified due to influence of source of ionizing ultra-shortwave electromagnetic radiation, for instance, ultraviolet light from minimal quantity of radioactive elements located in the chamber.

WHERE IS EXCESS ENERGY, GENERATED DURIN ELECTRIC BURST OF STEAM, FROM?

To sum up the idea of transforming steam into fuel, let's ask a simple question: where excess energy comes from and why this process can be repeated?

Apparently, the unusual electro steam device is an open energy system, i.e. a heat pump using energy of environment and self-energy. Water steam's structure contains self-energy in its cohesion and atoms. This self-energy of steam as a nonlinear system is released cyclically by EHD-discharge and the following burst. Due to EHD-burst of steam and steam transformation into hydrogen gas burned by the electric spark, the self-energy of steam is released gradually. This process of gas transformation into fuel can be used in heat energy systems. Of course, water solutions of worthless carbohydrates, for example, intestinal discharge, can be efficiently used for transformation into energy by this method due to methane gases released in the electric discharge zone. These gases will help to carry out thermo ionization of the steam burning process.

Conclusion for the chapter: *A technical possibility to use EHD-effect exists. The method suggests transforming steam into new cheap fuel burned. Its self-energy and heat energy are transformed then into other types*

of energy, which is used in energy systems and transport.

The innovation was experimentally tested on a model from 1986 till 1989.

CONCLUSIONS

1. It is shown that electrohydraulic Yutkin effect is available for constructing effective heat generators of new generation.
2. New straight flow and turboprop electro hydro (aero) reactive turbines, engines, pumps with minimal consumption of electric energy are suggested.
3. EHD-method for generating of cheap heat, kinetic and electric energy and combined devices for its implementing are suggested.
4. EHD-method of water steam transformation into cheap gas fuel and devices are suggested including a standard internal-combustion engine.

SUMMARY

EHD-effect opens new horizons and outlooks for radical improvement of energy engineering and transport. New effective methods of cheap heat, kinetic and electric energy generation suggested. They are based on combined use of abnormal energy of cavitation and EHD-effects and their transformation into other types of energy. In case these inventions will be realized as production prototypes and then produced, the suggested devices can be used soon in various spheres of energy engineering to do world community and Nature good.

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ENERGY SAVING

(current cycling over loading phases by means of the operated gates)

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The cost of electric power is constantly growing, and the problem of energy saving is becoming urgent.

Do we know how to use it rationally? I have certified and patented solutions which allow saving up to 25 – 30% energy. They are based on the concept of two types of electric power: active power, which works directly, and reactive power, which forms magnetic field in various inductive electrical devices (from solenoid starters to transformers and inductive motors). Having phase lag, this reactive current just loads a current line according to paying load.

The current makes up from 10 to 50%, which is the energy saving reserve.

There is a paradoxical and very important circumstance: the reactive currents' sum per period amounts to zero in three-phase circuits.

As a result, we can make a circuit for the reactive current flow (reactive electric power flow) from one loading phase to another according to a working cycle of the inductive loading and, therefore, all reactive power will be get caught in cycle.

It won't load uselessly the electric circuit: and considerable energy saving will be obtained due to reduction of ohmic losses between an energy source and its customers caused by reactive currents flow.

I named this concept of energy saving "artificial circulation" of reactive power over inductive loading phases.

This method is technically carried out using semiconductor no contact high-speed circuit breakers (thyristors or transistors), which are operated at the command of the elements sensing angle of shear between current and voltage in each phase of electric loading. This no contact, obedient "controller" of electric power flow's direction has rather simple logic.

In case signs of voltage phase and current phase are the same, a circuit passes through active electric power from power grid. In case the signs are different, the electric circuit "catches" reactive current in the required loading phase.

At the same time, the no contact "controller" allows accomplishing reduced-current start of electric loading, reducing start currents' rush, providing thermal protection and maximal current protection of expensive electric equipment.

This simple commutator can also control either active and reactive powers or one of them depending on a working regime, for instance, depending on degree of motor axis' loading. This innovation will allow improving energy saving and reliability of electric equipment.

This method of energy saving is the most effective in case of inductive loadings with low power coefficient, for example, in powerful inductive heating furnaces.

***I am looking forward to find partners
and investors for application of my
innovations to production.***

METHOD OF ELECTRIC ENERGY GETTING FROM NATURAL ATMOSPHERIC ELECTRICITY

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<http://www.ntpo.com/invention/invention2/13.shtml>

Our civilization is seriously concerned by the imminent global energy and ecological crisis. In these circumstances, the fact that Nature generates abundant quantity of electricity sounds paradoxical. This electricity hangs above us, in a literal sense. We only have to make the simplest rope devices and get the required quantity of electricity. You don't believe me, do you? Then I will describe a new no fuel electric energy source in details.

It is known that our planet has both electric charge and electric field. Its intensity is about 130 V/m at the surface. Electrical conduction of surface air is very small but it considerably increases along the height. There are powerful flows of Earth atmosphere's global circulation at 10 km height. These flows can hold an altitude sail or an airship joint with a surface mast by a strong electric rope. I suggest using the electric field of the planet and its renewable natural electricity (electrically charged particles of near-Earth plasma) for energy getting. An electric circuit joint to an electric loading can be easily made using a thin metal rope lifted by an airship at 10-15 km height. A power of such non-traditional no fuel energy source measured in the surface electrical loading can be up to thousands megawatt.

Nature itself creates optimal conditions for usage of the natural electricity at such heights. The atmosphere electrical conduction is high there, so potential of a natural electric magnetic gasdynamic generator reaches hundreds kilovolt.

Natural electricity is actually used by Nature and renewed by the natural electric generator.

The electric field and electric charge of the planet is created by the natural ionospheric magnetic gasdynamic generator, which works using kinetic energy of moving solar plasma within Earth's magnetosphere. Its enormous power exceeds power of all world electric stations many times. That's why it is technically possible, ecologically safe (in comparison with harm done by the traditional fuel power systems) and extremely useful to use a small part of electric power of the natural ionospheric generator with the help of the rope energy device.

It consists of a thin cable-rope, a holding device for the cable (an airship), two plates at the ends of the cable, a device for safe earthing of the lower end of the cable into electroconductive earth stratum, a device for bonding and controlling of rope's height above Earth.

Such simple no fuel electric station can permanently give electric power up to a number of megawatt depending on rope's length, rope's height above Earth, and square of plates. In general, this cable-rope is located in two electroconductive Earth spheres within the enormous electric potential of the natural ionospheric generator. Understandably, it is necessary to attach the low end of the rope to the surface electric loading while the loading should be safely earthed into electroconductive earth sphere (which can be moist soil or a natural electrolyte, salt sea water) in order to make electric current run through the rope. I think it would be the simplest way to earth naturally the rope energy system in ocean or sea because sea water is rather electroconductive. In order to improve power of the no fuel rope

electric station, charge plates, having electroconductive square as big as possible, should be placed at the ends of the rope. The upper plate should be attached to the electroconductive (metal) surface of the airship while the lower plate should be earthed by special masts dug deeply in the ground.

Actually, calculations show that the rope “flying” electric station can generate considerable electric power (up to 500-600 megawatt) without any fuel, in any place on Earth. Due to natural electric potential (up to hundreds of kilovolt) extracted at the ends of the rope and due to tapping of some part of energy, electric current will run through the thin metal rope, which is electrically contacted with loading. The current is a result of natural ionospheric condenser discharging from

electroconductive ozone sonde to electroconductive earth sphere.

Quantity of electric current and loading power depends on characteristics of the rope energy system and loading characteristics. The power can be controlled by both loading characteristics and characteristics of the rope energy system, for example, by the rope's height. We should mention that, due to strong atmosphere circulation at this height, the rope energy system can be used both as a wind-electric set and as a source of mechanical movement at seas. In this case, the lower end of the rope is attached to a rostrum. Pulled by the strong wind circulation, the airship will move ships and give free energy from the upper atmosphere. All basic calculations and draft is already done.

NEW METHODS OF EXTRACTION AND USE OF SELF-ENERGY OF MATTER

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In order to learn how to effectively extract self-energy from matter, first we have to know its meaning and extraction methods. This article is dedicated to these questions. A number of experimental discoveries and author's inventions in the field of electrophysics are described.

Energy

Today, according to explanatory dictionaries and encyclopedias energy is determined as ability of matter forms to perform work and common measure of matter motion [15]. However, these definitions are not concrete enough. They clear neither the essence of energy nor reasons of motion of all body parts. It is known by intuition that energy is a main universal quality of motion of everything. But what forces move all bodies and the world: from matter particles to galaxies? Science does not

know this yet. Meaning of the most important idea of “energy” is vague and its different interpretations are rather contradictory. The term “energy” appeared in the beginning of XIX century and was introduced in mechanics by Jung. Joule identified ideas of energy as type of work and heat in his experiments. Then, deformations and vagueness of this concept's interpretation were increasing, especially since quantum mechanics formation and discovery of X-radiation and other types of radiation. Scientists still have no common opinion concerning the meaning of energy: whether it should be a property of matter to work or the work, or motion and force characteristics of fields, or various types of emissions etc. Crisis of the modern science and the civilization is mainly caused by domination of scientific paradigm about power of law of conservation of energy (LCE) and unproved postulates of thermodynamics.

Meaning and application of law of conservation of energy

As everybody knows, the fundamental LCE is right only for a closed energy system [16] though there are no such ideal systems in Nature. The reason of paradox connected with understanding of these interrelated ideas (Energy and LCE) is that it is impossible to understand the meaning of LCE while true meaning of energy is vague. Contradictions in interpretation of the idea of energy were stated above. The analogous contradictions are in interpretation of the meaning of LCE concerning some nonconventional power devices using abnormal energy resources. On the one hand, science based on the existing awry and imperfect understanding of LCE denies the opportunity to create a device with efficiency more than 1 and any perpetual motion machines. On the other hand, science stands theories and practice of different heat pumps (HP), which obtain more energy from environment than consume.

Since HPs are real, in order to adjust this contradiction with law of conservation of energy, a concept of exergy was introduced in science as a coefficient of use of environment energy. Hence, exergy ratio of the real HP is much more than 1 while its efficiency is less than 1. However, as science develops, number of amazing scientific experiments proving the fact of violation of the classical law of energy conservation in open energy systems increases [1,3].

Energy exchange between matters and environment

New experimental data on generation of extra-unit energy in comparison with supplied energy make us think that there is an unknown type of energy running through environment and filling the other energy and matter types. Let's call it energy X or ether energy. To put it differently, any matter is an open energy system, an energy pump feeding the matter by this unknown energy. A method of this energy interconnection between energy X and matter and known fields is not clear yet. Nevertheless, the constant energy exchange of all bodies and matters and environment undoubtedly exists

because even the simplest matter particles (electron and proton) are open energy systems. In case we deny the mechanism of their energy filling by this undiscovered energy of environment, these matter particles violate the known law of conservation of energy and, therefore, turn into continuously operating machines of the first type. The simplest matter "bricks" are open energy systems and actually use environment energy.

Perhaps the energy of physical vacuum supply electrons and protons with energy needed for their continuous motion. As a result, conditions are maintained for existence and transformation of matters. In other words, a rightful hypothesis appears that it is vacuum energy that provides for existence of other energy types and the continuous round of matter in nature. Matter itself (field, matter) is an effective energy transformer and accumulator of different types of energy including energy of physical vacuum. Under certain conditions, this latent self-energy of matters can be discovered, extracted and used.

Numerous scientific experiments prove that it is possible to generate excess energy from self-energy of matters and fields, for example, experiments of Tesla, Avramenko, Serla, Kosinov, Floyd, Kanarev, Kushelev, Potapov and many other experimentalists. Due to the fact of energy exchange between matters and fields as energy concentrators and environment, a fundamental opportunity to use and transform their latent self-energy in real energy used in our real engineering exists. These ideas constitute a physical basis of the new energy of matters' self-energy extraction.

CONCEPT OF LATENT SELF-ENERGY OF MATTERS

The author has analyzed and eliminated disadvantages of previous definitions of energy and law of conservation of energy and also given their new specified definitions [1]. Ways of electric field's self-energy use for yield are shown below. It is known that there is self-energy in any matter type. The problem of its extraction is that enormous self-energy is adroitly hidden in matter and appears only

under certain conditions. Sometimes, during combustion or autodecomposition of active material, self-energy comes off openly and can be measured and used. But how can we extract even a minimal part of this enormous self-energy by other ways?

It is difficult to realize methods of effective use of matters' self-energy in energy engineering due to ontological unsolved scientific problems of energy exchange between matter and environment. Hence, the experimental method was chosen as the basis for research of effects and ways of extraction of matter's self-energy.

Latent self-energy of matter

Latent self-energy of matter is full kinetic energy of motion of all its elements and potential energy of its structure, i.e. energy of all intermolecular and intramolecular physicochemical interactions of matter. In other words, this is entire potential and kinetic energy of all matter's elements (electrons, photons, atoms, molecules etc.). Quantity of self-energy of any matter including liquid is characterized by its mass. Latent self-energy of any matter can be determined by the famous Einstein formula $W = mc^2$ (1), where m is mass of matter and C is speed of light. For example, a bank of self-energy in 1 kg of water calculated according to the formula (1) is approximately 9×10^{16} joule. It is obvious that using even a small part of latent self-energy of matters is an enormous energy reserve and the mainstream of development of alternative energy engineering.

MAIN PRINCIPLE OF EXTRACTION OF MATTER'S LATENT SELF-ENERGY BY EXTERNAL FORCE FIELD. IDEA OF ENERGY PUMPS

In order to extract latent self-energy of matter, it is necessary to force it by external force field operating as an energy pump. The pump works like, for example, a mechanical pump or extraction of toothpaste from a tube by force and external pressure. Heat pumps are a particular case of energy pumps, which are devices transforming self-energy of matters into useful external energy. During this, matter mass and potential energy of external field must

diminish. In order to force self-energy of matter, certain conditions must be created: phase changes and other energy nonlinearities of matter and gradient of external field in matter must be used. Then, the external field will produce pressure on all elements of matter.

It is known that pressure is created by force, which is generated by physical field. Hence, internal pressure of matter, for example, liquid, can be produced by external potential electrical field. Heat, gravitation, mechanical, acoustic, electric, electromagnetic fields etc. are known. Basically, any force field of certain parameters allows extraction of self-energy from matter.

Thus, energy pumps (EP) are field-devices, "extractors" and transformers of latent self-energy of matters. EPs can be classified as natural and artificial. It is the natural EPs which provide for energy and matter circulation in nature [4].

We will give some examples of natural EPs. Such energy pumps are created and used in living Nature for a long time. Earth is not only a space figure of revolution but also a natural heat and energy device possessing its own geomagnetical and geoelectric fields. Their combination provides for evaporation and circulation of planet water and also global circulation of ocean currents and atmosphere. We will try to use inventions of Nature for creation of the same energy pumps.

Method of extraction of self-energy of matters by external potential field

A new method of extraction of matter's latent self-energy (MLSE) of different physicochemical origin by external potential field is suggested. It is simply and effectively realized by, for example, a strong electrical field and coulomb repulsive forces of injected same electrical charges. Technological basis of the method consists in primary injection of a unipolar bulk electrical charge in matter (for instance, in flame, non-polar liquid etc.) and simultaneous influence on the charge by external force field. Method's development moves towards control of process of extraction and transformation of self-energy by changing of parameters of external vector electric field.

The suggested method was tested by the author experimentally. Some experimental data of numerous experiments carried out by the author is described below in order to prove marketability and efficiency of this method of extraction and transformation of MLSE. Concrete examples of experiments conducted by the author and their results are used. Peculiar qualities of use and results of realization of this method in processes of new electric-fire matter consumption and also in some electrohydrodynamic and electrodynamic effects and processes are considered as examples.

METHOD OF EXTRACTION OF LATENT SELF-ENERGY OF IMFLAMMABLES DURING PROCESS OF ELECTRIC FIELD'S INFLUENCE ON FLAME [2-4]

Effect of release of many matters' latent self-energy is mostly pronounced in the discovered effect of flame combustion in strong electric field (Figure 1). A prototype consists of the following basic elements: a source of strong electric field 7; two electrodes 5 and 6 set in quadrature and attached to the filed source 7 by a switch; capacities 1 with fuel, for instance, aqueous emulsion of straw, and a fir-tree electrode 2. During feed of electric field on flame 4 abrupt increase of flame brightness occurs. It becomes flat in vertical plane above electrode 5 and directed E-field radiation occurs fixed by a sensor 8.

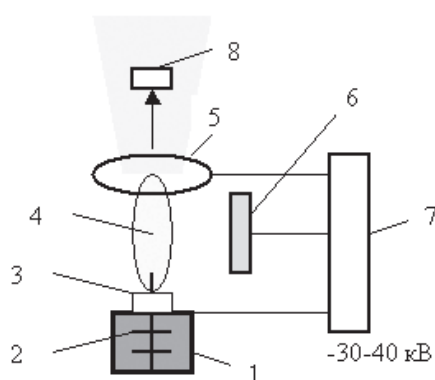


Fig. 1. Control device for matters consumption in electric field

- 1 - Capacity with fuel; 2 - Electrode; 3 - Candle (fuse);
- 4 - Flame; 5 - Ring level electrode; 6 - Vertical electrode;
- 7 - Source of electric field; 8 - Sensor of E-field radiation

Measurements show that, under conditions of flame combustion in electrical field, total heat and radiant energy of flame increases by 15-20% using the same quantity of fuel, i.e. not only combustion intensity but also heat capacity increases. This effect of specific heat increase by 15-20% during combustion of these matters in a flow of emission and in strong electric field [2-4] is connected with presence of fuel and H_2 evaporated by electroosmosis, which provides for increase of heat and radiant energy of flame. Effect of combustion intensification in strong electric fields was discovered by the author earlier [2-4]. Physics of such combustion due to combined catalytic influence on flame by the bulk electric charge and strong external field is rather complicated.

During these experiments, the author often observed effects of specific heat increase of inflammables, deep electric-fire and electrochemical decomposition of combustion products and parent substances in the electrified flame and, as a result, abrupt (by ten hundred times) diminishing of toxicity of effluent gases. Energy physics of the abnormal consumption is not sufficiently investigated yet. It is known that combustion is a complicated chain reaction of division (fragmentation) of internal structure of matter and release.

As a matter of fact, any matters can combust due to energy of intermolecular and molecular connections of hydrocarbon fuel. The electric-fire method allows burning in flame almost all matters including water due to the fact that electric field and the injected bulk electric charge cause other chain reactions in this flame, up to transmutation of some elements: air nitrogen and even water burns because the field dissociates its molecules on H_2 and O_2 [7]. Existence of this complicated electrophysics of combustion can be proved by increased directed E-field radiation of the electrified flame along the axis of the field vector. On the basis of long-time research of influence of strong external electric field on combustion processes, we come to a conclusion that it allows controlling the chain reaction of flame combustion by not only intensification combustion but also, in some critical cases, suppressing chain reactions of combustion up to instant extinguishing of flame [5].

Water as fuel

According to many famous scientists, water is a potential energy source of the third millennium [4, 5]. Availability of water as energy source is particularly conditioned by the fact that there is sufficient water on the planet and in the world ocean so far. Today the civilization spends enormous financial and intellectual resources on development and mastering of highly effective technologies of producing H_2 from water. However, this electric-fire combustion allows using water as fuel in case its electrostatic spraying in flame by certain draughts consisting of water-emulsion mixes and vapor.

Actually, that is why the present-day scientific and technological level allows extraction and transformation of latent self-energy of water and water solutions by potential electric field into other energy types, particularly in heat and kinetic energy, in case my discoveries and electric technologies is used. In this case, a unique opportunity appears to create a perfect energy-saving energy-fire and electrohydraulic engineering.

Thus, it is especially interesting to consider latent energy of water solutions of hydrocarbonaceous liquids and other ways of its extraction in details.

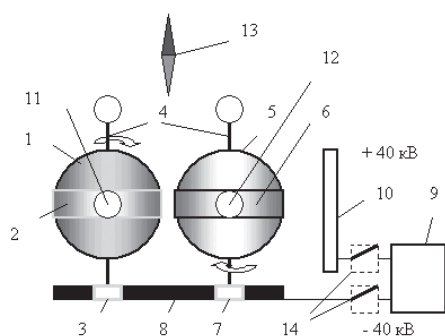


Fig. 2. Direct transformation of potential energy of electric field in kinetic energy of rotation

1,5 - dielectric spheres; 2,6 - metal rings; 4 - pivot pins of spheres; 3,7 - rotation bearings; 8 - metal basis; 9 - source of electric field; 10 - metal plate; 11,12 - neon lamps; 13 - compass needle

Method of extraction and transformation of self-energy of electrified matters into kinetic

energy of their rotation and electric energy [1]. The law of electrical repulsion of electrified bodies with limited number of degrees of freedom and pivot pins leads to occurrence of rotation moments of these bodies and allows explaining some unusual experiments carried out by the author and even rotation of planets.

Actually, due to forces of Coulomb repulsion, a steady position of these bodies is created along the straight line connecting their rotation centers while unsteady position is created in the perpendicular direction. Due to this, circular electric current, magnetic field and electromagnetic rotation moment occurs. As a result, these electrified bodies begin their torsion in the external electric field. In order to prove this idea and its experimental implementation, I have carried out an experiment on cross-rotation of two electroconductive spheres in the external electric field.

An experimental device for testing this effect (Figure 2) consists of the following main elements: source of the external electric field 9 (=30-40 kV), two partially metallized spheres 1, 5 with their own vertical pivot pins 4 and electric loading 11, 12 inserted into a gap of electroconductive rings 2, 6.

During feeding of the unipolar electric potential from the field source 9 to the spheres 1, 5 through the electroconductive basis. They begin to rotate on pins 4 in the opposite directions.

During feeding of the unipolar potential on the spheres and during their rotation neon lamps 11, 12 shine. This proves existence of electrical currents in electroconductive rings. These currents lead to appearance of magnetic field noticed by the compass needle. Magnetic fields from currents interact with the currents and create electromagnetic moment on spheres at a tangent to them.

These rotation moments are reasons for rotation of spheres. They begin to rotate in case there is only external potential unipolar electric field, i.e. a unipolar charged plate 10. In this case, electric potentials are not fed on spheres 1, 5 directly but applied on them from the external

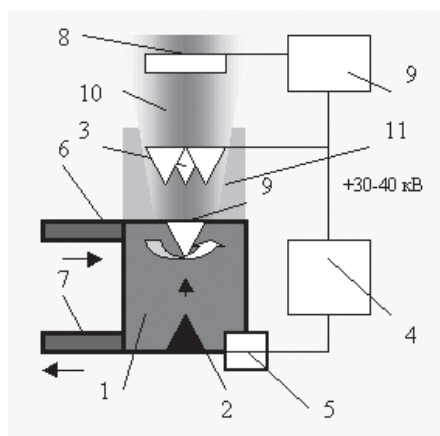


Fig. 3. Device for cooling liquids by electrical field and extraction heat energy from liquid
 1 - capacity with water; 2 - pointed internal electrode;
 3 - pointed external electrode; 4 - high-voltage source;
 5 - bushing; 6, 7 - induction and outlet pipes; 8 - receiver of E-field radiation; 9 - transformer of E-field radiation;
 10 - directed E-field radiation; 11 - zone of intense water vaporization

field of the plate 10 attached to the source 9 by electrostatic and electrodynamic induction. This physical effect of rotation of bodies in electrical field is an example of direct transformation of potential energy of electric field in kinetic energy. New types of effective electrostatic motor-generators can be created on the basis of this electrophysical discovery.

Method of heat energy extraction from matter (liquid) using electric field and simultaneous cooling of the matter [11]

Such extraction of heat energy of bodies' molecules and atoms can be most effectively and non-contact implemented by a strong vector electric field (with tension higher than 1 – 5 kV/cm) and used, for example, for cooling of liquids in electrical field (Figure 3). One high-voltage electric potential is fed directly on the heated body, for instance, 30 – 40 kV through the electrode 2 placed in the liquid 1, from the low-power high-voltage source 4 – electric field source. The second electric potential is fed through the pointed electrode 3 placed above the liquid. It is isolated from the tested body by an air-gap.

Earlier the author experimentally discovered and repeatedly observed the effect of intense cold vaporization and cooling of liquids in the strong direct-stress electric field along with rotation of the liquid above the remote

electrode and appearance of intensive, directed E-field radiation along the vector (flux) of this field. Physical meaning of this effect consists in the fact that flux of the field and coulomb forces inhibit heat motion of molecules and atoms polarized in the field, directed at an angle differed from zero to them.

Due to this, re-orientation of molecules' doublets and the heat motion of the particles according to the field vector as the less power-consuming type of motion in the field due to increase of heat energy density along the axis of the field vector.

During this process, latent self-energy of the heated matters discharges: excess heat energy is removed by photons of atoms and molecules in the form of directed E-field radiation (mainly in infrared spectrum) occurring along the field vector. Electric field is the energy pump and direct transformer of heat energy of the body.

Due to this forced radiation, the electrified body takes away excesses of heat motion of molecules and atoms providing for its effective cooling. This effect of intensive cooling of bodies in strong electric field was observed by us in many experiments, when different matters were used: from metals to dielectric liquids. The effect of bodies' cooling by electric field, discovered by me, occurs due to regulated motion of molecules and atoms in these bodies along the electric field vector. Effect of intensive heat energy emitting from bodies of different physical nature in the form of directed E-field radiation is, most likely, is a reciprocal reaction of the cooling body to external disturbance – impact of electric field. It is entirely natural in full accordance with physical laws.

Experiments have proved that bodies cool in electrical field much faster than under natural conditions. Speed of the unusual electric cooling is proportional to the value of electric field strength and is much higher than speed of natural cooling.

This electro-heat effect can be used in different ways: both for cold and heat energy generation. For example, it is possible to design a highly effective closed heat pump extracting heat energy of the environment by the strong field.

The pump pumps an environment, for instance, air or liquid, across the electric field cooler and transforms it into heat energy and then in other energy types: electric energy or kinetic energy of motion. The process of cooling by transformation of directed E-field radiation extracted from heat energy into electric energy can be of low power inputs, in case we obtain a source of electric field from the extracted and transformed electric energy and, therefore, cool bodies more actively. A particular case of this effect occurrence is an instant fire extinguishing due to its cooling by strong cross electric vector field (Figure 1 – through electrode 6). This physical effect can be used for designing efficient noiseless compressorless refrigerators and air-conditioners of new generation.

CONCLUSIONS

1. The general method of release of matters' latent self-energy is the following: external force potential field is applied on matter creating internal voltage inside it using nonlinearities of the matter.
2. Device for extraction of self-energy of matters operates as an energy pump. The pumps are divided into natural and artificial ones.
3. The value of extracted energy depends on combination of parameters of the energy pump and matter. Energy balance is filled up by environment matter.
4. Under certain conditions, latent self-energy of matter can be extracted under the influence of electric field energy pump in the form of directed E-field radiation, kinetic or electric energy of this matter's motion. As a result, properties of matter and its self-energy changes.
5. Value and type of extracted energy depends on parameters of energy pump and parameters of external electric field.
6. Electric field and the unipolar electric charge injected by it, for example, as explosive emission, are two main force influences for self-energy extraction according to the Dudyshev method.

7. Methods of extraction of matters' latent self-energy by electric fields can provide the civilization for cheap pure kinetic and electric energy in future.

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Revolutionary discoveries, inventions and technologies designed by Professor Dudyshev,

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Contemporary civilization surely suffers two global problems which hinder its development, and these are energy and ecology. This is proved by UN address to the global community and the world known Kyoto Ecological Treaty which states the beginning of global ecological crisis, changes of climate, and endeavors to create a unified strategy of all countries in terms of conservation, namely restriction of toxic exhaust and carbon oxides into the atmosphere, and which is up till now not ratified by the USA. But the attempts of the world community to resolve these global and interrelated problems by means of administrative measures show its inability to find the way out. So far the alternative power engineering is incapable to cope with this developing global crisis. So, is there a way out and where is the way to save the human civilization? In my opinion, this new and radical way of the world community lies through the development of the new methods to utilize and introduce into practice the energy of electrical and magnetic fields to create pure and effective technologies, - which is what I propose. This will result in abundant energy resources and simultaneously solve the global ecological problem. My report is dedicated to the nature and the meaning of the new inventions and new technologies of Professor Dudyshev.

assess the physics and role of electrical and magnetic fields in natural and technological processes as well as it has to find the effective means of their utilization. These inventions and discoveries will open the humanity a way to create new generation of thermocompressors, which will help to solve the global energy problem by means of development of low-cost, ecologically clear method to produce cheap hydrogen and useful types of energy (mechanical, thermal and electrical) [1,2,21,27,35,50-55].

These inventions and discoveries are briefly announced in the articles published in the world web at:

<http://www.sciteclibrary.ru/rus/catalog/pages/7601.html>
<http://ntpo.com/invention/invention2/8.shtml>

Since I am very much limited by the format of this notice I only give a couple of examples of my discoveries and the most significant pioneering inventions as well as new electrical technologies based on them. Owing to their effectiveness, they can revolutionize science and technology, transport and other fields, all in the nearest future.

Overall Methodology and Nature of the Proposed New Technologies

If humanity wants to obtain new paradigm and strategy of stable development, it has to re-

Electrical Field and Pure Burning. Fire Technologies by Professor Dudyshev

I have discovered that electrical fields with certain parameters exert powerful catalytic

effect on the process of combustion [1]. This phenomenon opens the way to effectively control the combustion of substances from intensification to total quenching [1,2]. Based on this discovery, which was experimentally proved by many of the world known scientists, I propose a whole range of ecologically pure and intensive electric combustion technologies. In particular, to save fuel at heat stations, to create an ecologically clear automobile engine, for pure utilization of waste by means of electrical combustion and transformation of waste into first-class fuel, as well as for momentary non-contact fire extinguishing [1-31]. Following are the addresses of my articles published in the WWW:

<http://ingenrw.narod.ru/Dud/Opi2.html>
<http://ntpo.com/techno/techno3/11.shtml>
<http://ecip.newmail.ru/iss/2002/0502.htm>
<http://www.ntpo.com/invention/invention3/19.shtml>

Electrical Field and Cheap Hydrogen. Fuel Gas Generated from Water and Aqueous Solutions
 I have discovered the phenomenon of Intensive Cold Capillar Evaporation of fluids inside of the powerful electric fields along with their simultaneous dissociation into H_2 and fuel gas. Based on this I have proposed and experimentally proved new effective H_2 -fuel technologies [32-35].

Details see in my articles at:

<http://www.sciteclibrary.ru/rus/catalog/pages/7599.html>
<http://www.efir.com.ua/rus/a.php?r=0&d=1>
<http://ecip.newmail.ru/iss/2004/0804.htm>
<http://www.ntpo.com/techno/techno2/6.shtml>

Electric Field and New Coulomb Electromechanics by Prof. Dudyshev

I have discovered a new phenomenon of explosive electron emission and powerful wave of pressure in fluids and gases inside of impulse electrical and electromagnetic fields and proposed new effective methods of utilization of the energy of electric field in power engineering and technology [36-39]. These

inventions open the way for supereffective and low-cost methods of transforming energy of electric field into kinetic energy. I have also proposed new non-contact electric-field motors and generators. More details see in my articles published in WWW at:

<http://ntpo.com/physics/studies/23.shtml>
<http://www.faraday.ru/ruscontent17.html>
<http://www.valery12.narod.ru/index1.htm>
<http://www.efir.com.ua/rus/a.php?r=2&d=22>
<http://www.faraday.ru/ruscontent13.html>

New Magneto-Mechanical Phenomena. New Magnet-Mechanic-Electrical Power Engineering by Prof. Dudyshev

I have discovered the phenomenon of direct transformation of magnetic energy of permanent magnets into various types of energy, and in particular into kinetic energy and electrical energy. I have also proposed methods and various mechanisms to practically utilize this phenomenon in power engineering and technology [39-41].

<http://ntpo.com/invention/invention2/25.shtml>
<http://ntpo.com/invention/invention2/27.shtml>

New Effective Method of Conversing of Energy of ElectroHydroDynamic Impact into Cheap Heat and Various Types of Energy

I have developed, approved and patented cavity- electrohydraulic method to utilize the Yutkin electrohydro impact effect to obtain cheap heat and electrical energy [42].

<http://www.ntpo.com/techno/techno2/7.shtml>

Inventions based on this phenomenon open the way for new electrohydrodynamic power engineering and mechanics to produce supereffective and low cost heat generators, electrical charge water turbines, hydro- turbo-thermal- and electric generators, fuel free transport engines.

RADICAL ELECTRICAL ENERGY SAVINGS

I have proposed, approved and patented a novel effective method to radically save electrical energy (30-40%) by means of forced elimination of reactive currents in "source-alternating current load" circuits [43-46]. These inventions are revolutionary for the global power engineering and are able to help save substantial amounts of electrical energy.

More details see at: <http://www.ntpo.com/techno/techno2/8.shtml>

Renewable Energy of Geoelectricity and Geomagnetism and the Means of their Utilization for the Global Electrical and Heat Power engineering

I have discovered how electrical charge and electrical and magnetic field of the Planet and its ionosphere are formed and explained in the new way, from the electromechanical point of view, and based on the above mentioned discoveries, the reasons for all natural phenomena including the Planet's rotation and known natural anomalies [50-55].

On the basis of these fundamental discoveries, I have proposed methods to obtain cheap electrical energy by means of utilization of the renewable energy of ionosphere and magnetosphere of the Earth and novel methods of cutting the result of global warming or its total elimination, as well as cutting the results of all natural anomalies [50-55].

1. By means of dosated electrical discharge of ionosphere by a laser beam [55].
2. By means of utilization of Planet's geomagnetic field to produce electrical energy [50].
3. Methods of control of Planet's electrical charge and magnetic field in order to to control the natural phenomena and prevent global warming [50].

More details see at:

http://ntpo.com/secrets_ground/secrets_ground/14.shtml
<http://www.sciteclibrary.ru/rus/catalog/pages/7600.html>
<http://kuasar.narod.ru/library/new-space-energy/>
<http://kuasar.narod.ru/library/new-space-energy/space-capacitors.htm>

Conclusions:

1. Above mentioned discoveries, inventions and methods of utilization of energy of electrical and magnetic fields are very useful to effectively overcome the global energy and ecological crises since they open the way to ecologically pure production of hydrogen, gas synthesis and all useful types of energy in quantities abundant for the visible future.
2. New Electro-combustion technology of extinguishing of fire and the newest technologies for the prevention of natural anomalies will help save millions of lives from man-caused and natural cataclysms.
3. New electrical combustion technology helps effectively and purely utilize any type of waste and converse it into useful fuel as well as to manufacture ecologically clear transport engines.
4. New electroosmotic technology helps to effectively obtain cheap hydrogen and fuel gas from any aqueous solution.

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News from Integrity Research Institute

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Canadian Researcher Invents New Solar Cell

TORONTO (Reuters) - It may only be a matter of time before we will be using our shirts to charge our cellphones. Researchers at the University of Toronto have invented a flexible plastic solar cell that is said to be five times more efficient than current methods in converting energy from the sun into electrical energy.

Team leader Ted Sargent, a professor of electrical and computer engineering at the university, said the cell harnesses infrared light from the sun and can form a flexible film on the surface of cloth, paper or other materials. And the film can turn 30 percent of the sun's power into usable electrical energy - a far better performance than the 6 percent gleaned from the best plastic solar cells now in use.

"The fact that these materials harness the sun's energy using flexible materials potentially could allow you to weave the plastics into fibers, sort of the way we have synthetic fibers already, and to weave those into clothing and make something that's a wearable solar cell," Sargent said from Boston, where he is working until the summer.

"That's sort of portable electricity," Sargent said the coating could be woven into a shirt or sweater and used to charge an item like a cellphone. "We expect that our cellphones or our e-mail can go anywhere with us, but we don't have that expectation of a continuous supply of power. The best that we have is batteries, which run out," he said. "So if we could have a wireless source of power like how the sun would provide, this would be pretty exciting."

Research about the new cell was published in the Sunday online edition of the scientific journal *Nature Materials*, and Sargent said he was now looking for investors who could turn the invention into a commercially viable product.

Terry White, president of the Solar Energy Society of Canada said solar cells on these lines could transform the industry. "If they make (solar cells) both less expensive and the potential applications more varied, then it's a major breakthrough," he said. Sargent said the technology could be available to the average consumer within five to ten years. But it already has Wall Street venture capitalists interested.

"The technology really caught my eye both in the scientific literature and the business prospects," said Josh Wolfe, managing partner at Lux Capital in Manhattan, a venture capital firm that makes an estimated \$1- to \$2-million U.S. investment per project in early stage nanotechnology.

"So the concept of having rollable newspaper displays or other things that could power your laptop or portable devices or create new products that are best left to the creativity of the engineers, to me, it represents a pretty sea-change."

So what happens if the sun doesn't shine? "There is obviously no power in the visible (light)," said Sargent. "But in the infrared, it's not completely zero power. It doesn't have to be as hot as the sun, but everything that's warm, gives off some heat. Even people and animals give off heat."

So there actually is some power remaining in the infrared even when it appears to us to be dark outside."

With Geopolitics, Cheap Oil Recedes Into Past

IT was a year that people in the oil markets are unlikely to forget - a year that prices set records, forecasts lost touch with reality, and almost everything that could go wrong, did. It was also a year that politics returned to the oil market.

And the trend is likely to continue this year. While oil prices have declined since October, many of the issues that have vexed the oil industry in 2004 are expected to recur. Cheap oil increasingly looks like a thing of the past.

Through the 1990's, prices were stable, supplies were secure and there was plenty of extra capacity to keep energy costs low and world growth buzzing. At an average of \$20 a barrel, oil was viewed as just another commodity.

But then came ethnic and labor troubles in Nigeria; chaos and protests in Venezuela before President Hugo ChAvez won a referendum allowing him to stay in power; hardball energy politics in Russia; and the continuing insurgency in Iraq.

While supplies of oil to the world markets were rarely interrupted, the uncertainties created by these events raised crude oil prices in New York by two-thirds this year, to a high of more than \$55 a barrel in October. And as energy costs surged, many analysts, traders and politicians woke up to the reality that oil was different from cocoa or coffee.

"Oil is a political commodity," said Robert Mabro, president of the Oxford Institute for Energy Studies, one of the world's foremost energy experts. "Geopolitics is the most fundamental issue if you're looking at oil markets. People seem to have forgotten that since the 1980's."

Of course, this is not the first time that oil and politics have mixed.

Decades ago, militant governments in Iran and Libya, for example, nationalized their oil

sectors, forcing American and European companies out and taking charge of their natural resources. Then came the oil embargo and the price shocks of 1973-74 and 1978-81, with long lines for gasoline and steep rises in inflation.

But for the most part, politics had dropped off the energy map since then. In the 1980's, energy experts largely discounted a war between two of the Persian Gulf's top oil producers, Iran and Iraq, because Saudi Arabia and some other OPEC nations could simply crank up their production to make up for losses.

Even the invasion of Kuwait by Iraq in the summer of 1990, and the subsequent embargo on their oil exports, roiled energy markets for only a few weeks.

But in recent years, the oil industry has undergone a fundamental change. While demand has steadily increased each year, the industry's exploration efforts have not kept pace in new discoveries.

Now that worldwide production is running at full speed to meet increased demand, there is no cushion left in the system to weather a potential blow to producers like Iraq, Venezuela, Iran, Russia or Nigeria. So, once again for oil markets, politics matters.

For instance, said Amy Myers Jaffe, the associate director of Rice University's energy program, Saudi Arabia's oil industry is no longer seen as being impenetrable to terrorist attacks; tensions in the Persian Gulf could swell over Iran's nuclear program; Nigerian factions may erupt in violence; and the fighting in Iraq goes on.

"All kinds of things can affect this market," Ms. Jaffe said, "especially when you're in a razor-thin situation. The only thing that could dramatically alter the outlook is a major economic recession."

The heightened geopolitical risk has translated into higher prices, something analysts call a "risk premium." Crude oil prices have averaged \$30 a barrel since 2000, but last year crude oil in New York climbed to an average of \$41 a

barrel. While energy prices are high, adjusted for inflation they are below the level in March 1981, when crude oil approached \$70 a barrel in today's dollars. Still, analysts do not expect prices to fall anytime soon.

High world prices since mid-2002 have helped sustain the economic recovery of Russia, which is raising output, according to the Energy Information Agency of the Department of Energy.

The former Soviet Union, of which Russia is by far the biggest country, is the world's largest producer, the agency says, followed by Saudi Arabia and the United States. The biggest consumers are the United States, which imports over half its needs; China; Japan; and the former Soviet Union, which uses about a third as much as it produces. Leo Drollas, chief economist for the Center for Global Energy Studies in London, expects oil prices to be higher in 2005, on average, than they have been this year. The institute was founded in 1990 by Sheik Ahmed Zaki Yamani, the former Saudi oil minister.

Even oil companies, which are usually extremely conservative about their price outlook, are coming around to that realization. Lord Browne, the chief executive of BP, now sees a new bottom of \$30 a barrel for the next few years.

"There is something fundamental holding prices up, whether that's at \$45, \$40 or \$35 a barrel," Mr. Mabro of the Oxford Institute said. "And politics won't improve things. Except if you believe a miracle is going to happen in Iraq."

*JAD MOUAWAD New York Times,
January 3, 2005*

US Review Rekindles Cold Fusion Debate

Energy panel split over whether experiments produced power. Claims of cold fusion are intriguing, but not convincing. That is the conclusion of an 18-member scientific panel tasked with reviewing research in the area.

The findings, which were released on 1 December by the US Department of Energy, rekindle a 15-year-old debate over whether nuclear fusion can occur at room temperature.

According to the report, the panel was "split approximately evenly" on the question of whether cold experiments were actually producing power in the form of heat. But members agreed that there is not enough evidence to prove that cold fusion has occurred, and they complained that much of the published work was poorly documented.

The review is a positive step for the field of cold fusion, according to David Nagel at George Washington University in Washington DC, who co-authored the summary of cold-fusion work that the panel reviewed. "Most scientists think that cold fusion is laughable, but when the dust settled, the researchers reviewing our work were evenly split," he says.

"Most scientists think that cold fusion is laughable, but when the dust settled, the researchers reviewing our work were evenly split." David Nagel (cold fusion researcher at George Washington University in Washington DC). Others remain sceptical, however. "It is astonishing that the panel didn't find cold fusion convincing after almost 15 years of additional research," says Bob Park, a professor of physics at the University of Maryland, College Park, and author of Voodoo Science, a book about junk science. Park says that although the quality of research has improved, no one should buy into cold fusion just yet.

Hot stuff

Fusion commonly occurs in stars like the Sun, where hydrogen atoms melt together to form helium and release huge amounts of energy in the process. Scientists have long believed that fusion has the potential to be an enormous source of power here on Earth. However, no one has yet been able to control fusion reactions because they only occur at temperatures and pressures similar to those found in stars.

Or so scientists thought until 1989, when Stanley Pons and Martin Fleischmann of the University of Utah claimed to have created a

new kind of fusion inside a small canister of water. Pons and Fleischmann claimed that when they ran an electrical current between two palladium plates separated by water containing deuterium, a heavy isotope of hydrogen, it created a small but measurable fusion reaction.

In a highly publicized press conference in Utah, the scientists claimed that this 'cold fusion' had the potential to revolutionize the world's energy production.

Pons and Fleischmann's claims were quickly debunked by other scientists, who pointed out numerous experimental errors in the measurements. But the idea of cold fusion lives on in movies and science fiction, and among a small cadre of researchers.

Those researchers finally caught the ear of the US energy secretary, Spencer Abraham, who commissioned the review in August 2003 from the department's science directorate.

Although the reviewers remained sceptical, they were nearly unanimous in their opinion that the energy department should fund well-thought-out proposals for cold fusion. Nagel says that he expects many in the long neglected field to submit research plans in the coming months. "I will be among them," he adds.

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Geoff Brumfiel, Nature,

December 2, 2004

Antigravity Has Feet of Clay

Space agency report is a downer for gravity-control researchers. Interstellar spacecraft powered by warp drives are still the stuff of science fiction.

Could astronauts take a leaf out of H. G. Wells's book *The First Men in the Moon*, and use spacecraft propelled by antigravity devices? Some see the idea as science fiction, but major space agencies take it seriously.

In 2001, the European Space Agency (ESA) commissioned two scientists to evaluate schemes for gravity control. They have concluded that, even if such control were possible, the benefits for lifting spacecraft out of the Earth's gravitational field would probably not be worth the effort.

But scientists working on such propulsion schemes dispute the report. "I regard the conclusion, even if correct, as uninteresting and, frankly, irrelevant", says James Woodward of California State University at Fullerton, who has worked for NASA on gravity-control propulsion.

NASA ran a research programme on speculative propulsion methods, called Breakthrough Propulsion Physics, from 1996 until its funding was cut in 2003. The project's founder and former manager, Marc Millis of NASA's Glenn Research Center in Cleveland, Ohio, says that the ESA report corrects some misconceptions in the field of gravity control. But he thinks its scope is too limited to rule out future research in the area.

"The risk of this paper is that the casual reader will more broadly interpret the negative findings to apply to all inquiries into gravitational or inertial manipulation," says Millis.

The report is not meant to kill off all such ideas, says one of its authors, cosmologist Orfeu Bertolami of Lisbon's Technical University in Portugal. "Our recommendation to ESA was to keep a critical eye on them," he says. But, he adds, "this should be a low-intensity activity. Our estimates show that conventional ideas [for propulsion] are much more effective."

Down to Earth

Wells's fantasy hinges on the invention of a substance that shields any object placed above it from the Earth's gravity. But can such a material really exist? Antigravity seems to violate the law of conservation of energy, which prohibits perpetual motion. Place a wheel half over such a gravity shield and the shielded segment will rise, causing the wheel to rotate forever without a power source.

"Conventional ideas for propulsion are much more effective" says Orfeu Bertolami, author of ESA report on antigravity. What's more, gravity cannot be screened out in the same way as light or sound: Einstein's general theory of relativity explains that gravity results from the way mass distorts space-time itself.

But relativity is not the last word on the subject. "Gravity does not fit into the standard model of particle physics," says Clovis de Matos, technical officer in charge of the ESA study. "And we do not understand the gravitational interaction at the quantum level."

De Matos explains that ESA commissioned the survey of gravity control partly to establish whether a quantum theory of gravity might expose loopholes in our current understanding that space technology could exploit.

Bertolami and his co-author, Martin Tajmar of the space technology company ARC Seibersdorf in Austria, looked at proposals for assisting spacecraft launch by weakening gravity. They were not impressed. "None of the proposals seemed convincing and detailed enough," says Bertolami. "Experimentally and theoretically they do not seem to meet a standard we could qualify as scientific."

Floating ideas

All the same, the researchers did feel that some ideas for modifying gravity are worth exploring. For example, as they are reaching the edge of the Solar System, NASA's Pioneer spacecraft are deviating from their expected trajectories. This has led some scientists to suggest that the current theory of gravity is incomplete.

There have also been suggestions that magnetic effects in materials whose behaviour is dominated by quantum effects, such as superconductors, might induce a kind of artificial gravity. NASA scientists have studied claims by Russian physicist Eugene Podkletnov that a spinning superconductor can act as a gravity shield, reducing the weight of an object placed above it by about 2%.

Independent scientists have been unable to reproduce this and similar claims, says Tajmar. He and Bertolami conclude that there are currently no good grounds for taking such effects seriously. All the same, they don't rule out the possibility of gravitational anomalies in quantum materials.

Other options involve the gravitational and inertial masses of objects. Gravitational mass

determines the force of gravity experienced by the object; inertial mass determines how much force is needed to set it in motion. General relativity says that the two definitions are identical, but some theories of quantum gravity suggest that they differ.

Tajmar and Bertolami looked at schemes to alter one kind of mass, leaving the other unchanged. They found that reducing the inertial mass has no effect on the amount of fuel needed to launch a spacecraft. And altering the gravitational mass alone, by gravity shielding for example, doesn't help unless the shielding is almost total.

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Philip Ball, Nature, 26 January 2005

The Daintiest Dynamos

By harvesting energy from radioactive specks, nuclear microbatteries could power tomorrow's microelectromechanical marvels and maybe your cellphone, too.

For several decades, electronic circuitry has been shrinking at a famously dizzying pace. Too bad the batteries that typically power those circuits have not managed to get much smaller at all.

In today's wrist-worn GPS receivers, matchbox-size digital cameras, and pocketable personal computers, batteries are a significant portion of the volume. And yet they don't provide nearly enough energy, conking out seemingly at the worst possible moment.

The reason is simple: batteries are still little cans of chemicals. They function in essentially the same way they did two centuries ago, when the Italian physicist Alessandro Volta sandwiched zinc and silver disks to create the first chemical battery, which he used to make a frog's leg kick.

Now, with technologists busily ushering in a new age of miniaturization based on microelectromechanical systems (MEMS), batteries have arrived at a critical juncture. MEMS are finding applications in everything from the sensors in cars that trigger air bags to injectable drug delivery systems to environmental monitoring devices. Many of these systems ideally have to work for long periods, and it is not always easy to replace or recharge their batteries. So to let these miniature machines really hit their stride, we'll need smaller, longer-lasting power sources.

For several years our research groups at Cornell University and the University of Wisconsin-Madison have been working on a way around this power-source roadblock: harvesting the incredible amount of energy released naturally by tiny bits of radioactive material.

The microscale generators we are developing are not nuclear reactors in miniature, and they don't involve fission or fusion reactions. All energy comes from high-energy particles spontaneously emitted by radioactive elements. These devices, which we call nuclear microbatteries, use thin radioactive films that pack in energy at densities thousands of times greater than those of lithium-ion batteries [see table, "Energy Content"].

A speck of a radioisotope like nickel-63 or tritium, for example, contains enough energy to power a MEMS device for decades, and to do it safely. The particles these isotopes emit, unlike more energetic particles released by other radioactive materials, are blocked by the layer of dead skin that covers our bodies. They penetrate no more than 25 micrometers in most solids or liquids, so in a battery they could safely be contained by a simple plastic package [see sidebar, "Not All Radioisotopes Are Equal."]

Our current prototypes are still relatively big, but like the first transistors they will get smaller, going from macro- to microscale devices. And if the initial applications powering MEMS devices go well, along with the proper packaging and safety considerations, lucrative uses in handheld devices could be next. The small nuclear batteries may not be able to provide enough electric current for a cellphone or a

PDA, but our experiments so far suggest that several of these nuclear units could be used to trickle charges into the conventional chemical rechargeable batteries used in handheld devices. Depending on the power consumption of these devices, this trickle charging could enable batteries to go for months between recharges, rather than days, or possibly even to avoid recharges altogether.

"IT IS A STAGGERINGLY SMALL WORLD THAT IS BELOW," said physicist Richard P. Feynman in his famous 1959 talk to the American Physical Society, when he envisioned that physical laws allowed for the fabrication of micro- and nanomachines and that one day we would be able to write the entire Encyclopaedia Britannica on the head of a pin.

Feynman's vision has finally begun to materialize, thanks to ever more sophisticated microelectronics. Micro- and nanoscale machines are poised to become a multibillion-dollar market as they are incorporated in all kinds of electronic devices. Among the revolutionary applications in development are ultradense memories capable of storing hundreds of gigabytes in a fingernail-size device, micromirrors for enhanced displays and optical communications equipment, and highly selective RF filters to reduce cellphone size and improve the quality of calls.

But, again, at very small scales, chemical batteries can't provide enough juice to power these micromachines. As you reduce the size of such a battery, the amount of stored energy goes down exponentially. Reduce each side of a cubic battery by a factor of 10 and you reduce the volume and therefore the energy you can store by a factor of 1000. In fact, researchers developing sensors the size of a grain of sand had to attach them to batteries they couldn't make smaller than a shirt button.

IN THE QUEST TO BOOST MICROSCALE POWER GENERATION, several groups have turned their efforts to well-known energy sources, namely hydrogen and hydrocarbon fuels such as propane, methane, gasoline, and diesel. Some groups are developing microfuel cells that, like their macroscale counterparts, consume hydrogen to produce electricity.

Others are developing on-chip combustion engines, which actually burn a fuel like gasoline to drive a minuscule electric generator.

There are three major challenges for these approaches. One is that these fuels have relatively low energy densities, only about five to 10 times that of the best lithium-ion batteries. Another is the need to keep replenishing the fuel and eliminating byproducts. Finally, the packaging to contain the liquid fuel makes it difficult to significantly scale down these tiny fuel cells and generators.

The nuclear microbatteries we are developing won't require refueling or recharging and will last as long as the half-life of the radioactive source, at which point the power output will decrease by a factor of two. And even though their efficiency in converting nuclear to electrical energy isn't high about 4 percent for one of our prototypes the extremely high energy density of the radioactive materials makes it possible for these microbatteries to produce relatively significant amounts of power.

For example, with 10 milligrams of polonium-210 (contained in about 1 cubic millimeter), a nuclear microbattery could produce 50 milliwatts of electric power for more than four months (the half-life of polonium-210 is 138 days). With that level of power, it would be possible to run a simple microprocessor and a handful of sensors for all those months. And the conversion efficiency won't be stuck at 4 percent forever. Beginning this past July we started working to boost the efficiency to 20 percent, as part of a new Defense Advanced Research Projects Agency program called Radio Isotope Micro-power Sources.

Space agencies such as NASA in the United States have long recognized the extraordinary potential of radioactive materials for generating electricity. NASA has been using radioisotope thermoelectric generators, or RTGs, since the 1960s in dozens of missions, like Voyager and, more recently, the Cassini probe, now in orbit around Saturn. Space probes like these travel too far away from the

sun to power themselves with photovoltaic arrays.

RTGs convert heat into electricity through a process known as the Seebeck effect: when you heat one end of a metal bar, electrons in this region will have more thermal energy and flow to the other end, producing a voltage across the bar. Most of NASA's washing-machine-size RTGs use plutonium-238, whose high-energy radiation can produce enormous heat.

But as it turns out, RTGs don't scale down well. At the diminutive dimensions of MEMS devices, the ratio between an object's surface and its volume gets very high. This relatively large surface makes it difficult to sufficiently reduce heat losses and maintain the temperatures necessary for RTGs to work. So we had to find other ways of converting nuclear into electric energy.

ONE OF THE MICROBATTERIES WE DEVELOPED early last year directly converted the high-energy particles emitted by a radioactive source into an electric current. The device consisted of a small quantity of nickel-63 placed near an ordinary silicon p-n junction a diode, basically. As the nickel-63 decayed, it emitted beta particles, which are high-energy electrons that spontaneously fly out of the radioisotope's unstable nucleus. The emitted beta particles ionized the diode's atoms, creating paired electrons and holes that are separated at the vicinity of the p-n interface. These separated electrons and holes streamed away from the junction, producing the current.

Nickel-63 is ideal for this application because its emitted beta particles are rather slow; if the particles were more energetic, they would travel longer distances, thus escaping the battery. The device we built was capable of producing about 3 nanowatts with 0.1 millicurie of nickel-63, a small amount of power but enough for applications such as nanoelectronic memories and the simple processors for environmental and battlefield sensors that some groups are currently developing.

The new types of microbatteries we are working on now can generate substantially more power. These units produce electricity indirectly, like minute generators. Radiation from the sample is converted first to mechanical energy and then to oscillating pulses of electric energy. Even though the energy has to go through the intermediate, mechanical phase, the batteries are no less efficient; they tap a significant fraction of the kinetic energy of the emitted particles for conversion into mechanical energy. By releasing this energy in brief pulses, they provide much more instantaneous power than the direct-conversion approach.

For these batteries, which we call radioactive piezoelectric generators, the radioactive source is a 4-square-millimeter thin film of nickel-63 [see illustration, "Power >From Within"]. On top of it, we cantilever a small rectangular piece of silicon, its free end able to move up and down. As the electrons fly from the radioactive source, they travel across the air gap and hit the cantilever, charging it negatively. The source, which is positively charged, then attracts the cantilever, bending it down.

A piece of piezoelectric material bonded to the top of the silicon cantilever bends along with it. The mechanical stress of the bend unbalances the charge distribution inside the piezoelectric crystal structure, producing a voltage in electrodes attached to the top and bottom of the crystal.

After a brief period whose length depends on the shape and material of the cantilever and the initial size of the gap the cantilever comes close enough to the source to discharge the accumulated electrons by direct contact. The discharge can also take place through tunneling or gas breakdown. At that moment, electrons flow back to the source, and the electrostatic attractive force vanishes. The cantilever then springs back and oscillates like a diving board after a diver jumps, and the recurring mechanical deformation of the piezoelectric plate produces a series of electric pulses. The charge-discharge cycle of the cantilever repeats continuously, and the resulting electric pulses can be rectified and

smoothed to provide direct-current electricity. Using this cantilever-based power source, we recently built a self-powered light sensor [see photo, "It's Got the Power"]. The device contains a simple processor connected to a photodiode that detects light variations.

Nuclear batteries can pack in energy at densities THOUSANDS OF TIMES greater than those of lithium-ion batteries.

Also using the cantilever system, we developed a pressure sensor that works by "sensing" the gas molecules in the gap between the cantilever and the source. The higher the ambient pressure, the more gas molecules in the gap. As a result, it is more difficult for electrons to reach and charge the cantilever. Hence, by tracking changes in the cantilever's charging time, the sensor even detects millipascal variations in a low-pressure environment like a vacuum chamber.

To get the measurements at a distance, we made the cantilever work as an antenna and emit radio signals, which we could receive meters away in this application the little machine was "radio active" in more ways than one. The cantilever, built from a material with a high dielectric constant, had metal electrodes on its top and bottom. An electric field formed inside the dielectric as the bottom electrode charged. When it discharged, a charge imbalance appeared in the electrodes, making the electric field propagate along the dielectric material. The cantilever thus acted like an antenna that periodically emitted RF pulses, the interval between pulses varying accordingly to the pressure.

What we'd like to do now is add a few transistors and other electronic components to this system so that it can not only send simple pulses but also modulate signals to carry information. That way, we could make MEMS-based sensors that could communicate with each other wirelessly without requiring complex, energy-demanding communications circuitry.

NUCLEAR MICROBATTERIES MAY ULTIMATELY CHANGE the way we power

many electronic devices. The prevalent power source paradigm is to have all components in a device's circuitry drain energy from a single battery. Here's another idea: give each component sensor, actuator, microprocessor its own nuclear microbattery. In such a scheme, even if a main battery is still necessary for more power-hungry components, it could be considerably smaller, and the multiple nuclear microbatteries could run a device for months or years, rather than days or hours.

One example is the RF filters in cellphones, which now take up a lot of space in handsets. Researchers are developing MEMS-based RF filters with better frequency selectivity that could improve the quality of calls and make cellphones smaller. These MEMS filters, however, may require relatively high dc voltages, and getting these from the main battery would require complicated electronics. Instead, a nuclear microbattery designed to generate the required voltage in the range of 10 to 100 volts could power the filter directly and more efficiently.

Another application might be to forgo the electrical conversion altogether and simply use the mechanical energy. For example, researchers could use the motion of a cantilever-based system to drive MEMS engines, pumps, and other mechanical devices. A self-powered actuator could be used, for instance, to move the legs of a microscopic robot. The actuator's motion and the robot's tiny steps would be adjusted according to the charge-discharge period of the cantilever and could vary from hundreds of times every second to once per hour, or even once per day.

THE FUTURE OF NUCLEAR MICROBATTERIES depends on several factors, such as safety, efficiency, and cost. If we keep the amount of radioactive material in the devices small, they emit so little radiation that they can be safe with only simple packaging. At the same time, we have to find ways of increasing the amount of energy that nuclear microbatteries can produce, especially as the conversion efficiency begins approaching our targeted 20

percent. One possibility for improving the cantilever-based system would be to scale up the number of cantilevers by placing several of them horizontally, side by side. In fact, we are already developing an array about the size of a postage stamp containing a million cantilevers. These arrays could then be stacked to achieve even greater integration.

Another major challenge is to have inexpensive radioisotope power supplies that can be easily integrated into electronic devices. For example, in our experimental systems we have been using 1 millicurie of nickel-63, which costs about US \$25 too much for use in a mass-produced device. A potentially cheaper alternative would be tritium, which some nuclear reactors produce in huge quantities as a byproduct. There's no reason that the amount of tritium needed for a microbattery couldn't cost just a few cents.

Once these challenges are overcome, a promising use for nuclear microbatteries would be in handheld devices like cellphones and PDAs. As mentioned above, the nuclear units could trickle charge into conventional batteries. Our one-cantilever system generated pulses with a peak power of 100 milliwatts; with many more cantilevers, and by using the energy of pulses over periods of hours, a nuclear battery would be able to inject a significant amount of current into the handheld's battery.

How much that current could increase the device's operation time depends on many factors. For a cellphone used for hours every day or for a power-hungry PDA, the nuclear energy boost won't help much. But for a cellphone used two or three times a day for a few minutes, it could mean the difference between recharging the phone every week or so and recharging it once a month. And for a simple PDA used mainly for checking schedules and phone numbers, the energy boost might keep the batteries perpetually charged for as long as the nuclear material lasts.

Nuclear microbatteries won't replace chemical batteries. But they're going to power a whole new range of gadgetry, from

nanorobots to wireless sensors. Feynman's "staggeringly small world" awaits.

See Nuclear Solutions website for details of the "betavoltaic battery" invented by Dr. Paul Brown. Brown's patents include "Layered Metal Foil Semiconductor Power Device" #6,118,204, "Isotopic Semiconductor Batteries" #6,236,812, "Apparatus for Direct Conversion of Radioactive Decay Energy to Electrical Energy" #4,835,433 at www.uspto.gov.

Other nuclear beta particle battery patents include: Lucent Technologies' "Self-Powered Device" #5,642,014

Ohmart's "Radio Electric Generator" #2,696,564, "Radioactive Battery with Chemically Dissimilar Electrodes" #3,019,358 and "Method and Apparatus for Converting Ionic Energy into Electrical Energy" #3,142,254

Linder's "Method and Means for Generating and/or Controlling Electrical Energy" #2,548,225

All of the above are included in IRI's newest report - "Nuclear Batteries: A Portable Energy Source"

*By Amit LaL & James Blanchard,
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Four-dimensional resonance

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Discontinuity of energy levels, particularly quantized atomic states, is studied in physics in detail. It is characterized by Planck's constant. In a presented article, this effect is considered as a particular case. Other examples demonstrating the general law of formation of matter particles and also elements of living matter, such as DNA, are shown.

Curvature

The linear curvature in mathematics is a value, which is inversed to some radius and it can be measured in reversed meters:

$$\rho = 1/R \quad [1/m] \quad (F.1)$$

In physics, there is an equidimensional value of the same dimension ($1/m$) called "wave number". It is reversed to wave-length value. Curvature of flatness is determined by two crossed lines. For example, for some sphere, we can use the following formula:

$$\rho = 1/R + 1/R = 2/R \quad (F.2)$$

It would be logical to develop this approach for three-dimensional space but we have to specify a radius' direction, i.e. radius of curvation of the three-dimensional space. Let's use analog approach. A line can be curved in the direction, which is "not included in it", as P.D. Uspenskiy wrote [1]. Surface of sphere is curved in the orthogonal direction to this surface. In both cases, space of line (one-dimensional) or space of surface (two-dimensional) can be self-closed i.e. connected to itself, then any motion in such space becomes cyclic. A parameter appears characterizing repetition of location (position data) of a point during its motion in the closed space. This parameter depends on motion speed and radius of the closed space. Actually, this is

a period of time. Hence, the time has the physical sense only considering some process (motion) in the space of known curvature. Three-dimensional space, observed by us, is curved in the direction of the fourth dimension. It creates periodicity of all processes: from oscillation of a pendulum to the process of isotopes decay (half-period of isotopes). We can suggest that the space itself is created due to some global process of energy density changing and in such case it is necessary to introduce notion of "the space of some process". Dimensionality of this space is determined by the parameters of the process. It can be more than 3 dimensions but in this case it is possible to use the theory of smooth variation of dimension (from 3 to 4).

Let's consider technical aspects. Using "energy density" term for the one-dimensional space, it is easy to find its physical analog: current density. In the two-dimensional space, energy density corresponds with a transverse electromagnetic wave. In its turn, changing of volumetrical energy density is a physical mechanism of creation of the three-dimensional space of process. Periodicity of the three-dimensional space's existence is characterized by its curvature:

$$\rho = 3/R \quad [1/m] \quad (F.3)$$

Technically, volumetrical energy density in space can be changing due to some modulation of density of any matter (including gas, steam or plasma) or density of energy. A number of electromagnetic methods of longitudinal waves' formation in aether environment also exist.

Calculation examples

1. Planet

Rotation period of our planet T is 31,557,600 seconds, which is equal to frequency of electromagnetic oscillation

$$f = 1/T = 3.16886 \cdot 10^{-8} \text{ [Hz]} \quad (\text{F.4})$$

and wave-length

$$L = c/f = 9.46 \dots 10^{16} \text{ [m]} \quad (\text{F.5})$$

So, curvature of the corresponding resonator (a value reciprocal to wave-length) is following:

$$\rho = 1/L = 1057.00 \cdot 10^{-20} \text{ [1/m]} \quad (\text{F.6})$$

Let's note that it is an integer value (1057) with good accuracy. Due to the fact that a dimension "one meter" was introduced as 10^{-7} of a distance (a part of meridian) from North Pole to Equator of the planet, the integer value of curvature of the electromagnetic resonator of the planet, found by us, is predictable and accountable. Integer values of curvature for the case of matter particles and other natural objects are interesting facts discovering mechanism of its formation as resonance 4-dimensional processes in aether. Parameters of this process are determined by the planet process since the planet is main mass object in our space-time. We will give some examples.

2. Bohr's atom

Radius of Bohr's atom (hydrogen) is $R = 0.52917 \text{ [A]}$. According to F.3, we find that the corresponding curvature amounts to one

$$\rho = 3/R = 1.00 \times 10^{-9} \text{ [1/m]} \quad (\text{F.7})$$

It should be mentioned that it is a simplest atom, i.e. element of matter, and curvature of its space amounts to one. In other words, this is a process taking place in similar four-dimensional resonator as our planet 4-dimensional resonator, but of the another mathematical order. So, the Universe is fractal design and we can see the same in a small and in a great.

3. Proton

Let's calculate wave-length of a proton having mass equal to

$$m = 1.6726231 \cdot 10^{-27} \text{ [kg]} \quad (\text{F.8})$$

Wave-length is

$$L = h/mc = 0.75676739 \dots \text{ [m]} \text{ (not taking mathematical power into account)} \quad (\text{F.9})$$

Curvature of proton's space is an integer with fine precision too:

$$\rho = 1/L = 132141.000 \text{ [1/m]} \text{ (not taking mathematical power into account)} \quad (\text{F.10})$$

Taking mathematical power into account is not important in this case, because this is just a matter of unit of length measuring i.e. the scale aspect. It is important that we obtain the integer curvature values with high precision in this case also.

4. Resonance parameters of DNA-molecule

Parameters of DNA helical spiral molecule are known: diameter is 20 A, jaw is 34 A, branches' displacement is by 0.7 period. One turn length in a flatness measurement is 71.44117 A. The value reciprocal to this wave-length, i.e. curvature of one turn, is integer with precision of the third sign after dot!

$$\rho = 1/71.44117 \dots = 13.997 = 14 \text{ [1/m]} \text{ (not taking power into account)} \quad (\text{F.11})$$

It should be taken into account that there are 10 nucleotides in a convolution of DNA helix. Branches are counter-displaced by 0.7 convolutions. Length of this section is 50 A

$$L = 0.7 \times 71.44117 = 50.00 \text{ [A]} \quad (\text{F.12})$$

Correspondingly, curvature of this part of the DNA molecule is also integer $\rho = 2,00 \text{ [1/m]}$, not taking power into account. Considering the fact that both DNA branches are "twisted" around cylindrical surface, we can mentally superpose (join) them after linear displacement along the cylinder's axle for a distance corresponding with a single curvature. We can make a conclusion that DNA-structure is reflection of a structure of some real energy-information field, which is not investigated yet. From this point of view, DNA molecule can be considered as a parametrical 4-dimensional

resonator generating and receiving energy oscillations of the given field to receive or to emit its information signals. Below, we will describe which types of real physical fields can have such structure to be used for DNA molecules communication.

The similar method can be used for calculation of resonance parameters of processes corresponding to a codon (a part of DNA molecule consisting of three nucleotides), the whole code-length (19.2 convolutions), information code-length (18.3 convolutions), and stop-codon-length (0.9 convolutions).

It is necessary to note that the molecule is twisted in proportions known in wireless engineering as optimal ratio of the length of one turn L and the jaw X for antennas of circular polarization

$$L/X = 2.1 \quad (F.13)$$

So, the DNA molecular is designed as optimal antenna. Taking this fact into consideration, let's consider physical basis of method of transformation of energy and information signal peculiar to DNA. Understanding of this method will allow developing systems of managed wave influence on DNA-molecules to biological objects in order to launch organism's reconstruction (rejuvenation) and, thereby, preventing degradation of biological systems caused by changing of its genetic code.

Longitudinal waves

A longitudinal wave is a wave, where changing of energy density occurs in the direction of wave distribution. An acoustic longitudinal wave is known, which is alternation of compression and decompression of gas (air). Since Tesla and Hertz, a discussion about existence of longitudinal electromagnetic waves in aether continues. Today, a progressive part of practical scientists study methods of generation and detecting such waves while the official theoretical science denies this opportunity. Why? The reason is that the longitudinal wave can exist only in some medium, i.e. in a physical matter permitting compression and decompression, i.e. changes of energy density. To acknowledge existence of such matter, i.e. a

global aether, is to acknowledge existence of an absolute reference frame, which practically means existence of God. Actually, this is discussed by the theoretical scientists while the practicing ones use experimental facts. In 1932, N. Tesla wrote that the universal medium is an gaseous body, where only a longitudinal wave can be spreading... creating alternating compression and decompression similar to those generated by sound-waves in air. Thus, a wireless transmitter does not generate Hertz-waves, which are a myth, but generates sound-waves in aether. Their behavior is similar to behavior of sound-waves in air, apart from the fact that their speed is equal to speed of light due to huge elasticity and very small density of this environment [2]. Now, it is possible to say that creation of longitudinal waves in aether is an easy technical task and, practically, is indirectly used in special telecommunication systems. Some researchers purposefully study generation of aether currents by dividing a flow of electrically charged particles and a flow of aether particles using special technical devices (Tesla invented a magnetic breaker of electric arc for this purpose).

Then, let's study an analogy with another famous theory, which will help understand connection between longitudinal waves and the idea of "time". A famous Russian scientist Nikolay A. Kozyrev created a theory of "active properties of time" [3] and showed experimentally that any irreversible process in material object (i.e. the changing of entropy) generates "a wave of time density". Methods of detection these waves show that they are longitudinal waves. Detectors based on quartz resonators, used in experiments of Kozyrev, showed changing of oscillation frequency by some orders while, under usual conditions, quartz resonators have stable oscillation frequency. In fact, this wave is compression-decompression of the space itself, i.e. comparing space parameters of the compression area with parameters of the depressed area, some relative difference of object's sizes and speed of processes' can be found. These changes in matter of the detector's sensors led to changing of their indications, for example, electrical resistance of resistors or oscillation frequency of quartz changes. It is possible to say that aether density determines space parameters and

speed of process of existing for any material object, i.e. speed of time. Moreover, Kozyrev showed that changing of aether density leads to entropy or syntropy changes in matter. On the other hand, these changes create waves of "time density", i.e. waves of aether density, which can be considered as "waves of space dimension".

Coming through air, a longitude wave in aether also creates a sound-wave, which can be easily detected. Due to this, many people mistakenly think that it is enough to generate usual sound-waves although method of sound generation plays an important role. For example, one of the methods to generate volumetrical vibrations of matter is magnetostriction effect creating sound-waves among the others. Nevertheless, if in the case of magnetostriction the oscillator is placed in vacuum, it will produce aether vibrations only, i.e. the waves of energy density we have discussed above.

Let's continue: research of P.P. Gariajev [4] showed that biological genetic system can transfer information using "electromagnetic and sound waves". Probably, the authors discovered in their own experiments the mentioned above indirect effects of the longitudinal wave in aether since such waves have sound and electromagnetic components. An interesting practical question appears: how this wave can be generated or perceived by DNA-molecules?

Technically generation of electromagnetic waves with longitudinal component is possible using spiral antennas (analogy between such antennas and DNA-structure was already discussed in this article above), and also in the case of volumetrical matter density changes or surface charge density changes. Special characteristics of longitudinal waves generated by changing of plasma density were investigated in detail by Alexander V. Chernetsky [5] when he developed a research on the so called "self-generating discharge". We should note that, using half-period of "negative electrical conductivity" when electric-field vector is directed towards current displacement vector, according to the theory of Chernetsky, "conditions are created for energy transmission from the environment to the wave". Due to this,

the longitudinal waves can exist without external power source and without transmitter of the wave for a long time. Actually, this is aether life forms. Interference of longitudinal waves generated by any irreversible process, including the biological ones, creates permanent (self-maintaining) holographic picture of the universal information field of the planet, the so called "noosphere". Studying the mechanism of DNA molecules information exchange will allow creating new telecommunications methods. In connection with this, experiments of Akimov and Shipov [6] in this field show considerable promises. Also the research on DNA-molecules irradiation by non-Hertz (longitudinal) electromagnetic waves [7] show that there is an analogy between methods of creation and reproduction of holographic information and methods of creation and reproduction of genetic information. But we have to note that in this case it is 4-dimensional holograph. Let's consider this idea in detail.

Four-dimensional hologram

This idea is an original term introduced here by the author. In the usual holography, information is saved in the depth of a photo-emulsion plate in the form of interference layers created by light waves incoming from different points of the object while it is scanned by a laser ray during holograms' creation. In the four-dimensional holography, information is saved on a time interval, which cannot have a size less than the minimal one. This minimal size of the time interval is connected with Planck's constant.

Then, during reproducing of the three-dimensional hologram, every point of the plate (surface) gives a whole image of the object because ray of light (usually the laser beam) penetrates in the emulsion's depth and it is reflected in every part of the interference picture with different angle. The plate, where the three-dimensional hologram is saved, can be broken to pieces but each piece will give a whole picture of the object in case a surface's part is big enough for ray of light to come in its depth at a certain angle.

It is analogy with some minimum period of time for the 4-dimensional case or with Planck constant for quantum world. Accordingly, in order to save and reproduce the four-dimensional hologram, one point of the three-dimensional space is enough but the minimal time interval is necessary. On this time interval a pattern of Universal history (all irreversible processes) is saved as in emulsion's depth of 3-dimensional hologram. It is clear that technical methods for the case of four-dimensional hologram differ from the ones designed for the three-dimensional hologram. Instead of an image of the object showing its three-dimensional form in space, we will reproduce events or processes as a reflection of energy density changing in time (a four-dimensional image). The suggested concept also allows obtaining some information about future events, i.e. about future irreversible processes in the material objects, which actually exist now.

Conclusions

The conclusions are obvious: material particles of each planet are resonance vortex aether processes and characteristics of these processes depend on space-time parameters of this planet. Other planet determines other parameters. This idea is not news but the calculating method is discussed here for the first time. Searching for facts confirming the concept led us to discovery, which lies in finding connections between value of space curvature of natural objects, for example, proton or any matter particle, and the planet space's curvature. It is discovered that curvature of the given objects (with high precision) is integer, in case we use SI system and decimal numeration. These results can be explained by the fact that the measuring system uses a concept of "meter" introduced into practice since 1795 as a one ten-millionth sector of the Earth meridian from North Pole to Equator. Practical sense of the new approach is that it allows calculation of resonance conditions of creation of the material elements (both organic and other matter) for each planet. It is particularly important for space projects and experiments on changing of aether density, time and

gravitation control. Moreover, development of the four-dimensional curvature concept allows understanding the physical meaning of time and developing a theory of four-dimensional resonators, which create special conditions for vortex aether processes and, therefore, generate stable matter particles or isotopes. Studying four-dimensional resonators clears the way to practical research on teleportation of matter, radioactivity control, synthesis or controlled transformation (transmutation) of matter particles for energy generation.

Thus, we can ground quantifying action by Planck as a particular case and understand the physical meaning of the discovered rule of integer curvature values of natural processes' space. Obviously, there is the minimal time interval (period) determined by energy parameters of every process creating a space, for example, the space of the planet, space of some atom or DNA molecular. Integer value of curvature in macro-world (the planet) and in micro-world (Bohr's atom) proves fractal structure of Universe.

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Multi-Rotor Homopolar Device

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www.rialian.com/rnboyd/godin-rocshin.htm

US Patent #6,822,361, Nov. 23, 2004

Back in 1831, Michael Faraday discovered that a cylindrical magnet suspended by a string and touching a mercury bath at the bottom could generate electricity while spinning along its axis if a second electrical contact was made at the periphery of the midpoint of the magnet. His experiment was a one-piece homopolar machine since the magnet and conductor were joined together. Such Faraday generators have also been called acyclic, unipolar or homopolar generators because no commutation or alternating of the magnetic poles is necessary for this machine in order to generate electricity. The type of electrical output is most often direct current (DC) unless specific means are designed to provide an interruption of radial conduction and thus simulate alternating current (AC). Historically, DC was championed by Thomas Edison during the early part of the 20th century while at the same time AC was championed by Nikola Tesla and George Westinghouse. In the future, DC will be coming back into style with the emergence of ambient temperature superconductive cables. Therefore, highly efficient homopolar generators will be in demand to meet the market demand for electricity.

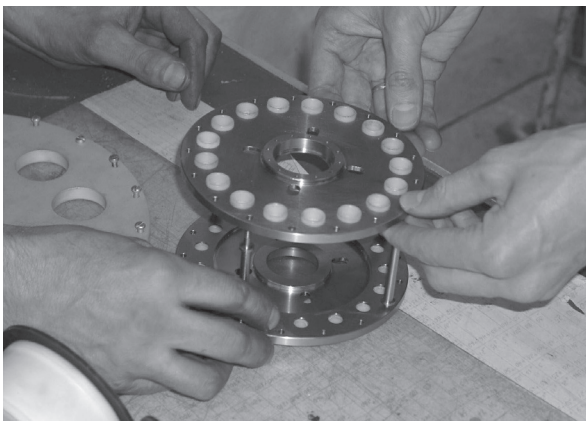


Fig. 1

Homopolar generators usually have a single disk or drum rotating in a stationary magnetic field with sliding contacts. The sliding contacts often present high resistance however. The construction and operation of homopolar machines for electric propulsion of marine vessels or railguns for example is already well known. Such machines include motors and generators wherein electrical current flows through a conductor situated in a magnetic field during rotation of the machine rotor. In the case of a homopolar motor, the current will develop a $\mathbf{J} \times \mathbf{B}$ force perpendicular to the direction of its flow through the conductor and that of the magnetic field. In the case of a homopolar generator, a voltage dependent on the rotational speed, magnetic field, and radius, is induced in a conductor moving within the magnetic field. When current is drawn from the homopolar generator, it also develops a $\mathbf{J} \times \mathbf{B}$ force for the same reason as with the motor but is referred to as back torque or armature reaction. General reference information including basic principles used to reduce back torque can be found in *The Homopolar Handbook* by Thomas Valone (ISBN 0-9641070-1-5).

The prior art rarely includes a one-piece homopolar machines that rotate the magnet with the disk. Even more unknown is the concept of rolling contacts. Eliminating sliding contacts is shown in the "Planetary Homopolar Generator," IBM Technical Disclosure Bulletin, Vol. 17, No. 6, p. 1786-87, Nov., 1974, H. D. Varadarajan. Using a conducting belt or rolling contacts to gather current from a magnetic field flux cutting rotor, there is an annular magnetic field through which the rotor executes a planetary motion. The large stresses resulting from the centrifugal force of the massive, unbalanced planetary rotor is a distinct disadvantage, prohibiting high speed operation. Thus, only a low rate of rotation is possible with

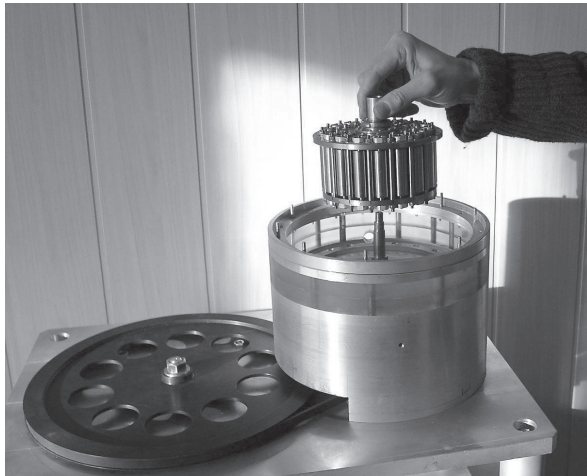


Fig. 2

the IBM design. The "Direct Current Homopolar Machine" U.S. Pat. No. 5,587,618 to Hathaway demonstrates an analogous concept of relative motion between conductive orbiting shaft and a stationary disc-shaped magnetized armature. Science Applications International Corporation claims an obvious conductive belt, dual disk "Homopolar Motor-Generator" in U.S. Pat. No. 5,241,232 to Reed that was already invented as the "Dynamo Electric Machine" of U.S. Pat. No. 406,968, patented by none other than Nikola Tesla in 1889, also with two unipolar magnetized rotors connected by a conductive belt. The belted dual unipolar machines solve one of the problems that plague the field by offering two sliding contacts at the low speed surface on the axle. However, the present invention requires only one sliding contact on the axle. These conductive belt machines also demonstrate, in principle, the concept of a multi-rotor, planetary design, by the process of coordinate transformation, since relative motion is the key to the operation of a homopolar generator. The concept of rolling contact is demonstrated with the Dalen "Dynamo Electric Machine" U.S. Pat. No. 645,943, where two disks are turning in opposite directions while in contact with each other at their periphery. However, the axle of each disk must remain fixed in place whereas each axle is in orbiting motion in the present invention. The Roshchin machine Russian Pat. No. 2155435 contains a basic concept of magnet rotors orbiting a circular stator but does not include the intimate electrical contact

necessary to utilize the homopolar generation of the present invention or to initiate a homopolar motoring effect. Homopolar machines can reversibly function as motors as well such as flywheels and used as energy storage devices. First used in transportation applications in the 1950's, flywheel powered buses were designed to have the flywheel accelerated at every stop. Composite rotors currently have been developed which can spin at very high revolutions (100,000 revolutions per second); and the speed is limited by the tensile strength of the rim of the rotor. By using a multi-rotor design, the centrifugal forces of a large disk can be greatly reduced and still maintain high energy storage or production. By using magnetic bearings, the friction on the axis of the rotor can be reduced sufficiently so that such rotors can maintain most of the energy for several days. Electricity can then be tapped, as with a battery, on demand.

The IBM Varadarajan planetary rotor is unbalanced and has a low rate of magnetic flux cutting due to its annular magnetic field design. The Hathaway direct current machine has unbalanced conductive material orbiting the central magnetized disk which limits the rotational speed. The conductive belt designs can be subject to oxidation and slippage, even requiring a toothed timing belt on each axle as well. With most disk models of homopolar generators, as opposed to drum designs, sliding contacts are the single most important contribution of resistance inhibiting the power output of the machine. Internal resistance is the only limit to the output capability of a homopolar generator and it is important to reduce all sources of internal resistance to obtain maximum power output for a given input torque. Rather than use high resistance carbon brushes, medium resistance silver-graphite brushes or dangerous conductive liquids such as mercury, low temperature solder, or sodium-potassium, there is a need to eliminate frictional sliding contact at the high speed periphery of the magnetized rotor completely. Furthermore, rather than maintaining two sliding contacts which contribute friction and resistance, even in the rolling and belted designs, there is a need to cut the number in half to only one high current sliding contact. The present invention satisfies both of these needs.

Summary of the Invention

The primary object of the invention is orbiting multi-rotor cylindrical magnets in rolling contact that eliminates friction while generating DC electricity. Another object of the invention is to provide high efficiency, low noise and low resistance in a high generator. Another object of the invention is that it uses readily available materials in a dynamically balanced arrangement. A further object of the invention is safety through reduced internal stress than comparable homopolar machines with a single rotor. Yet another object of the invention is that it provides distributed generation around an air core. Other objects and advantages of the present invention will become apparent from the following descriptions, taken in connection with the accompanying drawings, wherein, by way of illustration and example, an embodiment of the present invention is disclosed. The present invention comprises an improved homopolar machine with dynamically balanced, axially parallel, cylindrical, electrically conductive magnets arranged circumferentially around the vertical axis of central stator ring. Such a design can be referred to as distributed generation since each magnet rotor generates only a fraction of the current that is transmitted through the machine. Thus, the conductive bearings contacting the center of each end of the magnet rotors may carry only one tenth or less of the total current. The multi-rotor homopolar also does not include sliding contacts at each magnetized rotor rim but

instead utilizes a suitable rolling means attached separately to magnets and also to the stator ring for intimately contacting and engaging non-slip rolling between magnets and stator as they orbit around the stator. The magnetized rotors maintain rotational synchronism and equal relative position to each other with a bearing means rotatably securing the top and bottom end of each magnet to a corresponding electrically conductive circular endplate. The electrical energy is extracted, or inputted if used as a motor, through contacts on the conductive stator and at the machine's electrically conductive axle located in the center of the machine while rigidly attached to the top circular endplate that rotates with all of the individually magnetized rotors. The only high current, moving contact that is required is a single electrically conductive thrust bearing that supports the central axle. An insulating thrust bearing meanwhile separates the axle from the center of bottom circular endplate. The stator, which is of course stationary, accomplishes the second contact means through a standard electrical connection with no need for any relative motion sliding contact. The stator may be optionally magnetized in the opposite direction to the magnetized rotors in order to improve the coercive force or magnetic flux density of the rotors by closing the magnetic circuit. The drawings constitute a part of this specification and include exemplary embodiments to the invention, which may be embodied in various forms.



Fig. 3

More information

Experimental Research of the Magnetic-Gravity Effects with Magnetic Energy Converter (MEC) by V. V. Roschin and S. M. Godin

Roshchin-Godin article about Physical Effects in a Dynamic Magnetic System (http://users.erols.com/iri/Roshchin_Godin.PDF)

Summary of MEC Research Proposal (<http://users.erols.com/iri/MECProposal.htm>) - Contact EPS CEO Ivan Kruglak at ivan@ionsky.com for complete proposal

US Patent and Trademark Office Website for Patent Number Search <http://patft.uspto.gov/netahtml/srchnum.htm>

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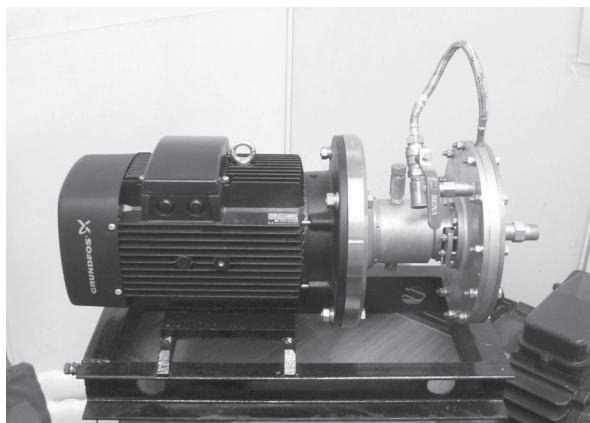
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Vortex heatgenerators

Vortex heatgenerators (VHG) have different names, for example, the Potapov heatgenerator, but the most of articles, advertisements and various websites mention only big, noisy, unreliable types of VHGs created by Yu.S. Potapov in the 90th of the last century.

In Russia as well as in the former USSR, scientists constructed and operated devices of more than 100% efficiency. These devices are progeny of the well-known Ranke vortex tube invented in the early 20th of XX century. However, it happened only after the World War 2 that vortex effect began to be widely used. In 1946, a German physician R. Hilsch gave guidelines on constructing VHGs in its experimental research of the vortex tube. Since then, the tubes are sometimes called Ranke-Hilsch tubes. The vortex tube was a basis of the first heat generating devices.



At the same time, heat pumps were developed, which differed from VHGs due to heat energy transferring. Simplest examples of the heat pump are a domestic refrigerator or an air-conditioner. Neither Ranke vortex tube nor YUSMAR heat generator are heat pumps due to **absence** of the thermal **absorption** zone.

In 1994, Potapov started constructing VHGs (which is more exactly, CVHGs – cavitation vortex heatgenerators). Their efficiency was a little more than 100%. They operate the following way: a pump flushes water under small pressure through a little sieve where cavitation processes occur. Multiple cavitation bubbles (cavities) blow up and give excessive heat. Of course, this is a simplified description of VHGs' operation though it explains rather exactly how first vortex heatgenerators operated.

Drawbacks of the first generation of VHGs disturbed many customers and hamper promotion. Since that time construction and design of VHGs considerably changed. VHGs of the **seventh** generation produced by various companies by repetition and limited production have nothing in common with the design of the first generation VHGs. Particularly, a VHG's motor does not operates as a pump now and overall energy is used for heat generation, i.e. VHG operates only as a heater while a simple and cheap circulation pump makes liquid circulate in the system. Problems connected with impermeability and noise have also been solved.

As progress constantly develops, we can witness how a new, eighth generation of vortex heatgenerators appear called vortex heatsteamgenerators (VHSG). According to AKOIL specialists, this device can be easily controlled and obtain the following characteristics: temperature is up to 130 centigrade degrees, pressure is up to 3-4 atmospheres. Using additional equipment, it is possible to construct a steamgenerator with higher working pressure and temperature.

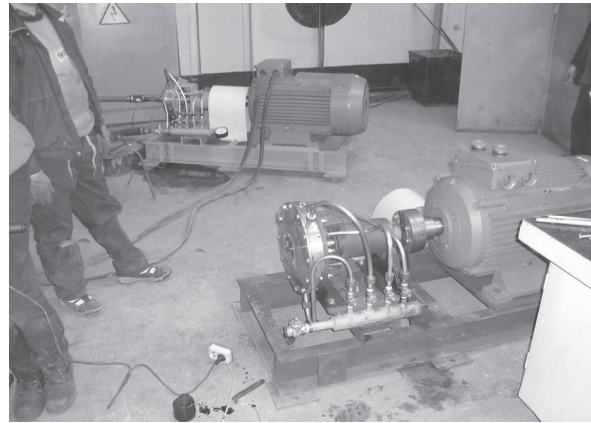
Customers of vortex devices use VHGs not only as a boiler substitute but also for dilution of oil

products, mixing oil products or fuel with water (it gave amazing results during lorry testing: engine power increased, exhaust became clearer), emulsion production, water purification and disinfection etc.

Taking this into account, we can conclude that majority of companies and private persons can buy the up-to-date, compact, effective and efficient equipment for heating, water heating and also for various engineering purposes including wood drying, heating of antifreeze and other liquids.

Vortex heatgenerators and heatsteamgenerators

Vortex heat generator (VHG) is an environmentally friendly heatgenerator of the new, eighth generation without heating elements. This unique device is invented by a professor, a member of the Russian Academy of Natural Sciences, famous inventor, laureate of the international "Birmingham torch" Prize Yu.S. Potapov. It is designed for heating and hot water supply of apartment houses, high-rise buildings and constructions, warehouses, hospitals, schools, working area, greenhouses etc. Heatgenerators are installed directly at works including ones with existing heating systems. They implement heating of liquid due to blow up of cavitation bubbles, friction and synthesis of water-molecules.



Vortex heatgenerator has all necessary accessories and an automatic control system. It can be easily attached to a new or existing heating system. Its design and size make it easy to place it in any room.

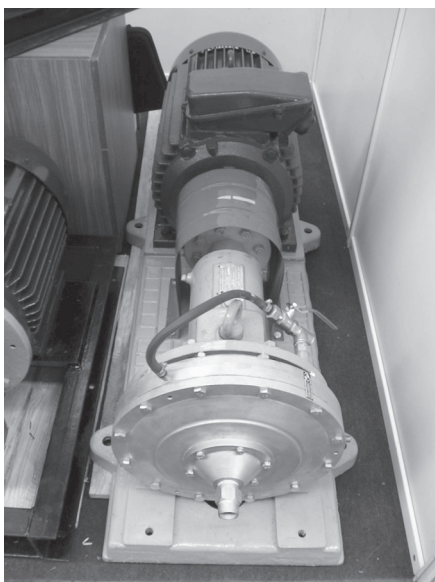
Our heatgenerators are made using up-to-date technologies. For example, omental and bearing units can work without replacement and repair for several years. Numerous internal changes are made in order to improve and simplify operation.

Advantages of heatgenerator use:

- You do not have to obtain an approval of corresponding authorized bodies.
- Minimal maintenance (one testing of omental and bearing units per 6 months). This

Table 1. Characteristics of vortex heatgenerators

Heat generator	Motor power, voltage, kW / V	Mass kg	Minimal heated volume, m ³	Measurements length, width, height, mm	Quantity of steam produced by VSG, kilocalorie / hour
VHG-2	2,2 / 220	20	200	450x 300x 300	2000
VHG-3	7,5 / 380	110	500	690x 336x 420	8000
VHG-4	11 / 380	120	950	720x 336x 420	13000
VHG-5	15 / 380	150	1500	820x 504x 520	19000
VHG-6	22 / 380	180	2000	860x 504x 520	24000
VHG-7	37 / 380	270	3000	1300x 800x 800	52000
VHSG-8	5 / 380	420	4500	1520x 800x 800	79000
VHSG-9	75 / 380	480	5600	1600x 800x 800	100000
VHSG-10	110 / 380 - 10000	800	8500	1720x 800x 860	150000
VHSG-11	160 / 380 - 10000	850	12000	2000x 900x 900	240000
VHSG-12	315 / 380 - 10000	1500	25000	2200x 1000x 1000	400000
VHSG-13	500 / 380 - 10000	2760	50000	3000x 1000 x 1000	800000



is conditioned by the fact during production stuffing-boxes are used made according to up-to-date technologies. They can operate without a heat-carrier (water) for a long time unlike other heatgenerators.

- **Efficient:** no money spent on heating mains construction and minimal heat losses; no money spent on water conditioning (water quality, degree of water pollution does not influence heatgenerator's operation); no scale in heating system due to the technology; no fuel supply and conservation is needed (in case fuel is gas, coal, firewood, oil products).

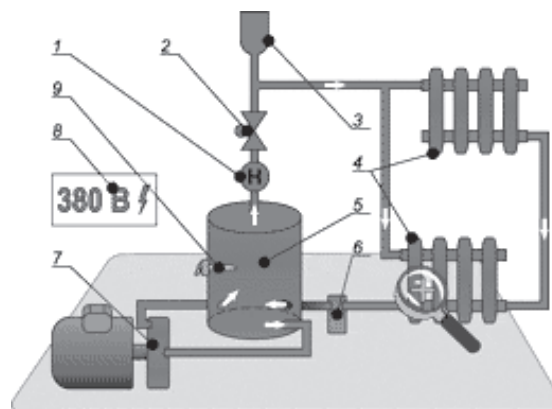
- **Safe and absolutely environmentally friendly:** the heatgenerator does not use environment contaminants such as gas, coal, firewood, diesel oil and, therefore, discharges no combustion products. Burst or fire is impossible; Up-to-date safe control devices completely prevent unregulated growth of temperature and pressure in the system.

- **It is easy to install and maintain the heatgenerator:** in order to install it, it is enough to attach supply and back nipples of the heatgenerator to corresponding nipples of a heating system; simple maintenance including heating and control of system's operation implemented by the automatic control block. No special training of the stuff is needed.

- **Universal use:** heating including systems with warm floors; hot water-supply systems; in new and existing systems; heating of liquids

used for various purposes; heating of liquids up to 100C and higher; heat generators can be used in oil-refining and oil-production industries for heavy oil dilution and its treating for the following oil refining. This will considerably diminish expenses for oil heating; for plants watering (which causes disinfection and structural changes of water and exerts wholesome influence on plants).

- **Portability.**
- **Vortex heatgenerators are autonomous heating devices** able to change its operating mode by themselves.
- **Reliability:** heatgenerators life is determined to be not less than 15 years. Service replacement of generator, stuffing-boxes and bearings is made during this period.
- **Super-low expenses on heating** comparing with other technologies producing heat energy.
- **VHGs have no competitors** considering heat water production. Even technologies based on natural gas cannot be compared with them concerning output.



Typical installation scheme: 1. circulation pump; 2. valve; 3. expansion vessel; 4. sink; 5. storage vacuum vessel; 6. grid; 7. vortex heatgenerator; 8. automated mechanisms; 9. thermal sensor.

Characteristics of vortex heatgenerators: You can save up to 30% by installing two-rate meter. It is possible to install electric motors of high voltage up to 10,000 volt. Average demand is 10 – 30% of VHГ's power rating. Average

Table. 2. Characteristics of steamgenerators

Device	Motor power, voltage, kW / V	Mass, kg	Size length, width, height, mm	Quantity of steam produced by VSG, kg / hour
БПГ-2	55/ 380	400	1520x 800x 800	500
БПГ-3	75/ 380	500	1600x 800x 800	700
БПГ-4	110/ 380 - 10 000	1500	1720x 800x 860	1000
БПГ-5	160/ 380 - 10 000	2000	2000x 900x 900	1500
БПГ-6	315/ 380 - 10 000	2300	2200x 1000x 1000	3000
БПГ-7	500/ 380 - 10 000	3000	3000x 1000x 1000	5000

season expenses on electric energy are from 1 to 5 watt per 1 sq. meter.

Vortex heatgenerators produced by Akoil correspond with standard 3614-001-16899178-2004 and certified according to RU.АЯ09.В03495.

Vortex steamgenerator (VSG)

The steamgenerator is a device for steam and heat energy production providing for quick heating of liquid up to steam formation. Steam is an effective energy carrier. It is used for hot water-supply and heating of buildings, cottages, transport vehicles, oil, black oil, paraffin, drying of agricultural products and wood. This is far from the complete list of possible heatgenerator applications.

Akoil company offers you perfect steamgenerators. They produce steam by cavitation, friction and synthesis of water-molecules. These processes occur simultaneously and cause formation of excessive heat energy. Due to this, steam is formed during one water cycle. Vortex steamgenerators not only save electric energy but also exclude expenses for fuel transportation and for laying and repair of steam-lines.

Application of steamgenerators

Steam is technologically used in food industry: at bottlers and breweries, tinned food and starch factories, bread-baking and macaroni plants, confectioneries, mills, dairies, butter-making plants, soap works, tobacco production, meat-

packing plants, battery farms, fruits and vegetables' processing, juice and mushrooms' production.

Steamgenerators are used in dryers of furniture factories, veneer mills, brickworks, mold-making shops, frame-and-panel construction, asphalt plants, paper mills, for production of ferroconcrete items (steaming of cement ducts and ferroconcrete items), production of toilet paper, tissue paper, at textile plants, in chemical industry, production of general mechanical rubber goods, foam plastic (cellular polystyrene), for heating of baths, autoclaves, steam presses and othet steam devices and customers.

Steam is used for heating of black oil, at oil fields for steam-heat influence on oil-bearing bed in order to increase efficiency of oil extraction and intensification of oil production, on tankers carrying oil products, for heating of containers and vessels during anchorage.

Steam boilers are used for bath-houses, laundries, dry-cleaner's, for heating of sterilizers and for sterilization, disinfection, degreasing and steam cleaning, for steaming.

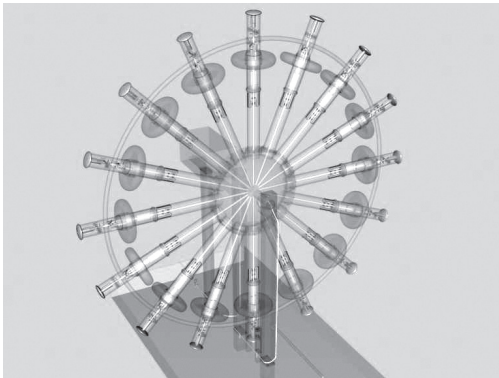
Electric power stations using air Brief characteristics:

Power – 50kW (up to 5,000 kW is possible); Operation at pressure 0.1 atm.; Air consumption is 1200 cub./hour; Operates in the autonomous mode self-sufficiently; Self-sufficiency requires 35% of energy while 70% left are used for operation.

Company News

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For over 100 years humans have tried to invent a technology that generates electricity without the need for external fuel. They call it perpetual motion machine.

No credible scientist would entertain any such notion that such a machine could be possible. The inventor of these machines was called crackpot.

The inventors were always secretive about how their invention works. Some machine was said to produce more energy then it take in. Some inventor shows the outside of their machine but not the internal working part for all you know inside could be empty.

A lot of inventors of these machines are confronted with the fact that their machine will not work and if they believe it will work, why not show exactly how it works. They reply that big business and government is suppressing their idea.

We at Environ Energy believe that anything is possible and when they are possible they should not be hidden. When a technology comes along which will shape the future of humans it should be laid in front of the public so they are able to

be the judge that this is indeed a great invention.

We at Environ Energy are not claiming that we have created a new form of technology that gives out more than it puts in.

We have not created a new form of energy, all we have done is to take kinetic energy store it at one point (this has now become potential energy) and release it at another point as mechanical energy, at another point this is by way of gravity and kinetic force.

The wheel is called the Waranlinc Wheel when on it's own and called SPEGG when connected to a generator.

We have invented a technology that when connected to a generator it produces electricity without the need for any external fuel.

The Waranlinc Wheel has 16 arms 8 of the 16 arms has a bullet in it, these bullet runs backward and forward.

When the wheel spins it avoids equilibrium; in other word one side of the wheel is kept heavy at all times.

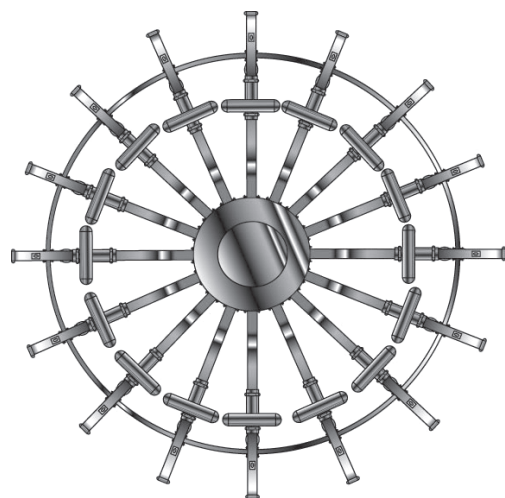


Fig. 1

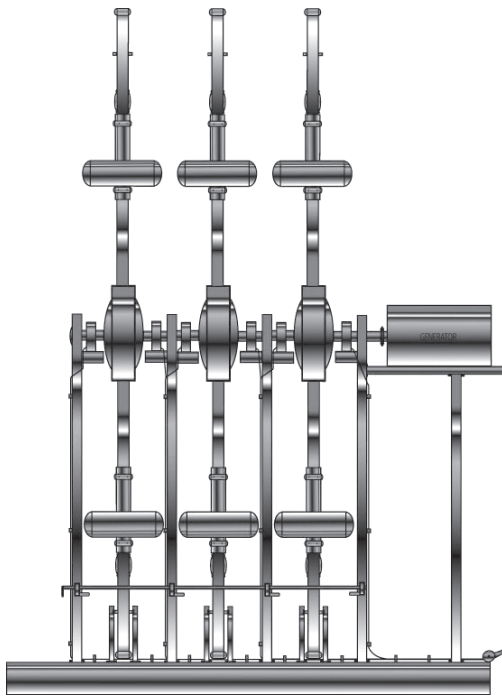


Fig. 2

The main piston chamber spring is compressed on the up cycle and the ram is locked. This is now stored energy.

The energy in the compressed chamber spring is released at the firing point, propelling a bullet weight upwards to the top where a one way gate is. This allows the bullet to go up but does not come down.

At the firing point the gate is kept open by two pistons pushing down on the gate arm. Once the arm is in the energy-stored position, the piston reverts back into its hole.

The energy stored in the main piston chamber spring is made possible by the large weight gliding up and down on the outer tube. The weight is attached to a piston that runs up and down in the hydraulic chamber. The kinetic movement of the outer weight is transferred via the piston through a set of rods and onto the main piston chamber spring, which results in the ram arm locking (energy-stored).

The energy in the spring is released at the firing point when past via two side rod, the two switch on the arm is pulled back there by firing the bullet.

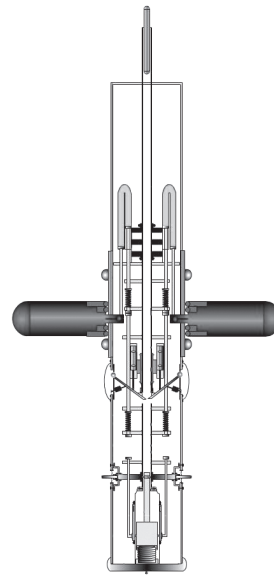


Fig. 3

To start the Waranlinc wheel spinning is simple, the wheel is primed at an angle, the brake applied this means the wheel is unable to spin once the brake is taken off the wheel begins to spin. To stop the wheel spinning, you apply the brakes.

Environ has also invented the generator that when attached to the wheel produces electricity.

MIT, Columbia begin new energy experiment: Half-ton levitating ring is key to work

Columbia University Office of Public Affairs,
<http://www.physorg.com/news2245.html>

MIT and Columbia University students and researchers have begun operation of a novel experiment that confines high-temperature ionized gas, called plasma, using the strong magnetic fields from a half-ton superconducting ring inside a huge vessel reminiscent of a spaceship. The experiment, the first of its kind, will test whether nature's way of confining high-temperature gas might lead to a new source of energy for the world.

First results from the Levitated Dipole Experiment (LDX) were presented at a meeting of the American Physical Society the week of Nov. 15. Scientists and students described more than 100 plasma discharges created within the new device, each lasting from 5 to 10 seconds. X-ray spectroscopy and visible photography recorded spectacular images of the hot, confined plasma and of the dynamics of matter confined by strong magnetic force fields.

A dedication for LDX, the United States' newest approach to nuclear fusion, was held in late October. Fusion energy is advantageous because its hydrogen fuel is practically limitless and the resulting energy would be clean and would not contribute to global warming as does the burning of fossil fuels. Scientists using the LDX experiment will conduct basic studies of confined high-temperature matter and investigate whether the plasma may someday be used to produce fusion energy on Earth. Fusion energy is the energy source of the sun and stars. At high temperature and pressure, light elements like hydrogen are fused together to make heavier elements, such as helium, in a process that releases large amounts of energy.

Powerful magnets, such as the ring in LDX, provide the magnetic fields needed to initiate, sustain and control the plasma in which fusion occurs. Because the shape of the magnetic force fields determines the properties of the confined plasma, several different fusion research experiments are under way throughout the world, including a second experiment at MIT, the Alcator C-Mod, and the HBT-EP experiment at Columbia University.

LDX tackles fusion with a unique approach, taking its cue from nature. The primary confining fields are created by a powerful superconducting ring about the size of a truck tire and weighing more than a half-ton that will ultimately be levitated within a large vacuum chamber. A second superconducting magnet located above the vacuum chamber provides the force necessary to support the weight of the floating coil. The resulting force field resembles the fields of the magnetized planets, such as Earth and Jupiter. Satellites have observed how these fields can confine plasma at hundreds of millions of degrees.

Perendev Magnetic Motor update

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After 30 years, Perendev has researched and developed a motor that is ready to go to the market. Units' availability will be 20KW Magnet Motor. Later larger units will become available: 60KW, 120KW, 200KW, 300KW, 600KW, 1MW, 4MW and also to client specs. Perendev will be ready to take orders for machines in the New Year: all orders will only be accepted on an official order form. The form will be available on the web page in a few weeks. Orders will only be accepted by email and no payments are to be made with order. Placement of back orders will be posted to you by email as to time and date of delivery.

Comments

From the Energy2000 yahoo group, "gr8wyfe" writes: I have become tired of trying to get any meaningful information about the status of the Perendev Magnetic Motor on this and other similar sites, so I decided to e-mail Mike Brady directly and see what is up. To my surprise, Mike e-mailed me back almost immediately. The following is his response:

From Mike Brady: "Thanks for your e-mail. Firstly let me put you at ease, the motor is very far advanced. Some of the difficulties that we had were not directly related to the motor, but rather to improving the design relating to mass production. We have a running motor that like all new designs has a few flaws which we are addressing and for the most part have resolved. We intend to launch the motor in the mid of January or end of January, depending on media availability."

I hope that at least a few of you reading this are as excited as I am about this motor. If it is what it is reported to be, then it should be the most significant development in the history of energy. I can't think of a more ideal "free energy" device. Let's all hope that, by the end of the month, we are able to celebrate it's public emergence and perhaps the beginning of an energy revolution.

Thermolevitation

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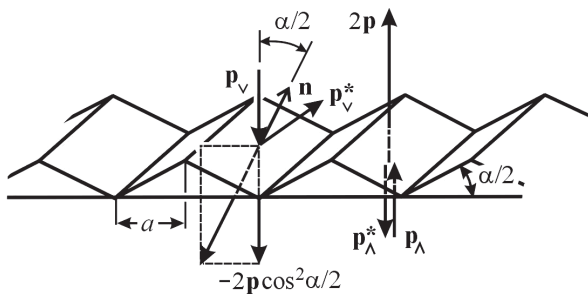


Fig. 1. Pseudo-levitation

Levitation of an asymmetrical body based on screening of gas by the same body is considered.

For a first view, the idea of this work is very simple. Consider a system of wedges located in the atmosphere as shown in Fig. 1. Suppose that a distinctive size of a wedge is much less than the range of the molecules of air. If we consider the simplified model of the ideal gas accordingly which the molecules may move in three mutually perpendicular directions only, one of them is vertical and another two are horizontal, we should assume existence of non-zero lift force. This lift force arises due to the screening of the molecules moving horizontally.

A molecule the momentum of which is $p_\lambda = mv$ moving vertically upwards collides with a lower side of a wedge delivering the momentum $2p = 2mv$ to this side. A molecule the momentum of which is $p_v = -mv$ moving down delivers the vertical component of the momentum $-2p \cos^2(\alpha/2)$ to the wedge, where $\alpha/2$ is the angle between a flank side of the wedge and the horizontal. Therefore, the lift force, if it exists, must be proportional $1 - \cos^2(\alpha/2)$. It is so if the molecules scattered by the next side do not reach the considered side of the wedge. This takes place at $\alpha < \pi/3$. At $\alpha = \pi/2$, all molecules scattered by the neighboring wedge move

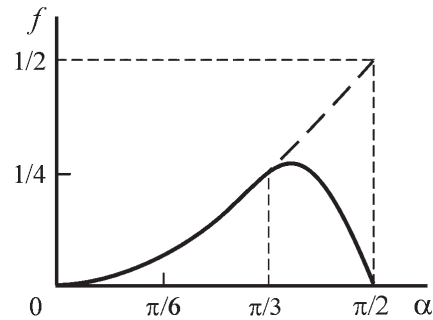


Fig. 2. Angular dependence of the relative lift force of pseudo-levitation reckoning the secondary scattering (solid line) and disregarding one (dashed line)

horizontally and deliver the vertical component of the momentum $-2p \sin^2(\alpha/2) = -p$ to the considered side. Therefore, the lift force equals zero at $\alpha = \pi/2$. Such an angular dependence of the relative lift force f is shown in Fig. 2.

The relative lift force is ratio of the lift force to the force exerted by the lower side of the system. It happens that each m^2 of the system can exert the lift force equal to one-quarter of 10^5 N ! Nature does not like simple solutions. Something wrong is in such simple considerations though this example proves a possibility of the levitation. First of all, the direction of this lift force is opposite to that following from qualitative speculations [1].

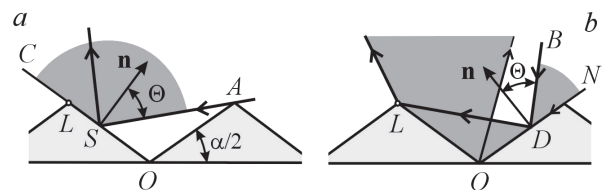


Fig. 3. Single (a) and double (b) scattering of molecules by system of wedges

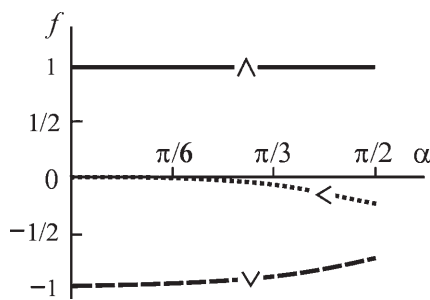


Fig. 4. Relative contributions of single (V) and double (<) scattering to the total force acting on the system of wedges

There is meaning to consider a more correct distribution of molecules. For simplicity we will study the system located in a two-dimensional gas (Fig. 3).

All the molecules momenta of which are in the angle ASC (Fig. 3a) collide with a surface element situated at a point S and, therefore, partly compensate the force F_{\wedge} acting on the lower side of the half-wedge. The angular dependence of the force F_V exerted on the flank side of the half-wedge due to single scattering is shown in Fig. 4.

If directions of moving molecules are concluded in the angle BDN (Fig. 3b), then the molecules scattered by a surface element located at point D of the neighboring side contribute to the force acting on the considered side of the wedge.

This contribution $F_{<}$ arising due to the double scattering is also shown in Fig. 4 as a function of angle α . For each point S on the considered side of the wedge, there exists a point N on the

neighboring side such as SO=OD. This means that angles Θ in Fig. 3a and Fig. 3b between the normal n to a surface and the borders AS and BD of the fields of the scattering gas are equal. One may guess that the module of net force acting on the flank side must be equal to that acting on the lower side of the half-wedge. Thus, the total force acting on the system of wedges is zero. Results of exact calculations plotted in Fig. 4 confirm such a conclusion. To all appearance, an alternative conclusion [1] is wrong.

How to put down the contribution from double scattering? There exists a method to do this one. It is sufficiently to cool the system of wedges. In this case molecules will lose the energy during collisions and, therefore, the compensation of the force acting on the lower side of the system will not be full.

Unfortunately, nobody knows how to investigate the energy losses theoretically. The only way to take the energy losses into account is to use a model, say, of the elastic scattering of the gas by solid state material. Let m_1 be the mass of the molecule of the gas and m_2 is an effective value of molecular mass of the target.

One should consider the effective magnitude of mass since a molecule of gas transfers the energy to the number of molecules of the wedge. For molecules of air, the accommodation coefficient is immediate to unit [2]. Therefore the mean energy $\langle \Delta E \rangle$ lost by the molecule is $\langle \Delta E \rangle = k(T_1 - T_2)$, where k - is the Boltzmann constant and T_1 and T_2 are the Kelvin

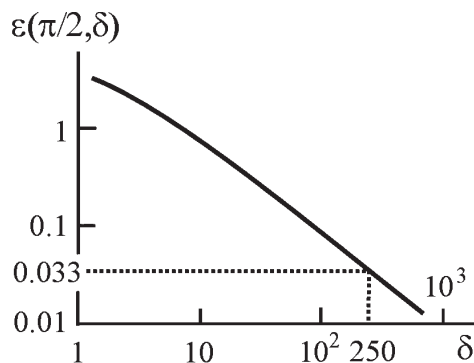


Fig. 5. Relative energy lost by the molecule as a function of the molecular mass ratio at $\alpha=\pi/2$.

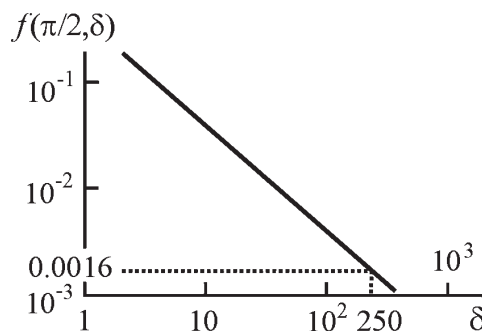


Fig. 6. Relative lift force as a function of the mass ratio at $\alpha=\pi/2$

temperatures of the gas and the wedge, respectively. On the other side the value $\langle \Delta E \rangle$ is proportional to the temperature of the gas: $\langle \Delta E \rangle = \epsilon(\alpha, \delta) k T_1$, where $\delta = m_2/m_1$. Thus, $\epsilon(\alpha, \delta) = 1 - T_2/T_1$. There is meaning to consider the best variant $\alpha = \pi/2$. At $\alpha = \pi/2$, the dependence $\epsilon(\delta, \alpha)$ is shown in Fig. 5. Suppose that $T_1/T_2 = 0.967$ that corresponds to room temperature and $T_1 - T_2 = 10^\circ\text{K}$. This gives $\delta \approx 250$ (Fig. 5).

Now we are in a position to estimate the lift force. The relative lift force as a function of the ratio δ at $\alpha = \pi/2$ is shown in Fig. 6. In this case we have a perfectly reasonable value of the lift force $f = 0.0016$ that corresponds to the lift force 160 N acting on each m^2 of the system.

In the meanwhile, this is only an idea though it reminds us somewhat a motion of an

asymmetrical body in the turbulent media [3]. There may appear other arguments, depending on a considered model, which prohibit the levitation due to heating or cooling a body. One must be grateful for such arguments. These arguments will enable us to save energy and time for searches of other principles of levitation.

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News

Having taken no profits from his publishing venture for a year has allowed Tom Bearden to subsidize the reprinting of his groundbreaking book *Energy from the Vacuum-Concepts & Principles*.

Consequently he is pleased to announce a substantial price reduction of this unique 1000-page volume to \$59, including U.S. domestic shipping (USD \$69 for global shipping). The student discount price for qualified students has also been slashed. See http://www.cheniere.org/sales/order_by_credit_card.htm

Cartons of 12 *Energy from the Vacuum* books, also individually shrink-wrapped, are now available for the incredible low price of \$350, including U.S. shipping. These make great gifts to politicians, scientists, teachers, libraries etc. Contact us for global shipping price on bulk orders.

Energy from the Vacuum is the world's first and only book to correct many of the errors and omissions in today's science, removing theoretical impediments to the extraction of free energy from the vacuum. It also catalogs the pioneering efforts of many of the inventors who have indeed extracted this free energy over the years. Over forty different methodologies are described in detail, some of them replicable at the high school level.

Thanks also to all you supporters and volunteers who have helped make this possible.

Regards,

Tony Craddock
Director
Cheniere Press/ The Tom Bearden Website
www.cheniere.org

REMOTE INFLUENCE OF ROTATING OBJECTS ON SEMICONDUCTOR GAMMA-RAY DETECTOR

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According to statistical analysis of peaks of full absorption and gamma radiation's amplitude, experimental and theoretical confirmations of rotating objects' remote influence on readings of semiconductor spectral equipment. It is shown that value of statistical distribution's shift depends on speed changing of collection of semiconductor's charges. A physical field generated during rotation, which is not connected with electromagnetic component, influences on speed of collection.

1. Introduction

First experimental research of rotating liquid was made by the author in 1991 [1]. It was carried out in semiconductor spectrometry during relative measuring of two modes of operation (with rotation and without it) and allowed discovering the effect consisting in square's diminution of gamma full absorption's peak. In 1995, published experimental results of various researchers confirmed the remote influence of gyroscopic motors on readings of counter tube and scintillation counter during measuring of natural radioactivity [2].

The aftereffect was discovered, i.e. influence existed after motors had been turned off. During further research, the following rules were found out: first, during rotation, the peak's distribution moves towards decrease of intensity; second, under certain conditions, a type of distribution changes (duplets, "tails" appear); third, during rotation, distribution shift of the peak's focus (gamma-quantum energy) occurs including increasing as well as diminution of the signal's amplitude [3, 4].

Analysis of statistical results allowed finding out that a system "radioactive source – semiconductor detector" can be used as a sensor

of the physical field's potential generated by rotating objects. This statement is based on shifting of statistical distribution of peak and amplitude's square towards diminution and measuring with rotation and without it. Quantity of shift depends both on electromagnetic interference and nonelectromagnetic component of the physical field. This work includes experimental and theoretical researches showing the electromagnetic component's influence on time of charge collection of semiconductor detector.

2. Description of experiments

In this chapter, a plan of the experiment is shown and possible sources of noise and their influence on experimental results are determined.

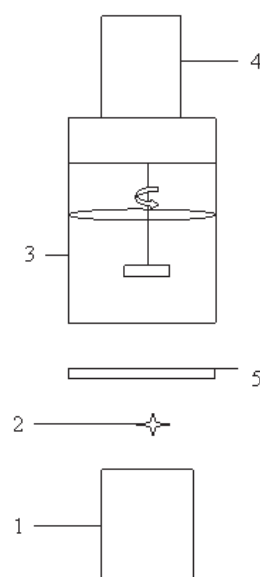


Fig. 1. Detailed scheme of the experiment

1 - semiconductor; 2 - radioactive source; 3 - beaker with liquid; 4 - electronic motor; 5 - coil with twisted filament

On Fig. 1, a semiconductor detector (1), a gamma-ray source (2) and a steel beaker with liquid (3) located on the one line, which is perpendicular to the floor, are shown. Vortex rotation of liquid was made by blades at a motor axis (4).

Steel discs (without the beaker, of course) were also used as rotating objects. A 250-watt commutator motor was attached to a post. The motor axis rotating with angular velocities 2100 and 6000 revolutions per minute (r/m) was located above radioactive isotope source at distances determined by the experiment's conditions. Sources (Cs^{137} , Co^{60} etc.) were attached at props of different heights from the semiconductor detector (SCD). Distance from the radioactive source to the detector was determined so that peak's square was S-8000-11000 pulses during not more than a minute. In case there was no the standard emission source of the previously chosen isotope, the studied element was irradiated by Tomsk research nuclear pile according to the method of neutron- activation analysis. Size of the source did not exceed 0.25 cm^2 .

The semiconductor $\text{Ge}(\text{Li})$ -detector, a preamplifier, an amplifier, and an analyzer were used as measurement equipment. The full absorption peak's square, which is proportional to quantity of registered quanta, and peak's centre of gravity, which is proportional to photon energy, from various sources of radioactive energy were measured. Data on the analyzed spectrum was processed by "Search" program developed in Dubna. Width of energy resolution did not exceed 3 kilo-electron-volt (keV). During a measuring hour shift of the peak's centre of gravity did not exceed 0.5 keV.

The peak was measured during two operation modes: motor working and stopped. Rotation was carried out both clockwise and anticlockwise. During the experiment, quality of measuring was carried out when gathering spectrum. Quality was determined by the following characteristics: first, due to significant changing of voltage or leakage current appearance (caused by humidity increase), the peak's width increases, i.e. energy resolution increases. Hence, accuracy of the peak's square determination goes down considerably.

Implementation factors (temperature and voltage changes) did not influence the peak's square. The influence is possible only provided that there is drift of a few units (keV) during spectrum gathering.

Second, being typically Gaussian, the peak is characterized by the gravity centre (the first derivative from the function, the approximating peak, turns into zero), i.e. by its place on energy scale. During each measuring, gravity centre of the peak was registered.

Third, as comparative analysis was carried out for readings of two operation modes, in order to avoid a systematic mistake (drift of gravitation centre), mode of the experiment changed after each ten measurements. Measuring was carried out during two operation modes alternately. Statistical distribution of gravity centre in rotating mode E_{rot} regarding gravity centre in nonrotating mode E_{st} was studied. It allowed exclusion of drift value.

Forth, the post of the electric motor was attached to a massive steel table (~60 kg) while Dewar bottle (31 kg) was on a soft tray preventing transmission of small vibrations from the electric motor to the detector.

It was only impossible to prevent influence of electromagnetic fields of the electromotor, generation of signal under discrimination lower level. It could lead to increase of total dead time of the registered equipment and diminish square of friendly signal's peak. Theoretical analysis of this situation will be shown below.

Statistical analysis of experimental results was carried out with 95%-credibility value.

3. Experimental results and their analysis

Experimental results connected with changing of rotation direction (clockwise and anticlockwise, view from above) are shown on Fig. 2. The steel disk (90 mm in diameter, 5 mm thick) attached to the motor axis rotates with angular velocity of 6,000 r/m. During each operating mode, 60 measurements of the peak's square were carried out by isotope Cs^{137} 's energy of 661.6 keV.

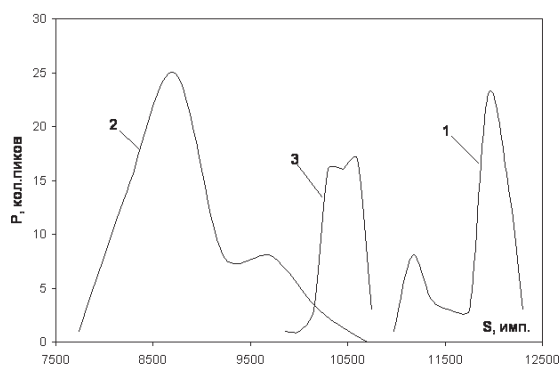


Fig. 2. Statistical distribution of full absorption peaks during measuring of photon emission. 1 - nonrotating mode; 2 - clockwise rotation mode; 3 - anticlockwise rotation mode.

Distance between the disk and the radioactive source was 97 mm; between the source and the detector – 20 mm. Average measure of the peak's square in nonrotating mode is $S_{st} = 11734$ pulses, standard mistake is $\sigma = 46.8$; in the anticlockwise rotation mode it is $S_{pr} = 10375$ pulses, $\sigma = 25.5$, while during clockwise rotation it is $S_{po} = 8693$ pulses, $\sigma = 83.5$. Univariate analysis regarding static mode has shown that Fisher-criteria are $F_{st}^{po} = 1009$ and $F_{st}^{pr} = 649$ while critical value is $F_{st}^{po} = 1009$.

Due to the fact that distribution shift depends on rotation direction, we can suggest that influence field has spatial orientation (left or right) and, accordingly, orthonormal matter screening the field influences distribution shift. A polyethylene coil with diameter of 70 mm and height of 20 mm consisting of right-twisted fosta nylon filament was used as a screen between the motor axle and emission source (Fig. 1).

Relative distribution of peaks of two samplings was investigated: in clockwise rotation mode and in nonrotating mode P_{po}/P_{st} . The following results were obtained: average value of relative distribution without the screen is $Sr^{po} = 0.9739$ rel. units, $\sigma = 0.0040$, Fisher-criterion is $F_{st}^{po} = 91.2$; with the screen, $Sr^{po} = 0.9807$ rel. units, $\sigma = 0.0092$, $F_{st}^{po} = 4.5$. Using left-twisted filament, influence field passes through the coil only when the motor axle rotates clockwise while, using right-twisted filament, it happens mostly during anticlockwise rotation. Thus, the coil is an absorbent of influence field. This shows nonelectromagnetic component of the physical field.

During further experiments, three steel disks hafted alternately on the motor axle with diameter of 90 mm and thickness of 5 mm were used as a generator of influence field. Distance between disks and isotope Cs^{137} was ~ 100 m. Steel grade was 40XA. The first disc (#1) was made of new steel, which had not been used in production; the second (#2) and the third (#3) ones were made of a material actively used during a year.

Thus, the two last discs differ from the first one in certain accumulated metal fatigue, i.e. they have many inner defects. Using 15-mm-distance between the isotope source and the detector, the following results were obtained in the static mode: average peak's square $S_{st} = 12248$ pulses, $\sigma = 38$, time of spectrum gathering (live) $t = 35$ sec. later, measurements in rotation modes were implemented. A difference (shift) in average values of the peak $\Delta S_{rot}^n = S_{st}^n - S_{rot}^n$ where "n" means the number of the studied disk. The following results were got: $\Delta S_{pr}^1 = 4207$ pulses, $\sigma = 235$; $\Delta S_{po}^1 = 5337$ pulses, $\sigma = 196$; $\Delta S_{pr}^2 = 1146$ pulses, $\sigma = 64$; $\Delta S_{po}^2 = 423$ pulses, $\sigma = 42$; $\Delta S_{pr}^3 = 722$ pulses, $\sigma = 129$; $\Delta S_{po}^3 = 789$ pulses, $\sigma = 44$. Shift of average values of the peak's square and its dispersion depends on condition of internal structure of the rotating object.

Studying influence of the rotating matter (liquid) on type of statistical distribution of the peak's square, an effect of non-Poisson distribution retention after the motor was turned off was discovered. Angular velocity of the axle was

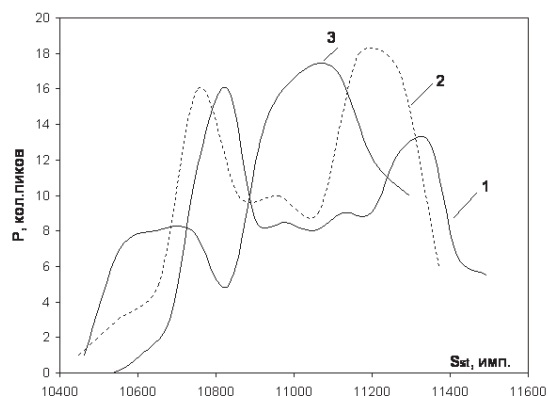


Fig. 3. Statistical distribution of peaks of full absorption during measuring of cesium photon emission's intensity in nonrotating mode. 1 - after the motor is turned off; 2 - in a day since turning-off; 3 - in five days since turning off.

2100 rev/min; the beaker with liquid was located above cesium isotope at distance of 10 mm. The peak was measured during various periods of time (live time of measuring is $t_g=90c$); right after the rotating motor was turned off ($t=0$); in 24 hours since turning off ($t=1$) and in 5 days since turning off ($t=5$) (Fig. 3). A tendency of distribution shift towards intensity diminution and changing of distribution type was noticed. A month since the source of rotation was turned off, statistical distribution becomes of a type close to normal distribution besides a small “tail”. Variance analysis of distributions obtained in moments of time $=0$; $t=1$) and ($t=0$; $t=5$) has shown the following Fisher-criteria: $F_{0-1}=4.3$ and $F_{0-5}=13.8$ while $F_k=3.9$. Aftereffect means that there is the physical field in metastable state.

In Table 1, the measuring results of some types of energy (the second column) under influence of the field's rotation on various isotopes are shown. Measuring was carried out during liquid's rotation with angular velocity of 2100 rev/min (Rot) or during the nonrotating mode (St). Type of statistical distribution of photons Q_p 's intensity is marked by the following letters: type in the form of duplet is D, in the triplet form is T, the type close to the normal (Poisson) one is N. Average values of the peak's square S , standard mistake σ and difference between extreme distributions in the multiple Δ_p is shown in columns 6 – 8. In the next column, letter “L” marks length of a “tail” of impulses’

distribution directed from the medium intensity towards its diminution. In the last four columns the same values are given for relative energy. Distribution of relations E_{rot}/E_{st} was studied. M_E marks a median of statistical distribution of relative energy.

As an example, distribution of peaks and amplitude of pulses during zinc isotope's measuring (in the rotating mode) is shown on Fig. 4. Reverse correlation of amplitude and peak's square with coefficient -0.54 is shown. Resonance effects both for peak's square and amplitude of pulses took place only during zinc isotope's measuring.

In order to study influence of the detector charging on quantity of the peak's square shift during relative measuring, 50 measurements of cesium-137 during different modes was carried out for distances of 1; 2; 4 cm from the detector while the distance from the beaker's bottom was unchanged. In this case, changing of charging characteristics of the detector happens. Relative distribution P_{rot}/S_{st} were studied. P_{rot} – selective values of the peak's square in the rotating mode, S_{st} – average value of the peak's square sampling in the nonrotating mode. The following results obtained: average value of relative distribution of the sampling in the rotating mode for a distance of 1 cm was $Sr_1=0.8591$, $\sigma=0.0085$; for a distance of 2 cm $Sr_2=0.9707$, $\sigma=0.0019$; for a distance of 4 cm $Sr_4=0.9869$ $\sigma=0.0059$.

Table #1

Iso- tope	E, (keV)	Quant. of mesur.	Ope rat. mode	Q_p	S , (pulse)	σ , (pulse)	Δ_p , (pulse)	L, (pulse)	Q_E	Δ_E , (keV)	M_E (rel units)	σ_E , $\times 10^{-6}$ (rel.units)
Zn ⁶⁵	1115	350	St	D	11326	11.5	250	-	N	-	1.000016	3.7
			Rot	D	10899	42.9	200	3400				
Rb ⁸⁶	1077	150	St	D	10500	16.4	250	-	T	1076.91-	0.999984	5.7
			Rot	D	9959	89.7	300	4500		1077.08		
Am ²⁴¹	59	100	St	N	11972	17.6	-	-	N	-	1.000051	68.0
			Rot	D	11839	24.1	100	540				
Cs ¹³⁷	661.6	426	St	D	11018	11.7	500	-	N	-	0.999978	7.1
			Rot	D	11018	12.8	400	1000				
Na ²²	1274	100	St	N	10352	19.0	-	-	N	-	1.000013	10.0
			Rot	N	10286	14.0	-	-				
Sb ¹²²	603	150	St	D	10091	14.7	150	-	N	-	0.999981	9.7
			Rot	D	10064	15.0	200	-				
Eu ¹⁵²	122	150	St	D	10266	13.2	150	-	D	122-	1.000053	19.5
			Rot	D	10247	12.4	150	-		122.02		
Co ⁶⁰	1332	150	St	N	10938	27.3	-	-	D	1331.9-	0.999950	8.9
			Rot	N	8500	87.9	-	2450		1332.18		

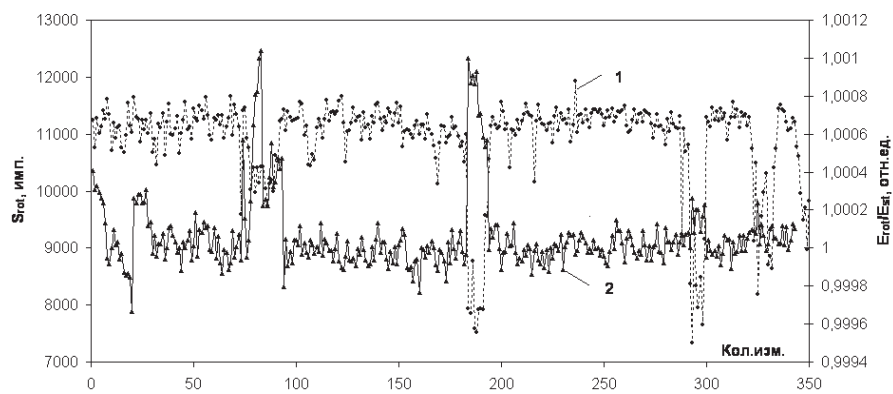


Fig. 4. Dependency of peak's square (1) and relative pulse amplitude (2) on number of measuring, during zinc isotope measuring in rotating mode

Univariate analysis for two types of distribution gave criteria $F_{1-4}=150.9$ and $F_{2-4}=6.6$ while $F_k=3.9$. Hence, the more discharging of the detector, the more difference in the peak's square distribution during different operation modes, though relative energy (amplitude) distribution for the two types does not change.

Investigating dependence of shift value of statistical distribution from spatial location of the system "source - detector" regarding the electric motor along the motor axle, changing of this value was noticed up to complete coincidence of measuring distributions during rotating and nonrotating modes. Within the limits of 10-30 mm from the rotating object (rotating speed of liquid is 2100 rev/min), maximal value of shift in the peak distributions was found.

Analysis of implementation spectrum of cesium isotope measuring has revealed one more peak with average energy of 669.6 keV. Its rate (i) in the sampling is different for various modes and geometries of measuring. We name it a peak-double – S_d . During the first measuring in nonrotating mode, it was measured that $S_{d1}^{st}=874$ pulses, $\sigma=54.1$, $i=15\%$. Accordingly, we determine average square of the peak-double taking into account rate of implementation spectra in the sampling, i.e. $s_d=S_d i/100$, where $s_{d1}^{st}=131$ pulses. During anticlockwise rotation, $S_{d1}^{pr}=1197$ pulses, $\sigma=15.5$, $i=76\%$, $s_{d1}^{pr}=917$ pulses. Measuring another cesium source, the following values were obtained: $S_{d2}^{st}=904$ pulses, $\sigma=34.0$, $i=13\%$, $s_{d2}^{st}=120$ pulses,

$S_{d2}^{pr}=1237$ pulses, $\sigma=19.6$, $i=93\%$, $s_{d2}^{pr}=1154$ pulses. Thus, significant increase of the peak-double's square takes place with regard to the nonrotating mode. Difference in the peak-double energy value (during second measuring) comparing Pr and St modes is $\Delta E_{st}^{pr}=0.87$ keV while $\sigma^{pr}=0.04$ keV. Increase of the detector's charging also increases the peak-double, for example, during simultaneous measuring of two cesium isotopes the following values determined: $s_{d3}^{st}=1442$ pulses, $s_{d3}^{pr}=1869$ pulses.

In order to study the peak-double's behavior depending on energy of the registered photons, along with cesium peaks Co^{60} with energy of 1173 keV and 1332 keV and, accordingly, peaks' squares with energy of 1183 keV and 1343 keV were measured. The experiment results are registered in table #2. In this case, energy of registered emission and detector charging increase. Comparing two cesium experiments, changing dynamics of peaks' squares for different operating modes considerably differs. When the experiment is repeated (the second measuring) with cobalt, the difference of the cesium peak-double energy is $\Delta E_{st}^{pr}=1.37$ keV, $\sigma^{pr}=0.087$ keV.

Table #2

	S_{661}	S_{1173}	S_{1332}	s_d^{669}	s_d^{1183}	s_d^{1343}
St	10123	9505	8886	1829	120	0
Pr	5536	4742	3988	687	710	522
Po	7085	6386	5769	1331	1543	1173

Measuring of implementation spectrum for clockwise and anticlockwise rotation was carried out on different days. Then correlation dependences of peaks and peak-doubles' samplings in each modes were studied. The correlation coefficients obtained were registered in Table 3. In order to diminish size of the table, all columns having correlation coefficients less than 0.6 were deleted. The following rules are discovered:

1. Correlation takes place only in rotating modes;
2. Correlation of selected values can occur in independent experiments;
3. Correlation is positive between peaks and peak-doubles.

Later, 24 samplings of cesium peaks' squares, which were got in different times and various geometries, were studied while the object was correlation of sampling values. Twelve correlation coefficients from 0.6 to 0.96 were gained including both positive and negative coefficients. Correlation is mostly negative among sampling values of the peak (661.6 keV) and the peak-double (669.6 keV).

During experiment, influence of rotation on different radioactive isotopes in various

geometrical conditions (rotation speed changing, measuring geometry, presence or absence of liquid) was studied. Dependence of medians $M_S(M_E)$ of the according distributions E_{rot}/E_{st} and S_{rot}^*/S_{st}^* , where S^* is sampling values of the peak's square. Almost all values of these medians are less than 1. The following dependence of medians $\Delta M_E(\Delta M_S)$ was built:

$$\Delta M_S = |1 - S_{rot}^*/S_{st}^*| \text{ and } \Delta M_E = |1 - E_{rot}/E_{st}| E_\gamma \quad (1)$$

Accordingly, E_γ -energy of the registering photon is in keV (Fig. 5). Areas of "prohibited" zones appear on the diagram and change of signal's amplitude distribution is connected with change of intensity distribution.

4. Theoretical analysis of results

In this chapter, theoretical basis of a possible reaction of the semiconductor detector to remote influence of rotating objects generating the physical field without the electromagnetic component is given.

It is know that impulse's amplitude in maximum point at the exit of the amplifier is determined by the expression $U = U_0[1 - \exp(-t/t_n)]$, where t is a measuring moment at maximal amplitude

Table #3

	Pr-1173	Pr-1332	Pr-1183	Pr-1343	Po-1173	Po-1332	Pr-661	Po-661
Pr-1173	1							
Pr-1332	0.85	1						
Pr-1183	0.72	0.49	1					
Pr-1343	0.82	0.90	0.46	1				
St-1173	-0.06	-0.02	0.25	-0.18				
St-1332	0.03	-0.05	0.31	-0.17				
Po-1173	-0.46	-0.43	-0.43	-0.43	1			
Po-1332	-0.58	-0.58	-0.49	-0.46	0.85	1		
Po-1183	-0.11	0.03	-0.47	0.44	0.61	0.37		
Po-1343	-0.59	-0.52	-0.35	-0.74	0.49	0.40		
St-661	0.09	0.05	0.33	-0.38	-0.21	-0.18		
Pr-661	0.89	0.87	0.66	0.83	-0.46	-0.61	1	
Po-661	-0.61	-0.57	-0.49	-0.61	0.86	0.94	-0.65	1
St-669	-0.24	-0.22	-0.12	-0.39	0.04	0.01	-0.29	0.10
Po-669	-0.46	-0.44	-0.33	-0.54	0.80	0.74	-0.42	0.76
Pr-669	0.47	0.48	0.28	0.70	-0.26	-0.33	0.62	-0.36

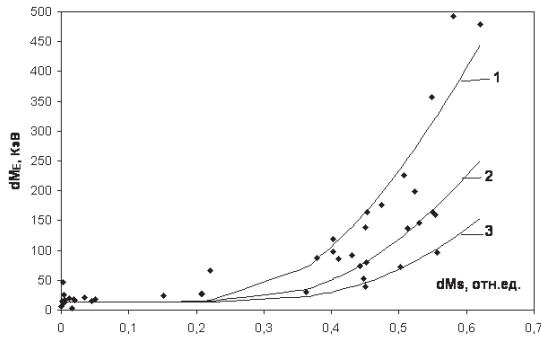


Fig. 5. Dependence of difference of energy distribution medians (amplitude) on difference of peak's square distribution medians during rotation regarding nonrotating mode; theoretical curves, 1- $t_n/p=1.73$, 2- $t_n/p=2.1$, 3- $t_n/p=2.43$

of output signal; t_n is a coefficient of RC-chain time; input amplitude is $U_0 = Qt_n/t_{cob}$ [5, 6]. Using the expression (1) and knowing that $U_0 \sim E_\gamma$, we can write $E_{st} = E_\gamma [1 - \exp(-t/t_n)]$. Due to the fact that analysis of experimental data was carried out in relative values, we can use an assumption that $E_{st} = \text{const}$ and $E_{rot} = E_\gamma [1 - \exp(-t/t_n)]$. After small transformations, the expression (1) is the following

$$\Delta M_E = M[\exp(-t/t_n) + B - 1], \quad (2)$$

where $M = E_\gamma/B$, $B = 1 - \exp(-t/t_n) - \text{const}$.

Let's pay attention to the time coefficient, which is the product of resistance and load capacitance of the detector $t_n = R_n C_n$. Amplitude $U_0 \sim t_n$ and average dead time of amplitude digital transformer (ADT) is $t_m \sim U$, so we have $t_n = pt_m$, where p is a coefficient of ratability [pulse] because of t_m . S_{st} value is a peak's square if $t_m = 0$. Using the expression $S_{rot} = S_{st}(1 - n_\Sigma t_m)$, where n_Σ is a total speed of the analyzer's calculation over all canals, we determine the loading time $t_n = (p/n)[1 - S_{rot}/S_{st}]$. Putting dependence of the loading time in the equation (2), we will get an equation of pulse amplitude changing in dependence on the peak's square changing

$$\Delta M_E = M[\exp\{-t_n/(p[1 - S_{rot}/S_{st}])\} + B - 1] \quad (3).$$

If we put in the equation (3) the experimental data ΔM_S and find three values - $t_n/p=1.73$; 2.1; 2.43, we will get theoretical dependences shown on Fig. 5.

It is necessary to find out how the electromagnetic field generated by the electric

motor can influence amplitude and square of the friendly signal's peak. We know that capacity C_w and resistance R_w are attached to the input stage of the amplifier. So, $C_n = C_d + C_w$ (a) and $R_n = R_d R'_w / (R_d + R'_w)$ (b), where $R'_w = R_w R_{wc} / (R_w + R_{wc})$. Having a variable component of current, capacitance $R_{wc} = 1/\omega C_w$, where ω is a cycling frequency of alternating current generated, occurs. Thus, not taking into account variable component influence on the detector's capacity (i.e., $C_n = C_w$), we have

$$t_n = R_d R_w C_w / (R_d R_w C_w \omega + R_d + R_w) \quad (4)$$

putting $t_m = t_n/p$ in the expression of the peak's square, we get

$$S_{rot} = S_{st}(1 - nt_n/p) \quad (5)$$

In this case, we can suggest that total speed of the analyzer's calculation will be increased by the impulse component generated by the motor's collector, jw , where w is rotation frequency and j is ratability coefficient, i.e. $n = n_\Sigma + jw$. Hence, in case ω and w increase, the peak's square and impulse amplitude diminishes, due to $U_0 \sim t_n$.

Value jump t_n/p seems to be connected with quantum effect in the semiconductor detector, which is caused by the generated multicomponent physical field influencing group speed of charge and changing t_{cob} (apparently $p \sim t_{cob}$). Below, we will describe influencing degree of electromagnetic component.

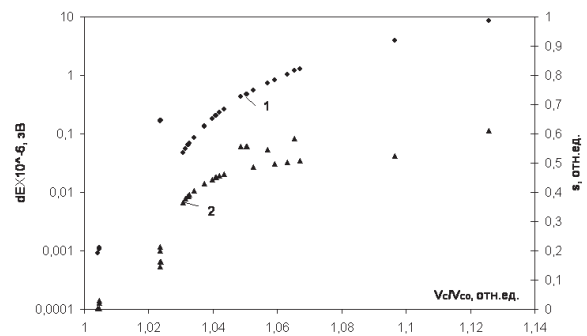


Fig. 6. Dependencies of increment energy (1) and relative peak's square difference on relative charge speed

Germanium-lithium generator is kept at the liquid nitrogen temperature. Acceptor dopant of lithium creates p-i-n hole conduction, so maximal collection time is connected mostly with speed of hole's diffusion, i.e. $t_{cob}=d/v$, where d is a width of the barrier region; v is an average (group) speed of holes [7]. It is known that $d=[\chi(U_c-U_1)/(2\pi eN_a)]: \chi$ is a dielectric constant, U_c is a bias, $U_1=0.3B$ for germanium, N_a is a concentration of acceptors. At the same time, charging speed $v\sim[U_c]^{1/2}$, and we can write, accordingly, that $t_{cob}\sim[U_c-U_1]^{1/2}/[U_c]^{1/2}$, and if $U_c=1500$ V, we can make a conclusion that collection time does not depend on changing of bias.

Meanwhile, loading time is proportional to the detector's capacity. Due to $C_d=1.1\chi s/(4\pi d)$, a proportion $t_n\sim 1/[U_c]^{1/2}$ forms. Obtained dependences show that the electrical field influences only loading time but not t_{cob} . In connection with this, it is necessary to clear a physical meaning of $\Theta_x=tn/p$ value ($x=1; 2; 3$). We determine the dependency $\Theta_x(t_{cob})$ using the constant electrical component ω -const. Due to the fact that $t_m\sim U$ и $U_0\sim t_n$ and using the formula of impulse amplitude, we can make the following expression $At_m=(Qt_n/t_{cob})[1-\exp(-t/t_n)]$, where A [pulse x V/c] and Q [V] are constants. If $Q/A=T$ -const, we can write using the expression $p=(t_{cob}A/Q)/[1-\exp(-t/t_n)]$ while $Ttn=v$ -const that

$$\Theta_x(t_{cob})=(v/t_{cob})[1-\exp(-t/t_n)]. \quad (6)$$

An equation shows that, measuring relative shift of the peak's square of gamma-quanta of different energies emitted by the same radioactive source (for example, Co), the peak's shift value can be different for each energy types (different t_{cob}). Experimental results confirm this conclusion. For instance, during simultaneous measuring of Co (1332 and 1173 keV) and Cs (661.6 keV), points of experimental values $\Delta M_E(\Delta M_S)$ of energy of 1332 and 661.6 keV was located on curve #2 while a point of 1773-keV-energy was located on curve #1 (Fig. 5). The most of experimental points of 1773-keV-energy are located on curve #1 while points of 661.6-keV-energy are distributed evenly on three curves. Thus, it is necessary to find out a cause of jump of the charge collection time.

Collection of nonequilibrium charges in the semiconductor detector happens in the following way. After photoeffect, electron gets energy sufficient for cascade process of balanced charges' dislodging. Most electrons go to acceptor. Accordingly, normal band is zone of p-type conductivity. In this research, collection time depends only on diffusion speed of holes. Changing of the collection time influences both the peak's square and input amplitude. It is confirmed by following arguments. If $\omega=0$, impulse amplitude depends on the ratio t_n/t_{cob} . Putting equations (a), (b) and $R_d=\lambda t_{cob}$ (λ is a constant while E_v -const) in the expression (4) and lightly modifying it as the dependence $t_n(t_{cob})$, we get $t_n(t_{cob})=R_w C_w \lambda t_{cob}/(\lambda t_{cob}+R_w)$.

Due to $\lambda t_{cob} \ll R_w$ ($\lambda t_{cob} \sim 10^5$ ohm; $R_w \sim 10^8$ ohm), the expression can be changed as $t_n(t_{cob}) \cong C_w \lambda t_{cob}$. In case $Q=q/C_w$, the input impulse amplitude is $U_0 \cong q\lambda$. The less t_{cob} , the more the expression $(1-\exp(-t/t_n))$ and, accordingly, the more impulse amplitude. Putting the obtained dependence $t_n(t_{cob})$ in the equation (5), we calculate $S(t_{cob}) \cong S_0 \{1-G[1-\exp(-t/C_w \lambda t_{cob})]\}$, where $G=nT\lambda C_w$. Thus, increasing of the collection time diminishes the peak's square (Fig. 4).

Group speed of a hole depends on energy level of normal band, that is expressed as $v=dE/dk(2\pi/h)$, where k is a phase vector and h is Planck's constant. In scalar form, $E=\hbar^2 k^2/(8\pi^2 m)$ close to normal band's borders. Effective mass of m-hole depends on state of energy level, its width and charge motion's direction in a crystal. Correspondingly, reciprocal of effective mass is determined as double tensor. It is known that energy is maximal close to normal band's limit if $k=0$. In case energy level reaches borders of Brillouin zone of the according k-field $k=\pi/a; 2\pi/a \dots$, a band gap forms, due to charge diffraction on potential of the lattice. If k-vector increases, energy jumps according to the level. Using the expression (6), in case tn -const, we can write a following proportion

$$\Theta_x(t_{cob}) \sim 1/t_{cob} \sim v \sim dE/dk \sim k/m.$$

Thus, values of the peak's square shift and amplitude are directly connected with changing of energy level and phase vector of the semiconductor's charges.

Functional dependence of the registered peak's square on charge collection time and, accordingly, on energy levels' state allows finding out physical meaning of the effect of duplet formation in statistical distribution of the peak. Duplet can be caused only by energy level splitting. The splitting leads to changing of the medium level's state and t_{cob} value. In this case, experiments with the turned-off motor (Fig. 3) can be taken as an example of nonelectromagnetic component of the physical field existence [8]. Analysis of experimental dependencies (Fig. 5) determined the following dependence: during anticlockwise rotation and duplet formation (i.e. energy levels splitting) in the peak's square distribution, points were located mostly on curves #2 and #3. In the opposite case, i.e. clockwise rotation and duplet formation, points were located on the curve #1 and a level's state drifted towards diminishing of charges' speed.

Energy of normal band level is described by an expression $E=E_0+C+3W(2-k^2a^2)$, where a is a lattice constant; W is an exchange integral determining the disturbance potential; C is an average value of alternating disturbing field. Level splitting leads to increase of exchange integral's proportional coefficient and average energy of the level, if W has a positive sign. In constant field's potential orienting electrons' spins splitting can occur, in case an unpaired electron exists (Li). Transfers among splitting levels connected with use and production of energy change the charge's group speed. Implemented experiments considerably differ from the experiment of electron paramagnetic resonance by absence of constant magnetic field. Hence, the listed effects can occur only in the

constant field orienting charges' spins, which is not the electromagnet component.

Collection time changing influences the peak-double's behavior. The peak is formed due to effect of temporary charge recombination (stick) [9]. Time, when charges are attached in stick zone, is $t_{pr}=N/[\gamma N_p(N-n_z)]$, where N is concentration of stick levels in stick trapping sites, $\gamma=\sigma v$ is constant recombination, σ - is a capture cross-section. N_p is density of free state holes. It depends on depth of hole border level of trapping sites E_D . State of this level is determined by the same possibility of thermal reflux and recombination. If quantity of effective hole states is $n_{ef}=Lm^{3/2}$, where L is a constant value and m is an effective mass, $N_p=Lm^{3/2}\exp\{-E_z+E_D/\kappa T\}$, where E_z is a width of the band gap; κ is Boltzmann constant; T is temperature. In case $t_{pr}<(t-t_{cob})$, a component of impulse amplitude resulting from power surge of previously caught carriers will increase the output amplitude by $\sim 1\%$. In case $t_{pr}>(t-t_{cob})$, the output amplitude will coincide with the absorption peak's amplitude. Thus, possibility of the peak-double formation will depend on ratio of average values of t_{cob} and t_{pr} , $f=(t-t_{cob})/t_{pr}$, i.e. $s_d\sim[1-\exp(-f)]$. In the expression of charge hold, the divisor $\gamma N_p(N-n_z)$ is an intensity of thermal reflux from holes' stick zone to normal band while difference $N-n_z$ is a concentration of blank stick levels, i.e. the more gamma-quantum energy, the less $N-n_z$ and, accordingly, the less s_d (the first column of Table #2). Charge collection time diminishing and effective mass increasing increase a possibility of the peak-double formation, hence, nonelectromagnetic component of the field influence the listed values and statistical distribution of the peak-double.

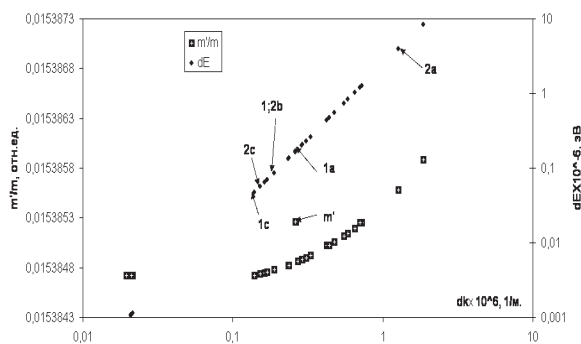


Fig. 7. Dependencies of increment effective mass of hole and increment energy on increment wave vector

In case ω not equal 0, signal amplitude increases along with increase of group speed of charge collection. At the same time, the electromagnetic component ω considerably diminishes t_n . It leads to competitive process of influence on U . This statement is based on the following dependence obtained: in case $R_d=\lambda t_{cob}$ and $Q=q/C_w$, we get $U_0=q\lambda R_w/[\lambda C_w R_w \omega t_{cob} + \lambda t_{cob} + R_w]$.

Putting values of $\lambda \sim 10^{12}$ ohm/pulse.c (while $E_\gamma \sim 1$ MeV); $R_w \sim 10^8$ ohm; $C_w \sim 5 \times 10^{-11}$ F; $t_{cob} \sim$

10^{-7} c, we can notice that t_{cob} influences the output amplitude in a case constant value of ω is about a few hundreds hertz. At first approximation, a frequency of ω will coincide with the frequency of voltage harmonics generated by the electric motor. Hence, $\omega \approx wxl$, where w is angular velocity of rotor, x is a number of grooves per pole and collector's phase, l is a quantity of phases. Changing of the peak's square depends on changing of values of n and t_{cob} , so the more degree of influence by any of the field's component, the more shift of the peak's square distribution towards diminishing. Due to this, in case the electromagnetic component is constant and reverberatory interacts with a moving charge, the relationship $U(S)$ should be inverse negative (Fig. 4).

Obtained formulas (2)-(6) and experimental results (S_{rot} , S_{st} , E_{rot} , E_{st} , n , ω etc.) allowed approximately determining charge collection time before rotation t_{c0} and during rotation t_{cob} . In case a barrier region's width is $d=1.7$ cm, we could calculate speed $v_c=d/t_{cob}$ and charge acceleration $r'=\Delta v_c/\Delta t$, where $\Delta t=t_{c0}-t_{cob}$ and $\Delta v_c=d/t_{cob}-d/t_{c0}$. In case external electric field ϵ exists permanently in the semiconductor, a force $\epsilon q=rm$ influences a charge q . Due to the fact that charge speed increases during rotation, we can write an expression $(m-m')(r+r')=\epsilon q$. Hence, $m'=m-\epsilon q/(r+r')$, where r is acceleration of holes in nonelectromagnetic component absence. Average acceleration of heavy and high mobility holes is $r \approx 1 \times 10^{17}$ m/sec², and then we calculate increment of wave vector $\Delta k=(2\pi m' \Delta v_c/h)$ and energy increment $\Delta E= \hbar^2 \Delta k^2/(8\pi^2 m')$.

Dependencies of the relative peak's square difference $s=1-S_{rot}/S_{st}$ and increment energy on the relative speed are made: $v=v_c/v_{c0}$ (Fig.6). Step decrease of ΔE value can be seen on the diagram while the relative charge speed is $v_1=1.03$ rel/units. Thus, from the moment v_1 , the more charge energy, the less peak's square S_{rot} , while before the moment v_1 $s<0.22$ and does not depend on energy.

Now we make dependencies $\Delta E(\Delta k)$ and $m'/m_0(\Delta k)$ of the so called increment Δk – space (Fig. 7). On the diagram, the value of increment mass (m') deviated from the obtained curve. The analysis showed that this result had been

got during rotor's rotation with speed of 2100 rev/min.

In case gamma quanta of different energies are measured simultaneously, values of n and ω are constants. Due to this, considering influence on charges' spins in the semiconductor, t_{cob} -time for every gamma quantum can be different. We will describe two experiments as examples. They were carried out with angular velocity of clockwise rotation of 6,000 rev/min, without the steel beaker (named 1a, 1b, 1c) and with the empty one (named 2a, 2b, 2c). In this case, simultaneous measuring of cobalt (the registered energy was marked ($a=1332$ keV and $b=1173$ keV) and cesium ($c=661.6$ keV)). It can be noticed that the beaker used in the experiment influences the charge energy only in points a and c. This effect shows increase of energy levels at 2a and 2c points relative to the 1a and 1c experiment provided by possible splitting of the given energy level. Statistical analysis of the peak's square distribution (S_{rot}) helped finding out the following dependence: at 1c point, the distribution is normal; at 2c, 1a, 1b, 2b points they have a duplet form while, at 2a point, the distribution is triplet. Thus, energy scale shift towards increase is straightly connected with increase of multiple distributions and, accordingly, with energy level splitting (proportional coefficient of the exchange integral increases). It is interesting that the $a/c \approx 2$ relation can possibly cause the synchronal shift of energy scale.

Analysis of theoretical and experimental results has shown the following rule: in case the angular speed of the motor axle is 2,100 rev/min, the obtained results were located in the $v < v_1$ area; in case in case the angular speed of the motor axle is 6,000 rev/min, they were located in the right area (Fig. 6). Influence of the electromagnetic component during experiments was relevant. In case $\omega=0$, a relevant signal amplitude is $E_{rot}/E_{st} > 1$. Actually, almost all values are $E_{rot}/E_{st} < 1$. At the same time, the electromagnetic component cannot contribute to energy levels' splitting during these experiments. The calculation showed that a frequency of electronic resonance, being ν , is $\nu \sim 10^6$ hertz during cesium gamma quanta registration after the motor is turned off. Maximal frequency of field absorbed by a

moving charge of the semiconductor was $\sim 10^{10}$ hertz during measuring in the rotating mode. We know that radiointerference having frequency spectrum of 10^5 - 10^8 hertz can be generated at clips of collectors, although this does not explain the mentioned above effects [10]. In electron spin resonance, electric field frequency not more than $\nu \sim 10^{10}$ are used but it is ~ 1 weber/m² in strong magnetic fields. That's why we describe a hypothetical field explaining all the effects.

5. Conclusion

Some experiments, such as memory effect (measuring after liquid stops rotating); information transfer about a rotating object's state (rotation of discs) etc. confirming existence of nonelectromagnetic influence on charge energy of the semiconductor allow suggesting that the described interaction belongs to torsion field.

In works of A.V. Bagrov etc. [11] equations of small relativistic particle's motion in external torsion field are obtained. They show dependence of kinetic energy of the particle on the nonelectromagnetic component. An expression for Hamiltonian is determined forecasting torsion field's influence on energy levels. In case the component of pseudo-vector of torsion exists, each level can be split in two with a certain energy difference. The obtained equations also show that interaction with torsion bends a moving electron's trajectory while vector of spin precession in external torsion field depends on speed of the particle. That's why these effects can lead to changing of density and mobility of charges used in semiconductor devices.

1. As results of the experimental research, it was found out that rotation of material bodies using the electric motor creates the multicomponent physical field in the motor's ambient space. Many of the results can be explained only by presence of nonelectromagnetic component.

2. The nonelectromagnetic component's impact on the system "radioactive source - detector" influences the statistical distribution of the peak's square and amplitude of the studied

spectrum. In this case, changing statistical distribution of the peak's square towards diminution (during rotation regarding to nonrotation) depends on changing of energy and wave vector of nonequilibrium charges of the semiconductor. Hence, such effects as levels' splitting and their changing during charge's absorption of energy of the field generated by the rotating object, which can change statistical distributions, are possible in the semiconductor.

3. The effect of duplets formation in statistical distributions discovered. It is connected with splitting of charges' energy levels in the semiconductor's normal band. The effect causes shift of medium energy level and changing of charge collection time. In this case, the constant nonelectromagnetic component influences because there is no constant magnetic field during experiments.

4. Rotating liquid forms the physical field in ambient space. The field stays in metastable state long enough and influence state of energy levels of the semiconductor's normal band. Energy levels' splitting occur leading to formation of duplets in distribution of the peak.

5. The effect of correlation of independent statistical results discovered only in experiments with rotation.

On the basis of the implemented research we can make the following conclusions:

- rotation is a source of the physical field having the same characteristics as torsion field's ones. Hence, the listed effects can be construed as influence of this field on matter. In this case, torsion field considered a spin, which is a polarized state of physical vacuum, accordingly, spin influence on ultimate particles is possible. In external torsion field, spin of a moving particle is oriented according to the field and, correspondingly, energy level's splitting occurs. Changing of levels occur due to resonance absorption of alternating field's energy leading to increase of the particle's speed. As the research has proved that such changing exists, we can suggest that torsion field also has the variable component, which is possibly generated by Earth. Most likely, in case the frequency of spin precession coincides with the

frequency of the physical field's alternating component, resonance absorption and changing to another energy level happen. Experiments prove that, besides cross component of the alternating component, its longitudinal components appears (correlation of independent data).

- the system "radioactive source – detector" can be used as a sensor of torsion field, in order to research distribution of potentials in ambient space of rotating objects. The rotating object is a source of information of its internal state, hence, a nondestructive method of controlling internal state of rotating objects.

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News

Young innovator gets invitation from Kalam

Pathanamthitta, Dec 10 - An expert team of the National Innovation Foundation (NIF) yesterday visited the young physics prodigy Aasis Vinayak P.G., an 11th class student in SDA English Medium School in Pathanamthitta, and discussed with him the low energy water-drawing system he has developed. Aasis' "invention" has drawn national and international attention.

The NIF team is led by its national coordinator, Manish Vaidya. Mr. Vaidya told that the NIF team would evaluate the new theory after discussions with Aasis. The team had a discussion with the innovator in the presence of the school Principal, T. I. John.

Aasis has been invited to the third National Innovation Awards ceremony to be held in Ahmedabad on January 5. The President, A.P.J. Abdul Kalam, will hold a 10-minute discussion with Aasis during the ceremony on his 'Theory of Absolute Creativity' which, according to him, "explains the origin of universe".

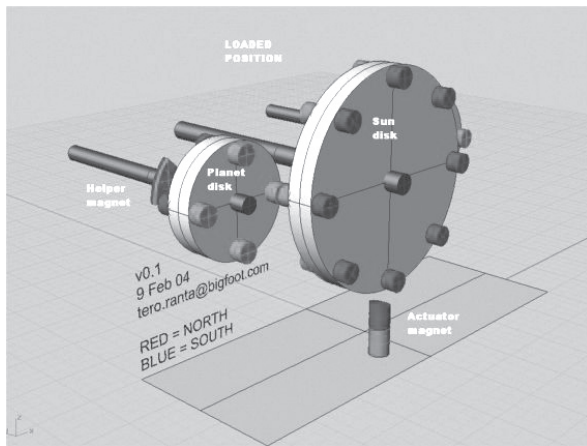
Aasis has developed the innovative water-drawing system, Vinayak's Hydel System, by making use of the gravitational force and atmospheric pressure. The Nobel Physics laureate of 2000, Herbert Kroemer, has acclaimed the young scientist's invention saying that "it can even solve the present energy crisis".

Aasis claims that his effort is to explain the source of energy at the time of the origin of the universe, which, according to Dr. Kroemer, is "the first ever link between God and science".

The Bowman permanent magnet motor

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In 1954 an Electrical Engineer named Carl C. Lienau, visiting relatives in California, learns that Lee Bowman of Sherman Oaks is seeking investors for the development of his device which he keeps in a case labeled: "Behold The Energy Of The Universe"-opened the machine is an 8x10x5 inch model mounted on a 1/2 inch aluminium base. No compartment to hide batteries.

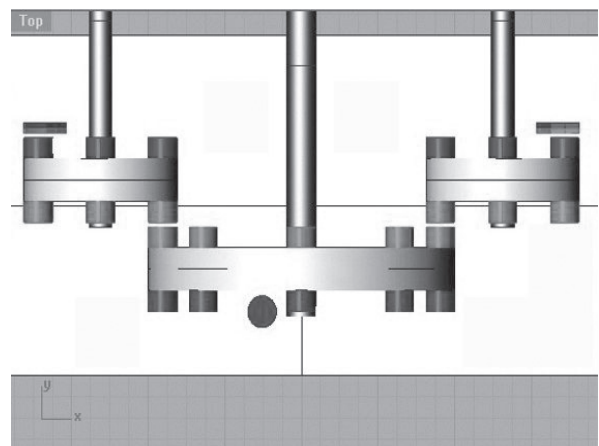


The device consists of three parallel shafts geared together so that the centre one turned in opposite direction to the two outside shafts. There was no electric motor attached to the assembly. On the centre shaft there was a 4 inch Lucite disc about 1/2 inches thick. At the end of the outside shafts 2 Inch Lucite discs were attached. The discs contained small Alnico magnets, eight of them spaced around the large disc, four around each of the small discs. The Alnico slugs were equally spaced. The Axis of the cylindrical slugs was parallel to the shafts. Their ends were accordingly ground so as to pass close to opposing wheels with only a minute gap. When the wheels were moved by hand the magnetic slugs passed, where so phased as to synchronize in position. Bowman had a small block of aluminium carrying a cylindrical slug magnet whose end had been

positioned at an angle. He put the block into a groove in the base where its position was such as to graze the magnet pair coming up. The system then began to rotate at a speed of almost 1/2 revolution per second of the side shafts. The gears were so positioned that the end shafts ran at the same speed. When the block was slid into a second groove, just opposite the first the system rotated in the opposite sense.

By placing a finger on the periphery of the large Lucite wheel, the friction torque made the system slow down. The energy required to stop the rotation was estimated at about 4 inch pounds. From this the mechanical output was 4 inch pounds per 1/2 seconds per rotation. The machine continued to rotate at that speed for 15 minutes before Bowman terminated the operation and inspection by Mr Lienau, who was much impressed and unable to account for the phenomenon. It is understood that Bowman had applied to patent the device, but was refused because the Patent Office considered it an "unpatentable perpetual motion machine."

Bowman related that the manufacturer of his magnets had tested a set of magnets which he used for a year and found that the remanent magnetism had not measurably declined.



Lienau subsequently wrote to Bowman specifying the conditions of a Pony Brake test of the machine running in mechanical and technical isolation. If the output continued for a time beyond the specified capacity of the most long - lived batteries equivalent to the 10 lbs. gross weight of the machine, the evidence would be conclusive that the machine was not fraudulent. Bowman had been in communication with competent physicists at the University of Utah. Bowman took umbrage at the implications of the letter proposing a test. Bowman was a fine machinist and had a well equipped machine shop at his home. Lienau estimated that the device required about 100 hours of work. The material costs are not significant. Bowman made his living in geophysical prospecting and exhibited an album of testimonials from clients. At the time of the demonstration Bowman was 75 years old. He decided, according to one report to have his device taken apart and after his death to have the parts buried in different locations in California.

How it works

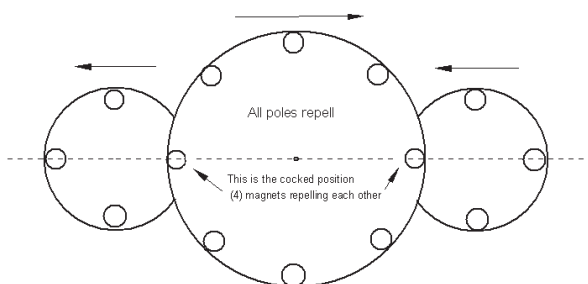
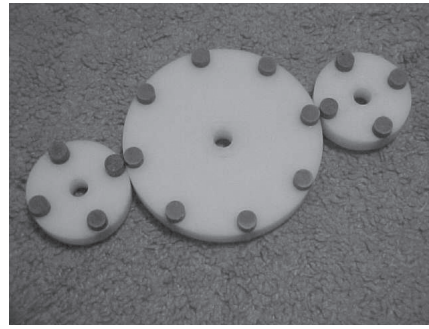


Fig. A

As we rotate the center disk by hand clockwise, the unit continuously changes from loaded to release. This is done because all magnet poles are repelling.

Also there is a gear ratio differential continuously being changed. The ratio is 2:1 or 1:2 at all times. When the engine is turned to the loaded position and allowed to return to release position on its own, the ratio is 2:1 from the planet gears to the sun gear.



It has a lot of force built in to this release. I have mine documented in inch lbs. which I will post later.

To make the engine run we have to somehow get the disks in the loaded position for free. To do this we bring attraction into the game. Attraction will overcome repel every time, and easily using the 2:1 gear ratio. With the engine now in release (Fig.B) refer to (Fig.D) . We place an attracting magnet behind each planet disk to help pull the sun disk into the loaded position at a 2:1 gear ratio. Also we place an actuator magnet in the repel mode against one of the sun disk magnets. So it is also helping to get the engine loaded using a 1:2 gear ratio. It also tends to help give the engine a sense of direction.

As the engine reaches the end of the final loaded position, this is where magnet overlap between the disks need to be adjusted correctly. This determines the time of centerpoint for release. If centerpoint is too early, it won't release properly from the attracting magnets to the planet disks. This causes a clanking of the gears as it turns, because of the shift in gear ratio's. If centerpoint is too late you waste valuable release force and the magnet next in line on the sun disk may not have enough power to overcome the actuator magnet.

Yes, when adjusted properly the release is so strong that it drives the next magnet in line on the sun disk right through the repelling actuator magnet. This is why Bowman had such close gaps between his alinco magnets, he was trying to make his release as strong as possible. Which increases engine speed. With neo35 magnets we don't have to get that close. It does nothing but chase its own tail setting it up for the next magnet.

The actuator magnet and the helper magnets

I think everyone here is getting the idea of operation and we can now do some fine tuning. Move the top of the right helper magnet to the right about a 1/4 of an inch. Now move the bottom of the left helper magnet out the same distance. This will allow for a smooth release into the repel or release mode. Once the helper magnets have pulled the planet disks from their locked positions, the sun disk starts to help reach the balance of center point. Plus with help from the actuator magnet.

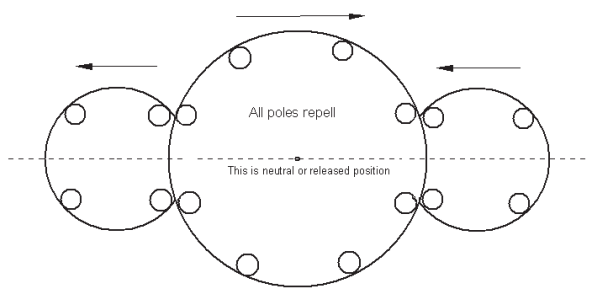


Fig. B

Right before center point we need the helper magnets to ease up on their attraction and let overcenter repel take over. Moving those helper magnets out a little on the release ends will allow this to happen.

The one actuator magnet is very important, for more than what you may think or see. The angled or trapezoid end of the magnet is a gate in this design.

I have put together an easy test to try and see that what I say is true. You will need 2 rod magnets as used in the engine. You will need one that has been ground to an angle. First let me explain. To find the exact place of the Bloch wall in the rod magnet. Measure it in length and divide by two. This is the exact location of the Bloch wall. Now if you were to cut the magnet completely in half, the Bloch wall would move to the center of each half that was cut. But we are not going to cut the magnet. Take a paperclip and move it up and down the length of the magnet. You will find the Bloch wall at the center of the magnet and the paper clip will not

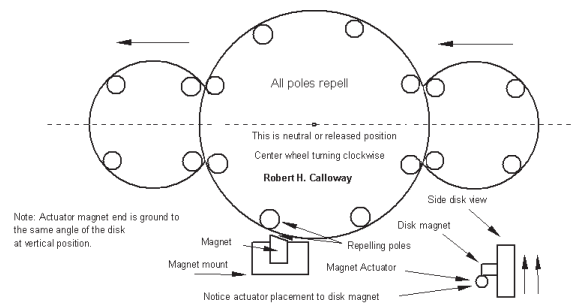


Fig.C

stick to it. It will move to one end or the other and travel all the way to the face of the magnet and stay there. This proves that the face is the strongest point of the magnet for repel and attraction.

Now grind a 45 degree angle on the end of the face without taking away any length of the magnet on the high side of the angle.

In other words the overall length of the magnet remains the same. Now, re-find your Bloch wall. Its still in the same place because you didn't take away any length of the magnet except for one side of the magnet in the angle. Test again with the paper clip. At the angle the clip will go to the highest point in the angle face.

Have your sun disk in place on the engine without the planet disks being installed.

Put your angled or trapezoid magnet under the sun disk in place.

Now place a 9/16 wrench on the outside nut holding the sun disk in place. Now place a load or weight on the end of the wrench. Apply more weight until the sun disk goes through the angled magnets repelling field. Record the

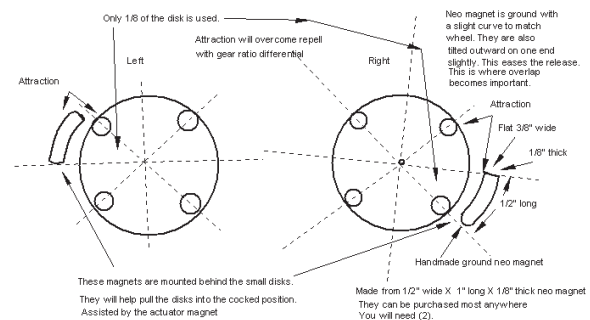


Fig. D

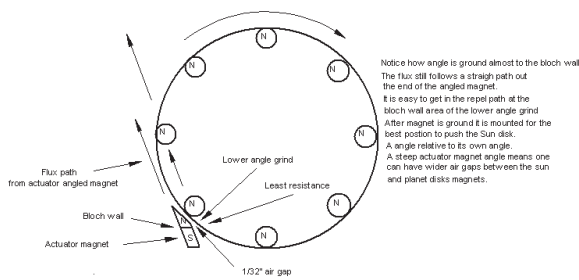


Fig. E

amount of weight that it took to do so. Now remove the angled actuator magnet and install the other magnet which is a straight cut end magnet and angle the magnet to the sun disk so that it would appear that we are doing the same thing as the angled magnet or position it any way you wish as long as the air gap is the same as the angled magnet test. Apply the wrench and the same amount of weight. The sun disk will not go through the non-angled magnet. Open the air gap up a little. Still does not go through. Add more weight until it finally goes through the non-angled magnet. Record the weight. You will need roughly about one half as much more weight on the wrench for it to get through the straight cut end magnet. The angled or trapezoid magnet acts as a lower resistance entry gate which indeed is needed for the engine to run.

Be sure you understand the helper magnets importance completely. The actuator magnet must be able to push the sun disk out of the planet disks attraction to the helper magnets into over center repel or release mode. If you think your gaps are too close between the sun disk and the planet disks don't be afraid to put more angle on the actuator magnet. But when you put more angle in the magnet you need to tilt the magnet more to the left because flux still flows straight out of the end of the magnet even though it is angled. The actuator magnet needs to be positioned so that it has the greatest amount of push on the sun disk turning it clockwise.

I also need you to know that the thickness of the helper magnets is not critical. I am now trying to build adjustable helper magnets for my motor. The planet disks can be adjusted further away from them if necessary. Whatever magnets

you use, if they are too strong simply back the planet disks away from them for correct adjustment.

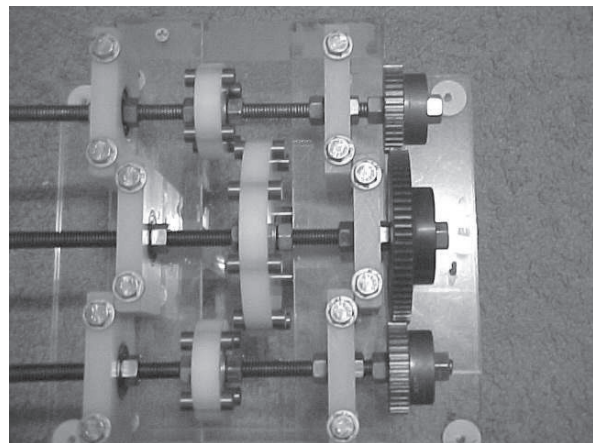
I added a drawing (Fig. E) that may help you understand how the actuator can be changed by angle.

It comes down to this: More angle, means easier gate entry. Less angle means harder gate entry. The steeper you grind the angle the more the magnet has to tilt to the left to give the greatest push on the sun disk. That push gets you out of the attraction from the helper magnets into over center to the release mode. Then it simply starts all over again chasing its own tail.

Engine run adjustments

This may save you some time and hassle getting the engine to operate.

Let me say here that the engine does indeed have some fairly wide run parameters. Install all disks on the shafts in repel position. Do not install the helper magnets at this time. Adjust the sun disk so that the gaps between it and the planet disks are about 1/4 of an inch at face to face (Fig. A). Install your actuator at a 1/32 air gap to the sun disk (Fig. C).



Now, turn one of the planet disks by hand so the sun disk is rotating clockwise. Check for any binding. Just a smooth re-cock or reload and release. Now hold the planet disk in the reload position (Fig. A). Now let it go allowing the sun disk to turn clockwise.

The next magnet in line on the sun disk must go through the actuator angled magnet. If it does not, decrease the air gaps between the sun and planet disks until it does so. Record air gap measurement. Now measure torque using a torque wrench or use the 9/16 wrench method and record the weight it takes for turning the PLANET disk to get it into the reload position. Remove the sun disk. Place the helper magnets behind the planet disks, by super gluing or some other method (some thoughts here from the group).

Be sure they attract to the back side of the planet disks (Fig. D). With the sun disk still removed, adjust the planet disks gap to the helper magnet by measuring 1/2 the weight or 1/2 the torque if you used a torque wrench. In other words each planet disk will be pulling the measured torque when the sun disk was in place. So each planet disk needs to pull 1/2 that torque plus a little. Now... plus a little. We are adjusting magnetic flux fields. All engines will be slightly different. You have to use horse sense here. If you do not have any, go find someone that does for that adjustment.

Therefore all measurements are approximant. If your planet disks are too close to the helper magnets, you will have a release problem. If they are not close enough, they will never pull the sun disk into loaded position. This is where it would be handy to have some kind of adjustability to the helper magnets.

Install the sun disk and adjust to the recorded air gap. If the engine tries to run while adjusting, remove the actuator, but put it back in the same place after adjustments to the sun disk gaps.

The engine will now start turning if you are in the ball park. You can play with engine speed by increasing the actuator magnet angle.

Remember. Repel force is less at the lower part of the angle because you are closer to the Bloch wall. A steeper angle means easier entry gate. To a certain point. If you grind away too much magnet material gauss rating will drop drastically causing it not to give the required force on the sun disk to get past over center at the planet disks. So it has to be played with. But for now, just get it running.

Device test

To test any Bowmans that have been built, do this test. Place your actuator magnet in place like shown on Fig. C. Now gently turn one of the planets disks in the direction that the actuator is trying to turn the sun disk by hand. When it reaches cocked position Fig. A, release it. If this motor is going to succeed, it must go through the next magnet in line. If it doesn't, one must move the disks gaps closer together. If it still does not....the motor will not work at all.

Encyclopedia: Gears

Pitch diameter means the "effective" diameter of the gear. The outside diameter is slightly larger. You must use the pitch diameter to determine the spacing of the shafts. For example, assume that you have two gears, one with 90mm pitch diameter and 93mm outside diam and the other with 45mm pitch diam and 48mm outside diam. The spacing of the centers of the two parallel shafts would then be $90\text{mm}/2 + 45\text{mm}/2 = 67.5\text{mm}$

Tips & tricks

Grinding the actuator will heat up the magnet. You must avoid this because it destroys the NEO.

A way of cooling is: Get a thick piece of aluminum. Put a small puddle of water on it. Hold warm magnet in puddle against aluminum. It will instantly suck the heat from the magnet.

When grinding your magnets, wrap the bottom half of the magnet with aluminum foil and coil a wire around the foil to secure it on the magnet. Solid MIG/TIG Aluminum welding wire will work, or even magnet wire. You will have a big heat sink depending how much foil you use. You can even dip the end of the foil in a cold glass of water for more heat transfer, or blow cool air from a fan through it as you're grinding. Be careful it isn't too cold or the magnet may crack from the temperature difference.

Place a steel rod or screw driver on the end of the magnet that will be cut off so the little piece

doesn't fly off and land on your skin or eye and burn a hole through it. Wear eye protection. Wear a mask so you don't breathe the poison metal dust.

Place a steel plate in the vicinity of where the Neodymium dust will fly off as you are grinding to collect the magnetic dust.

Have a fire extinguisher or wet towel just in case the dust explodes or starts to burn.

When drilling holes in the sun and planet rotors, drill extra holes between the magnet holes on both the planet and sun rotors. This extra hole could then be used to insert a dowel rod (temporarily) to line up the sun and planet rotors while tightening the nuts on the gears.

Possible Electric Propulsion Systems for Flying Triangles

Richard Alexander and Adam Whaley

<http://www.ttauv.freemove.co.uk/9000electric.html>

The information for this section is taken from several sources including Dr John F. Santarius (University of Wisconsin) Lecture 30: Charge!; Capt. James Szabo's paper "Solar Electric Propulsion Systems"; University of Michigan's College of Engineering Plasmadynamics and Electric Propulsion Laboratory Web Site; Air Force Office of Scientific Research - Electronic Propulsion Web Site; sundry other Internet sources.

Our research into the Flying Triangle "UFO" (which we are becoming convinced is actually a family of such vehicles, and which do not all necessarily use identical propulsion systems or have similar uses) has lead us to believe that the most likely main propulsion system that is employed by craft, similar to that seen in West Wales in November 1996, is of an electrical nature. This is based on the lack of obvious propulsion features seen (or not seen) on the craft as reported by witnesses. Nobody has observed propellers or air intakes and exhausts.

Also there is the lack of normal aeroengine noise - although we are aware that the technology does exist to mask such noises. Similarly the extremely bright flashes of light emitted by the craft when in "burst mode" seem to indicate that microwave or laser beam technology is used to propel the craft at these times, whereas the less

powerful electric propulsion methods listed below seem the most likely candidates for the "cruise mode" propulsion methods, despite many of them seemingly being designed for use outside of earth atmosphere. We shall deal with the microwave and laser propulsion technologies in another article.

Another problem posed by the previous FT Report was why would a presumed US experimental craft be flown over Wales. Whilst we are not privvy to the secrets of the Pentagon, we would point out that the Captain James Szabo in his Web pages for the USAF Office of Scientific Research states that "The AeroSpace Corporation currently supports a project between the US Dept of Defense and the UK Ministry of Defense for exchanging information on requirements, concepts, R+D, technologies and experiments related to systems such as space-based radar. Electric Propulsion is among the above mentioned technologies."

Electric Propulsion has been designated as a preferred technology for US MilSatCom space vehicles for the 21st Century, based on existing research and experience. Some of these technologies are more hypothetical than others as will become clear. Others, such as the Hall effect thrusters, have been operational for nearly 20 years.

We shall leave it to our more technologically / scientifically qualified readers to decide which if any of these technologies could possibly be used on the FT craft. We would remind readers that we are looking for something that involves the creation of plasma around the hull of the craft, whereas it would appear that most of the systems below appear to be more traditional engine designs using the generation of a beam of some sort emitted through a nozzle or similar channel. The three main types of electric propulsion systems are: ElectroThermal, ElectroStatic and ElectroMagnetic and we will deal with each of these in turn, first in general theoretical terms then looking at specific examples and more detailed technical performance related detail.

ElectroThermal Thrusters

This class of thrusters does not achieve particularly high exhaust velocities. These are divided into arcjets, resistojets and RF-heated thrusters. The resistojet uses a filament to heat a propellant gas (not plasma), while the arcjet passes propellant through a current arc. The RF-heated thruster uses radio-frequency waves to heat plasma in a chamber and potentially could reach somewhat higher exhaust velocities.

Hydrazine Arcjet

This electrothermal thruster has an arc discharge which is sustained between an internal cathode and an anode that also serves as an expansion nozzle. A 1.8kW, 500s-arcjet and power processor is already available for use on commercial satellites, including the AT&T NSSK ComSat. This form of thruster is considered to be fuel efficient and the radiated emissions from the arcjet and power processor are within accepted limits at frequencies above 500MHz, indicating that conventional GHz class communications (radar etc) would not be affected by the kW class arcjet system.

Hydrogen Arcjet

Arcjets for medium power (3 - 10 kW) and high-power (10 - 30 kW) applications have been

explored by USAF and NASA. The Phillips Lab ESEX program will fly a 26 kW ammonia arcjet.

Hydrazine Resistojet

This electrothermal thruster uses a propellant that is fed through a resistive heat exchange prior to expansion through a nozzle. Specific impulse is 300s for 0.5 kW thrusters. Characterized by an absence of plume ionization, meaning that the interaction of a resistojet with spacecraft subsystems is similar to that of a small hydrazine chemical thruster.

Hydrogen Resistojet

During the 1960's high-powered hydrogen resistojets achieved impressive performances in testing, e.g. 850 sec specific impulse, 85% thrust efficiency at 1 kW to 30 kW input power. Thrust to input power ratio (200 mN/kW) is several times greater than for other electric propulsion systems.

ElectroStatic Thrusters (Ion Thrusters)

The key principle is that a voltage difference between two conductors sets up an electrostatic difference that can accelerate ions to produce thrust. The ions must be neutralised - often by electrons emitted by a hot filament. The three main stages of an ion-thruster are: ion production, acceleration and neutralization.

Xenon Ion Engine

This thruster uses a Xenon plasma discharge from which an ion beam is extracted using grid-plates perforated with holes. They have been produced by the USA, Europe and Japan. Ion engines use propellant very efficiently. Specific impulse is 3000s at 0.5 kW input power at 55% thrust efficiency. US MilSatCom is currently sponsoring a laboratory investigation of the British UK-10 ion engine. NASA's NSTAR program is intended to test a high power (approx 5 kW) ion thruster for primary propulsion applications. Performance is

comparable to the Russian TAL (> 2500 sec specific impulse at $> 60\%$ efficiency) and proven. Beam divergence is much less than Hall-Effect thrusters, which alleviates concerns about plume impingement.

ElectroDynamic Thrusters

There are four main categories of Electrodynamic thrusters: Magneto-plasmadynamic, Hall-effect, Pulsed-plasma and Helicon. Each will be described in turn.

Magnetoplasmadynamic Thrusters

In MPD thrusters a current along a conducting bar creates an azimuthal magnetic field that interacts with the current of an arc that runs from the point of the bar to a conducting wall. The resulting Lorentz force has two components: Pumping, a radially inward force that constricts the flow and Blowing, a force along the axis that produces the directed thrust. Note that erosion at the point of contact between the current and the electrodes is generally a problem area for this class of thrusters. A pulsed propulsion system requires many components including a pulse applied-field MPD thruster, a pulse-forming network, a charge control unit, a cathode heater and high-speed valves.

MagnetoPlasmaDynamic Thrusters

MPD thrusters use the Lorentz force arising from the interaction of discharge current with self-induced and / or applied magnetic field. Both steady state and plasma MPDs have been developed. Demonstrated performance of steady state MPD thrusters is 20 - 30% at 1000 - 7000s specific impulse and 10 - 60 kW power. Megawatt pulsed MPDs have demonstrated efficiencies above 50% with hydrogen propellant. Pulsed MPDs thrusters can reduce launch mass by between 1000 and 2500 kg over those achievable with hydrogen arcjets. Noble gas propellants could also be used but with lower specific impulses. An MPD thruster does not yet exist at laboratory level which is suitable for orbital transfer applications. The first major MPD thruster flight test occurred in 1980 on the Japanese MS-T4 spacecraft. The

instantaneous thruster performance was 22% efficiency at 2500s specific impulse. Each discharge lasted 1.5ms. During the flight the MPD thruster was successfully operated for over 5 hours and accumulated over 400 discharges.

Hall-Effect Thruster

With these thrusters perpendicular electric and magnetic fields lead to an $\mathbf{E} \times \mathbf{B}$ drift. For a suitably chosen magnetic field magnetitude and chamber dimensions, the ion gyroradius is so large that ions hit the wall while electrons are contained. The resulting current, interacting with the magnetic field, leads to a $\mathbf{J} \times \mathbf{B}$ Lorentz force, which causes a plasma flow and produces thrust. The most common current Hall-effect thruster is the Russian Stationary Plasma Thruster (SPT).

Xenon Plasma Thruster

This device is analogous to a gridless ion engine with very high thrust density. It is sometimes referred to as a Hall-Effect thruster because of the electron motion in the crossed electric and magnetic fields. Specific impulse is 1600s at 1.4 kW input power with 48% thrust efficiency. Following the 1995 Moscow International Electric Propulsion Conference the US SMC and Aerospace Corporation submitted a proposal to evaluate the Russian SPT-100 for use in US satellites. High power Hall thrusters have been lab tested in Russia, e.g. the 50 kW TsNIIMASH TAL (Thruster with Anode Layer), which has a performance ranging from 3000 - 7000 sec specific impulse and 70 - 75% thrust efficiency.

Pulsed-Plasma Thruster

In a pulsed-plasma accelerator a circuit is completed through an arc whose interaction with the magnetic field of the rest causes a $\mathbf{J} \times \mathbf{B}$ force that moves the arc along a conductor.

Teflon Pulsed Plasma Thruster

This is an electromagnetic device in which a high-current discharge ablates the surface of a Teflon bar and accelerates plasma through a discharge channel. PPTs have been used for

autonomous orbit correction on NOVA navigation satellites. The use of solid-state Teflon simplifies the propellant feed system and allows for compact packaging.

Helicon Thruster

The principle of the helicon thruster is similar to the pulsed-plasma thruster: a travelling electromagnetic wave interacts with a current sheet to maintain a high $J \times B$ force on plasma moving along an axis. This circumvents the pulsed-plasma thruster's problem of the force falling off as the current loop gets larger. The travelling wave can be created in a variety of ways, and a helical coil is often used.

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AIAA/SAE/ASME/ASEE Joint Propulsion Conference. <http://www.aiaa.org/events/jpc02>
 Journal of Propulsion and Power.
 IEEE Transactions on Plasma Science.
 NASA workshops on specific types of thrusters.
 The AFOSR - EP WWW Server will eventually contain links to the 8 main research sites, an electronic search engine and a Bulletin Board. Currently there is an impressive list of abstracts of papers published relating to this area of research.

Bioelectromagnetics Program

Integrity Research Institute
1220 L Street NW, Suite 100-232
Washington DC 20005
USA

With generous donations from IRI member, Palph Suddath, a bioelectromagnetic machine was designed and developed by the bioenergy team of IRI in 2003.

The Premier, Photonic Rejuvenation Energizing Machine & Immunizing Electrification Radiator, is IRI's multiple combination experimental electro-medicine machine. Developed by the bioenergy team, under the direction of Dr Valone, it is based on

the Azure patent #6,217,604 "Method for treating diseased states, in particular AIDS, using an electromagnetic generator." This 200 kV machine energizes the body in a very short exposure lasting less than 5 minutes. One can sit in a non-contacting position nearby or take advantage of the TouchPad™ and/or Wand to receive antioxidant electrons which studies show will fight free radicals. (Review the Azure patent at www.uspto.gov)

ENERGY INVENTIONS ADVOCATED BY INTEGRITY RESEARCH INSTITUTE

Integrity Research Institute
1220 L Street NW, Suite 100-232
Washington DC 20005, USA
www.IntegrityResearchInstitute.org

1) **FocusFusion.org** - Controllable hot fusion project that is compatible with electricity extraction. Makes the Tokamak obsolete. Eric Lerner has already achieved the necessary billion-degree threshold demanded by nuclear physics while funded by a small NASA grant. An environmentally safe, abundant energy source: decaborane. Hydrogen boron fusion uses a plasma focus device. A recent simulation confidently predicts the LPP reactor can reach break even at 1.5 MA (MA = megamps = million amperes) and produce net energy at 2 MA. Low risk and high payback. Contact: Eric Lerner, 973 736 0522, email: elerner@igc.org

2) **Pre Seismic Earthquake Predictor & Triangulator** - Patented invention (US Patent #4,724,390) by a university physics professor, provides days of advance warning before a major earthquake or volcanic eruption. Published in several journals, texts and conference proceedings, the T 1050 has had several trials and successful predictions of earthquakes. Contact Dr. Elizabeth Rauscher, 480 982 2285 email: FlyingWG@msn.com

3) **Magnetic Energy Converter (MEQ)** - A robust power generating device that can produce electricity and a propulsive force. Business plan brings this amazing invention to market within three years. The MEC converts a known energy source that quantum physicists call zero point energy (ZPE), into conventional electromagnetic energy, which can be harnessed as electricity, used to turn wheels, turbines, etc. Inventors Godin and Roshchin (US patent #6,822,361) have published several journal articles, with proof of principle prototypes to their credit.

Contact Ivan Kruglak, 818 681 0091 email: ivan@ionsky.com, website: www.ep systems.net

4) **Bitterly Flywheel Automobile** - The country's leading manufacturer of nondestructive fiberwound flywheels claims over 95% efficient storage of mechanical energy, exceeding the efficiency of any battery. This project is directed toward creating a Flywheel Powered Hybrid Vehicle by replacing the battery bank with a retrofit flywheel assembly and drive it from LA to Sacramento. Contact Steve Bitterly, 818 710 1428 email: sbitterly@earthlink.net

5) **Dune Solar Still** - Designed by a Portland State Systems Scientist to have efficiency six times that of a conventional greenhouse solar distillation unit. A 180 m2 solar desalination pilot plant to be produced and tested. A separate portable still project will also be prototyped for backpack applications. US patent pending. Contact Dr. Paul La Violette, 518 372 2711 email: StarCode@aol.com

6) **Sky Earth Generator** - Utilizing atmospheric electricity for energy with a proprietary method of inducing and sustaining a micro vortex electrical gradient of low areal density between the upper highly positive atmosphere and the negative Earth ground. The process is similar to what actually occurs in a tornado but without the wind and high forces. Contact Len Danczyk, 805-966 1234 email: Len7@cox.net

7) **Energy Conservation Licensing Program** Innovative energy efficiency product for any product that plugs into the wall. Designed to

be a 200 - 400 kWh/yr electricity savings per computer for example. Contact Ryan Wood, 720 887 8239 email: rwood@plugloads.com

8) Ultraconductor Project - Provides ambient temperature superconductive capabilities in a thin film conductor. Patents and prototypes already generated. Large consumer market. Contact Mark Goldes, 707 280 8210 email: mrb@ap.net

9) Wireless Electric Power Transmission Over 10 years of experimental and theoretical work by university professor that confirms all aspects of this revolutionary invention, pioneered by Nikola Tesla. Two articles reprinted in Valone's *Harnessing the Wheelwork of Nature* by the inventors describe more details of the safe and highly efficient (95%) electricity transmission method. Contact Dr. James Corum, 304 291 0466 email: jcorum@ieee.org

10) Freeze Framer Biofeedback Device Computerized finger sensor that produces lower stress level in minutes. Product developed by the Institute for HeartMath, known for its innovative heart related science research. Successfully marketed at \$1 M level already. Funding is for expanded marketing plan to ramp up sales to targeted audience. Contact Dr. Deborah Rozman 831 338 8707 email: drozman@quantumintech.com

11) Synaptic Neuromodulation Treatment Program - This treatment of Parkinsons disease is just one example of dozens of alternative health therapies available from NFAM. Program includes initiation of clinical trials and inventor assistance for marketing and licensing. Contact Dr. Mark Neveu, 202 463 4900 email: mneveu@nfam.org

12) Computerized AuraMeter - Unique neurobiological energy signatures for therapists. The only consciousness monitor available today that mirrors chakra activity. Yields a person's immediate response to outside stimuli. Ten years of research by UCLA professor. Prototype completion. Contact Dr. Valerie Hunt 310 457 4694 email: vhunt@biofields.org

13) NovaLite Electrotherapy Machine Outperforms other high voltage Tesla coil and Noble gas devices, for healing of a wide range of diseases. Inventor almost lost his leg which needed to be amputated until he discovered electrotherapy. Contact Ralph Suddath, 940 498 0120 email: Aquajewel@airmail.net website: www.NovaLiteResearch.com

14) Rife Technology Beam Ray Therapy Device - Company already has an IRB for research and clinical trials proving efficacy and has applied for FDA approval. Probably the best Rife technology available today. Program includes upgrading several dozen clinics in the US for treatment of chronic pain (once approved by FDA) as well as a wide range of diseases. Contact L Kenny. 205 841 6554 email: beamray@mailcily.com

15) Electrotherapy Teslatron - Installation in a CA clinic of a successful million volt Tesla coil therapy machine in a room size treatment protocol for stubborn and terminal disease patients. Several medical doctors routinely work with this inventor and send patients for treatment. 10-patient study ongoing. Contact Guy Obolensky, 845 753 2782 email: soliton@optonline.net

16) EM-Probe.com - Pocket size magnetic pulser cured inventor of congestive heart condition. Endorsed by doctors and the subject of a NASA four year study. Contact Glen Gordon MD, 360-297-8736 email: DrGordon@em probe.com website: www.em probe.com

17) Transformative Energy Bioenergy Projects: (1) *Spiral Magnetic Motor* which uses a magnetic gradient to achieve torque. The motor can be configured into a car motor which will use voltage without current to spark each cycle. The finished prototype will be incorporated into a Bittery Flywheel vehicle for a followup Phase II project. No fuel is required since the magnetic attraction (gradient) performs useful work. A microturbine powered by magnets is another spinoff project. Magnetic motor optimization design exists from previous engineering study for a linear Hartman magnetic motor and rotational Spiral motor. (2) *Electricity Generating Shock Absorber* for

electric cars that can be prototyped within an 18-month period. (3) Restoration and licensing the *Transdermal* TD 100 treatment unit of Dr. Andrija Puharich which was patented to cure nerve deafness, along with the scanning of his personal archives and publication of the "origin of life experiment logs" in IRI possession to put on CD for distribution. (4) *Dental Vapor Ionizer* designed to remove the toxic mercury vapor I from dental operatories everywhere in the US

where poisonous mercury amalgam is still used. Invention has two model designs and is in production. (5) *Planetary Protector* for incoming meteors, tsunami amelioration, and tornado/hurricane dispersion, uses a Podkletnov projectable gravity impulse device. Journal articles published on collimated beam experimental results. Contact Dr. Thomas Valone, 301 513 5242 email: iri@erols.com Integrity Research Institute

An ether-based engine as the best way of space sailing

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Many people interested in space engineering must have heard about "light sail", which reflects incident sunlight and, therefore, can generate thrust sufficient for autonomous or pilot motion in circumsolar space. In case planet attraction is used simultaneously, it is possible to move by "board", not only "along solar wind" but also against it coming nearer to the Sun. Some experts think that such sailing vessels are an ideal method for solar system exploring, which can be used for interstellar flights in future in case external illumination from beneath of the sail by laser beams or mirrors of solar energy thickener is additionally used. Let's make some assessment.

According to reference books, there is the so called solar constant equal to $1,353 \text{ W/m}^2$, which characterizes quantity of solar energy accounted for a square unit during normal dip near Earth. Hence, we use the known ratio between energy and impulse of E-field radiation for finding light pressure on square unit of the sail. We will see that it does not exceed 1 mg per 1 sq. meter . It means that a sail with square of 1 km , made of $100\text{-micron-polymer}$ film, will make not more than 1 kg having mass of 100 tones. It will take $3\text{-}4$ years to change speed for a value compared with the first circular velocity, 8 km per second.

Permanent readers of the "New Energy Technologies" perhaps have paid attention to the article called "A manual for designing of ether-based engines" (see [1], [2] and <http://www.tts.lt/~nara/help/ozenki.htm>) reporting that electromagnetic energy can produce force by its own original effective method, which allows increasing thrust by thousand and million times. All materials are presented at <http://www.tts.lt/~nara/>.

Let's explain. Resonators of various shapes - Π -type, U-type, V-type (wedge-shaped) and cylindrical – are shown on the figure below.

They are made of thin well-conductive sheet materials and include two flat or cylindrical surfaces, which are adjoining (Fig.c) or connected by straight or arched bonds (Fig.a, b). In case electric oscillation is generated between planes, stationary electromagnetic wave will be settled. Its magnetic field will influence surface currents by force having a resultant, which differs from zero, for all resonators shown on the figure [2]. As magnetic field and surface current change in-phase, the resultant has a variable quantity but constant direction. This statement has both a strong theoretical basis [2] and a convincing experimental confirmation. Effect of this force

was registered during a series of experiments conducted by the author, see <http://www.tts.lt/~nara/zamet/opyt/opyt.htm> “Detecting ether-based motion”, experiments of a Moscow physician F. Kushelev [4] and the classical experiment of G. M. Graham, D. G. Lahoz [4] (see the detailed description at <http://www.tts.lt/~nara/introduc/introduc.htm>).

According to the carried out calculations, tractive force generated in the resonator (based on ether) is higher than light pressure force by $Q \gg 1$ times. The following technical solution is suggested. Energy of light flux is transformed into electrical one used for resonator excitation. The obtained ether-based thrust exceeds force of light pressure of light sail with surface of the same square by Q times.

Let's compare efficiency of a device containing a resonator, which gets energy from light sail transformed in phototransformer, with the primary sail, which operates using light pressure. We will know that the more geometrical measurements the more Q and efficiency.

Thus, a device with size of 1,000x1,000 meters and mass even of 1,000 tons will be able to move with acceleration about g (10 m/c^2 , which is 100,000 times more than acceleration of light

sail) and can take off from ground surface without fuel, only due to solar energy transformed into electricity. Using such acceleration, it is possible to reach any medium-remote planet of the solar system during a few days while a very remote planet can be reached during a few weeks. Even in the field of small dimensions (about one meter) acceleration will be exceeded by 2,500 times.

Therefore, comparing two no-fuel (using free energy) methods of space sailing we were obviously convinced that the ether-based method is better and exceeds the traditional method of light sail in all respects.

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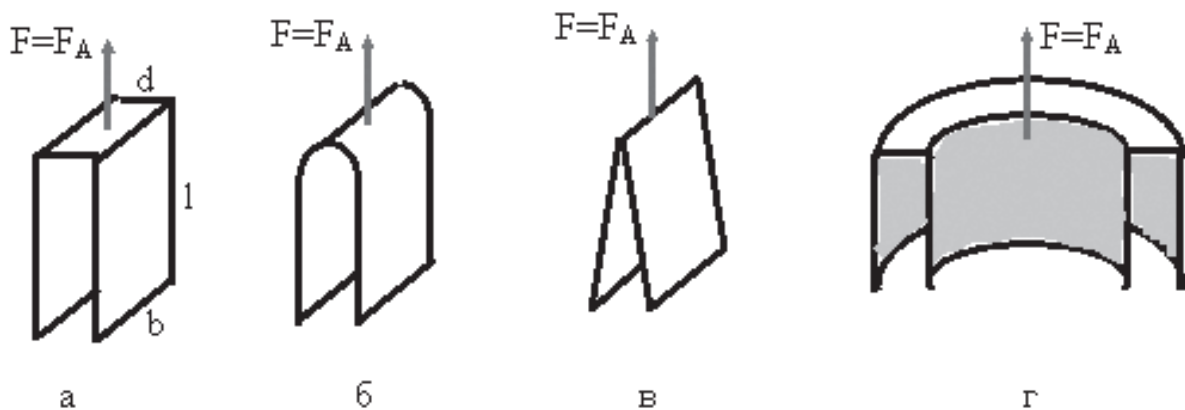


Fig. 1. Ether-based resonators
b, l, d – geometry measurements

One-Megawatt Fuel Cell Planned for San Diego Hotel

This is an excerpt from EERE Network News, a weekly electronic newsletter. March 02, 2005

FuelCell Energy, Inc. announced in mid-February that it will provide four 250-kilowatt fuel cell power plants to the Sheraton San Diego Hotel & Marina by year-end. The one-megawatt fuel cell installation will provide baseload power to the hotel, and its waste heat will be used to heat the pool. The project is the first in a series under an agreement between Starwood Hotels & Resorts Worldwide, Inc., which owns the Sheraton, and Alliance Star Energy LLC, a joint venture of FuelCell Energy and Alliance Power. The new agreement provides the framework for fuel cell projects for Starwood hotels, with an initial focus on its California properties. See the FuelCell Energy press release. The Tokyo Gas fuel cell system includes the fuel cell and a reformer that converts natural gas to hydrogen. FuelCell Energy and Alliance Power have also been working with the City of Santa Barbara to install two 250-kilowatt fuel cell plants at the El Estero Wastewater Treatment Facility. The 500-kilowatt system will be fueled with methane generated at the facility. The companies and the city dedicated the new system on February 23rd. See the FuelCell Energy press release. Residents of certain areas of Tokyo, Japan, have the opportunity to provide power and hot water for their homes using a fuel cell cogeneration system developed by Tokyo Gas Company, Ltd.; Ebara Ballard Corporation; and Matsushita Electric Industrial Co., Ltd. At a cost of about \$9,550 (1 million yen), customers will have use of a 1-kilowatt fuel cell system for 10 years. Customers will also earn a 3 percent discount on their gas bills for three years and will have their bill capped at about \$90 per month (9,500 yen). See the Tokyo Gas press release (PDF 137 KB) and the Tokyo Gas Web site.

International Hydrogen Energy Congress

(Under the auspices of the Turkish Ministry of Energy and Natural Resources)

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This prestigious congress will take place from Wednesday, July 13 through Friday, July 15 2005 at the Istanbul Lutfi Kirdar Convention Centre, where 6000 delegates can have simultaneous parallel sessions in up to 26 rooms. Furthermore, an exhibition area of about 10,000 m² is provided inside the conference centre for exhibitors. The conference centre is located in the heart of Istanbul, within walking distance of many five star hotels and other amenities.

CONGRESS TOPICS

1. Hydrogen Production Technologies (Chemical); 2. Hydrogen Production Using Different Energy Sources; 3. Biological Hydrogen Production; 4. Hydrogen Utilization; 5. Hydrogen Safety; 6. Hydrogen Storage and Transport; 7. Hydrogen Energy Systems; 8. Fuel Cell Development; 9. Environmental Issues; 10. Hydrogen Economy; 11. National/International Perspectives; 12. Other Topics

PRELIMINARY PROGRAM

13 July 2005

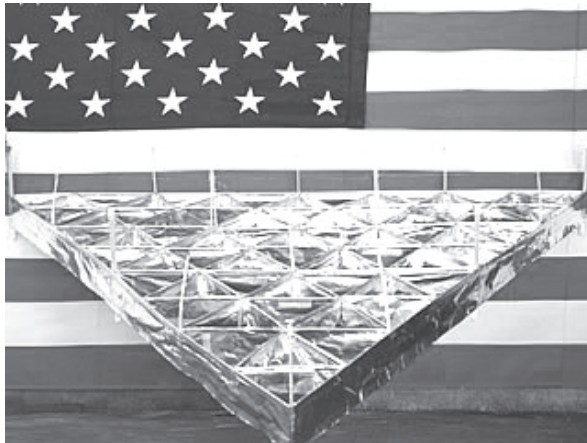
09:30 Opening Ceremony
10:30 Plenary Lecture
11:00 Coffee Break
11:20 Plenary Lectures
12:30 Lunch
14:00 Parallel Sessions
16:00 Coffee Break
17:30 Closing sessions
18: 00 Welcoming Cocktail

The Evolution of Lifter Technology

Tim Ventura

<http://www.americanantigravity.com>

This article covers the author's background in electrogravity and antigravity research and the development of Lifter technology from the beginning of the concept through current prototypes to designs currently still on the drawing board.



Is This Antigravity?

Lifter technology is currently being investigated to determine if the anomalous side-effects noticed in testing are in fact gravitational in nature, but Lifter technology is probably not "true" Antigravity. The definition of "true" Antigravity would be that it actually reduces or negates the effects of gravity on the prototype.

Lifter technology is a method of producing directional thrust using an electromagnetic propulsion system that has no moving parts. This could be considered the effective equivalent, or "effective" Antigravity for the purpose of future vehicular transportation.

AAG Lifter Experimentation

American Antigravity is currently conducting experiments with Electrokinetic propulsion, and is in the process of developing a practical source of Electrokinetic propulsion for possible use as a vehicular propulsion source. Our

experiments are conducted using modified Biefeld-Brown effect transducers, which convert high-voltage electrical current into motive force.

Our experimentation has currently progressed to the point of being able to levitate a tethered Lifter for an indefinite period of time while carrying payloads of up to 1 pound. While this is a very small payload at the moment, it demonstrates a propulsive efficiency orders of magnitude higher than alternative Electrokinetic technologies.

Technology Goals

One of the primary reasons that the debate about the propulsion-source for the Lifter is important concerns the potential of Biefeld-Brown technology versus ion-wind technology. Ion-wind technology has been demonstrated to require large amounts of power and provide relatively inefficient thrust in tests by NASA and other aerospace organizations. Additionally, ion-wind technology requires direct atmospheric interaction to work, which makes shielding and modularizing ion-wind devices difficult to achieve.

Biefeld-Brown propulsion is similar to ion-wind technology in that it utilizes high-voltage electricity to produce motive-force, however, unlike ion-wind technology the Biefeld-Brown transducer can be shielded from the atmosphere to prevent unwanted ionization. Additionally, Biefeld-Brown technology appears to have a much greater efficiency than ion-wind propulsion, which equates to lighter power-sources and better fuel-economy.

Lifter Basics

All Lifters contain two primary elements that are essential to the proper functioning of the device - a corona or "emitter" wire, and a "collector" foil. The foil is typically 3 to 5

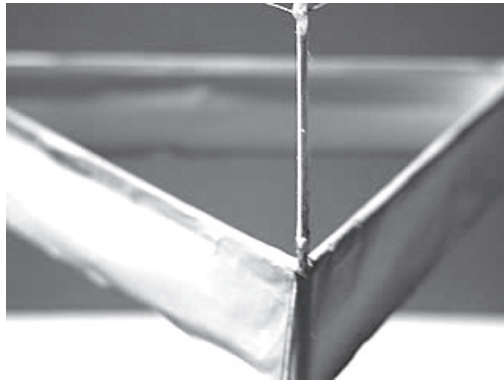


Fig. 1. Triangular Design

The Lifter 1 consists of a single triangle, with a high-voltage corona-wire suspended above a grounded foil-skirt

centimeters in height, and serves as a collector for a high-voltage charge emitted by the corona-wire.

A similar design developed over 50 years ago by Alexander DeSeversky uses a wire-mesh as a collector instead of a vertically-mounted foil. Although DeSeversky's design functioned effectively for the ion-wind component of the propulsion, it doesn't seem to have the effectiveness for the Biefeld-Brown effect propulsion that the newer Lifter-designs have. Lifters are usually, but not always, triangular in shape. They usually measure from 6-inches up to 9-feet on each side, and use mounting posts at the ends to suspend the corona wire above the foil collector. The triangle shape is not critical to the functionality of the Lifter, but it does reduce the complexity of Lifter construction and provide somewhat better internal structural support from the triangular geometry.

Types of Lifters

There are a variety of different variations on the theme of the Lifter, but they generally tend to fall into one of two categories - either single-cell or compound multicellular designs.

Single-cell Lifters contain only one triangular-cell and are typically less than 1-foot in length on each side. A newer version of larger-scale single-cell lifters known as "Beamships" have also been developed recently. Beamships vary from the conventional Lifter design in that they

typically have more structural reinforcements to support the weight and size of the larger lifting-cell.

Multicellular or "compound" Lifters contain a series of smaller triangular shape lifting-cells mounted on the interior of a single exterior cell. This design allows a greater amount of thrust to be created from smaller devices. For instance, American Antigravity's Lifter 4 measures only 4-feet on each side, but contains over 30-feet of lifting-surface.

Lifter 1: The Basic Prototype

The Lifter 1 was originally designed by Jeff Cameron of Transdimensional Technologies and serves as the basis for all contemporary lifter designs. It consists of a single triangular lifting-cell that lifts off and flies when a high-voltage charge is applied to it.

How Does It Work?

Lifter technology is powered by the Biefeld-Brown Effect, which is based on the idea of asymmetrical capacitance causing thrust. Ion-wind also plays a role in thrust, as demonstrated by the smoke-test photos above.

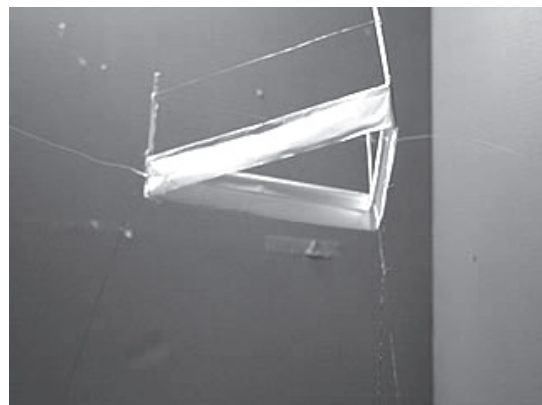


Fig. 2. Tethers & Power

Lifters can't carry enough weight for onboard power, so external power-leads are used. Tethers hold the lifter down during testing

The Biefeld-Brown Effect and Ion-Wind have both been experimented with by a number of agencies, including the US Military and several major aerospace companies.

Lifters require tethers to keep them near the ground, but they aren't limited to low altitudes. Biefeld-Brown Effect technologies don't require a track or special surface like Maglev, which means that they can go anywhere an aircraft can.

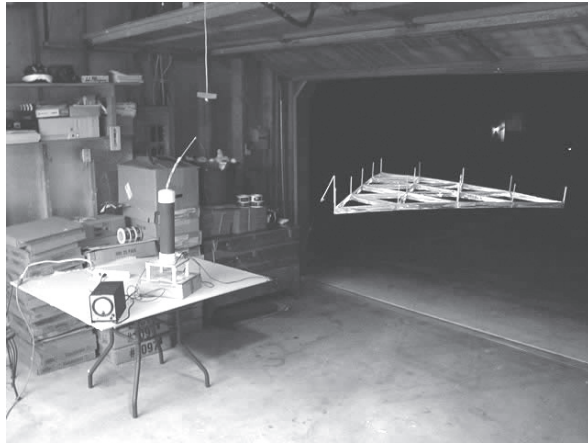


Fig. 3. Stable Levitation. In this photo, the Lifter 4 is shown levitating 5 feet above the floor. The GRA-50 HV-supply is visible on the left side of the picture

How Can I Build One?

Building a Lifter is simple and inexpensive, and a complete set of plans for construction, testing, troubleshooting, and safety guidelines are available on our site.

What about Power Supplies?

Lifters require a high-voltage, low-current power supply. Early experiments were conducted by tapping the 30kV output of a discarded computer monitor, but American Antigravity now uses the GRA-50 power-supply from Information Unlimited.

Why Aren't These Commercial Yet?

One of the major drawbacks of Lifter technology is the efficiency of the Lifters compared to conventional aircraft and helicopters. At the moment, American Antigravity's most efficient Lifter lifts about 3 pounds per horsepower, which is about half as efficient as a helicopter.

As time goes on we are learning new methods for increasing the overall efficiency of the Lifter

technology. New technologies like air-gap pre-ionization play a major role this effort, and may even result in future lifters with efficiency greater than even conventional aircraft.

The Lifter 4 Power-Supply

The Lifter 4 indoor tests were performed using the Hvolt series power-supply from Information Unlimited. The critical voltage required to achieve lift is 17.5 kV - however, increasing the voltage correlates with an increase in thrust.

American Antigravity conducted extensive Lifter 4 testing from August to October of 2002. Due to lightweight construction materials and adverse humidity effects, our initial Lifter 4 prototype was retired in late November. The construction of a second Lifter 4 prototype required 4 days of effort, and was completed in mid January 2003. This prototype features a more durable and robust chassis, as well as having an air-gap 7 centimeters tall (the first prototype was wired with a 5cm air-gap).

The increased distance of the air-gap on the second prototype provided a thrust increase when compared to the older model. The increased distance from the wire to the foil more effectively transfers kinetic-energy from the emitter to the collector, thereby providing higher thrust efficiencies.

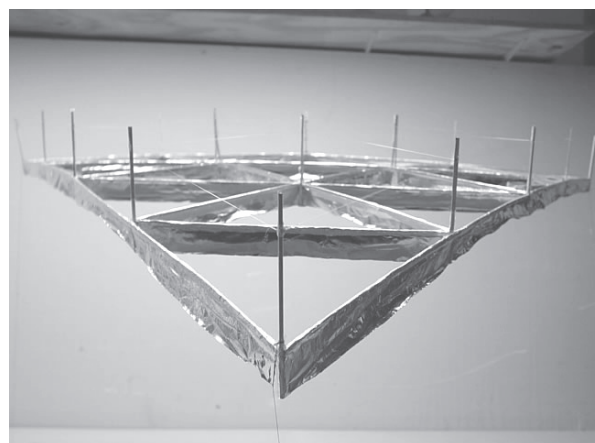


Fig. 4. High Thrust Output. The Lifter generates enough thrust to cause an upward bowing-effect in the structure of the prototype even at partial thrust

During testing in January, it was discovered that creating a bypass on the output load-resistor of the GRA-50 power-supply effectively increased thrust. The increase in performance was very noticeable, and it is believed to be the result of creating a "dynamic voltage" across the air-gap.

Testing last summer involved utilizing the conventional power-supply, which uses resistors to maintain a minimum-voltage. Bypassing the output load-resistor allowed the voltage to remain steady across the air-gap at a 'bare-minimum level' to maintain charge transfer. Therefore, power that would have gone into producing voltage was instead converted into higher current-levels, which resulted in much greater charge-transfer from emitter to collector.

Upward-bowing of the chassis of the Lifter 4 was unexpected, due to the structural reinforcements that we added during construction. The increased thrust is distributed evenly across the Lifter, but has a normal additive effect on the center of the Lifter that causes upward bowing in the structure. This bowing is seen as a tension on the structure of the Lifter and occurs when the applied power is above 40-watts.

The amount of thrust generated by a Lifter is partially a function of its length. For multi-celled Lifter designs, the length as measured as the combined length of the wire-foil combination for the all cells in the Lifter. The Lifter 4 measures 4-feet on each side and contains 16 cells, but the amount of cumulative length is over 30 feet for both the first and second prototypes.

Force was measured during testing by the use of a digital-scale mounted underneath the test-surface and connected to the Lifter by thread running up through a hole. This experimental setup was designed to prevent ionization from affecting the accuracy of the scale's measurements, and appears to have provided adequate shielding for our purposes. It should be noted that it is considerably easier to test the Lifter-4 connected to a scale in comparison to smaller prototypes like the Lifter 1 because of its greater size and increased stability.

Additionally, the higher-thrust provided by the Lifter 4 reduces the degree of error inherent in all calibrated measurements.

The Lifter 4 uses slightly more current than the Lifter 3 does - when powered by the 100kV Hvolt 100 power supply, the current draw for the Lifter 4 is between 3.5 and 4 milliamps - for the Lifter 3 the current draw is between 2 and 3.5 milliamps.

American Antigravity's Largest Lifter!

The Lifter 9 is breakthrough in large-scale Lifter technology for American Antigravity. The Lifter-9 is expected to be much more efficient than smaller lifters due to natural economies of scale with regard to Ion-Wind/Biefeld-Brown technologies. To learn more about how we constructed it:



Fig. 5. Multi-Cellular Design. Multiple lifting-cells increase thrust output and overall efficiency. The Lifter-9 has 36 cells, and a combined air-gap length of 100 ft!

With over 36 lifting-cells and nearly 100-feet of wire-foil combination, the Lifter-9 has raised the bar for large-scale composite Lifter design. In fact, the Lifter-9 is large enough that it requires more power for peak operation than the GRA-50 supply is capable of providing. This means that until we complete the assembly of our 2,500 watt power-supply, the exact performance and efficiency of the Lifter-9 is unable to be determined.

Reinforced Lifter Frame

The Lifter-9 has a reinforced balsa frame, joined at the major stress-points with an additional piece of high-strength plastic that has been bonded to the balsa. In addition, we're no longer using cyanoacrylate adhesives (ie: super-glue & derivatives) to put together Lifter struts. It has been found that common household hot-glue functions much more effectively for this task, because hot glue is more flexible and resilient to shocks and abrasion.

In addition to the reinforcements already built into the Lifter frame, the amount of flexure in the Lifter-9 during testing indicates that external reinforcements may also be required. This might include tensioning struts and wires to hold the Lifter together in the same manner that antique airplane wings were held steady by cables.

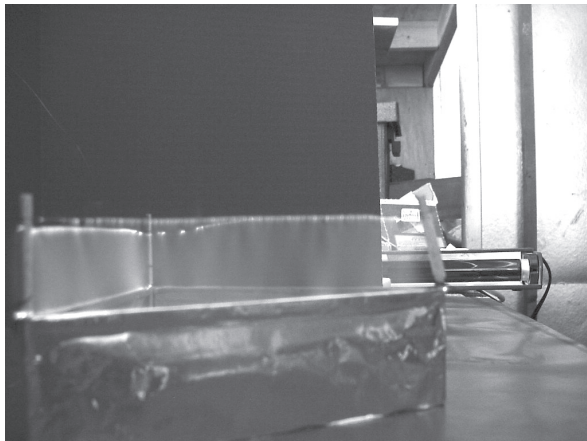


Fig. 6. 30-Gauge Wire. The bright purple glow of the corona from the 30-gauge copper wire was captured using a 1-second shutter exposure

High Thrust-Output Capability

The emitter/collector wire-and-foil combination is the primary key to increasing Lifter performance. In a well-built Lifter, the sides of each lifting-cell will be substantially long and have a set of interior cells to maximize field-strength.

With nearly 100-feet of air-gap to do the work, the Lifter-9 is capable of sustaining far larger levels of thrust than the Lifter-4, which had only 30 total feet of air-gap length.

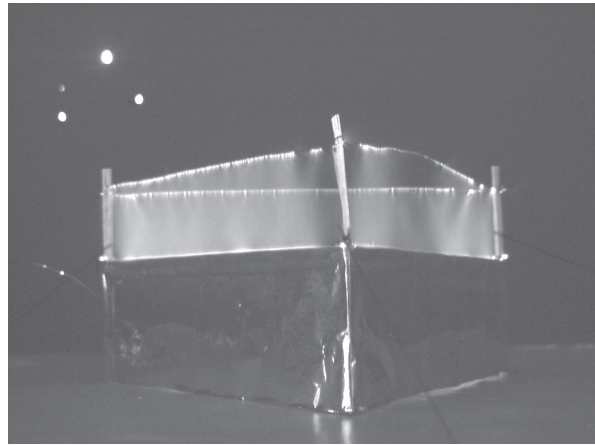


Fig. 7. 30-Gauge Wire. This front-view photo shows the coronal-sheet that completely fills the air-gap when in operation using 30-gauge wire

The Lifter 9 Power-Supply

American Antigravity is in the process of designing and constructing a custom 2,500 watt power supply for advanced high-energy lifter testing. This supply produces ten times more energy than the GRA-50 that we currently experiment with, which allows the investigation of a whole new realm of technology.

The new power-supply will not be completely until early 2004, and in the meantime very basic experimentation with the Lifter-9 has been carried out using the GRA-50 supply that we normally test with. While it produces lift on the Lifter-9, the Lifter in general is designed to use

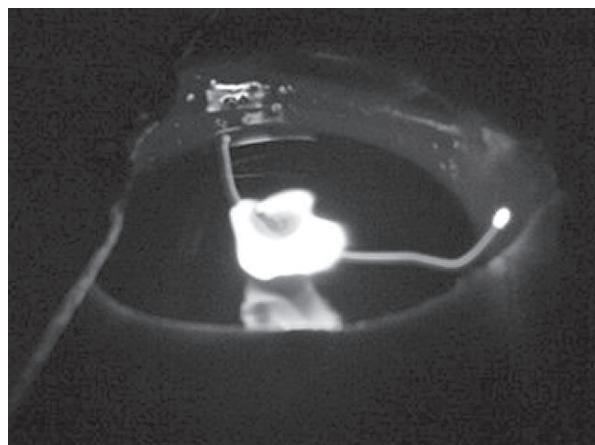


Fig. 8. Corona-Plasma Arcing. As the flame passes through the charged air-gap, combustion-gases form a plasma-channel and conduct electricity as long sparks

more current than the GRA-50 can deliver. This leads to general inefficiencies in thrust due to "brown outs" in the Lifter's composite cells.

Microcell Overview

Normally a compound lifter is composed of a number of triangular cells glued together at the edges to form a larger composite triangle. While this method works well for Lifters containing large amounts of space on the interior of the cells, each of these individual cells contains space that doesn't participate in propulsion due to being too far away from the edge of the cell where thrust occurs.

Thrust occurs at the edge of each cell, and travels in a vertical axis up from the foil collector to the wire emitter. Typically, longer wire-foil combinations are preferred to reduce electrical leakage at the 3-corners of each triangular cell. This leakage is due mostly to construction methods and irregularities in the process of manually building lifters.

The Lifter-3 Microcell concept is designed to take advantage of unused space in the center of each lifting-cell by adding a smaller foil-triangle to the cell to allow the device to dissipate more power than the lifter would otherwise be able to.

Greater power-dissipation means more thrust coming from a much smaller overall device

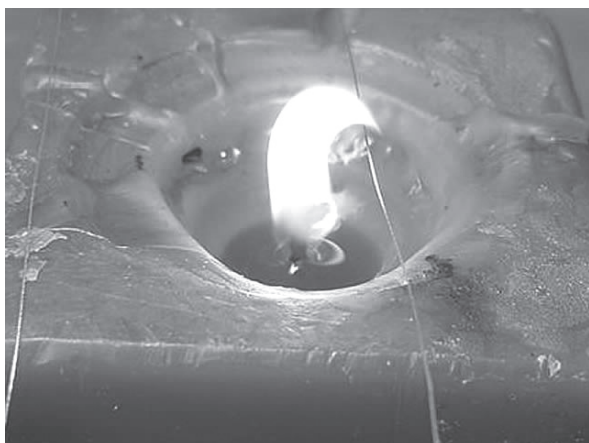


Fig. 9. Flame Bisecting Air-Gap. When high-voltage power is applied across the air-gap, the flame is drawn onto the ground-potential collector

design, although one major drawback to increasing the power-dissipation for the Lifter-3 is that much greater amounts of energy are required than normal in order to satisfy the larger power-requirements.

It should be possible through the use of Microcell technology to allow the 3-foot Lifter to dissipate as much power as a 5 or 6-foot design would, which in turn provides thrust similar to the larger model Lifter at only a fraction of the physical scale.

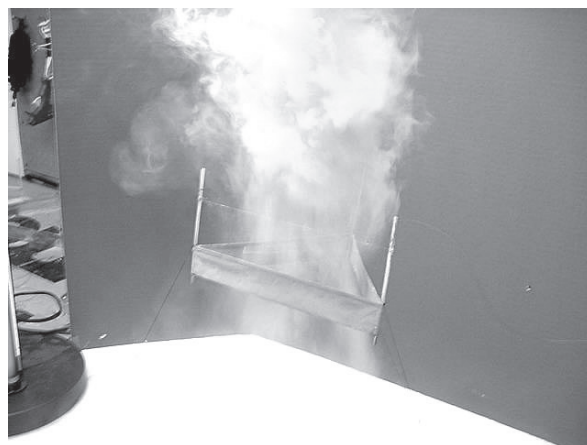


Fig. 10. The EM field from the Lifter confines the cloud of smoke, and accelerates it through the middle of the Lifter

Lifter Corona

Early lifter designs typically utilized a 30-gauge wire for the high-voltage emitter, which gave off considerable ozone and corona. Newer designs utilizing 50-gauge stainless-steel wire do not have this problem. The photos below are a comparison of the corona-emission from Lifters using 30-gauge and 50-gauge wire.

Corona Overview

The Lifter corona is a result of high-voltage charge-transfer between the emitter-wire and foil-collector. The coronal-effects in the above photos occurred primarily with early Lifter designs, which typically used a heavier-gauge emitter wire. The photographs were taken using a light-enhancement feature to better detect the corona, which is typically very faint in a well-lit room.

50-Gauge Stainless Steel Wire

American Antigravity replaced the magnet wire on the standard Lifter 1 shown in the majority of our test videos with 50-gauge stainless steel corona-wire.

The results that we encountered were highly surprising. The hissing noise that usually accompanies the lifter during operation completely disappeared, and our light-enhancement photographs show that aside from residual glow from workmanship issues, the prototype with the new wire shows no corona during operation.

In addition to the lack of noise or corona, the lifter also showed a dramatic increase in lifting power. Also, the lifter showed an increase in stability that allows increased tether-height without swaying.

Flame-Test Coronal-Effects

The flame is drawn towards the 30-gauge collector wire when power is applied partially through an aerodynamic push from ions travelling from the emitter to the collector, but also because the flame is a mixture of combustion-gasses and gas-plasma that picks up and carries charges in the air-gap to the collector.

In essence, the flame serves as a charge-transport mechanism across the air-gap, and as such it picks up ions from the surrounding air in the corona and delivers them to the collector.

Purchasing 50-Gauge Stainless Wire

You may be able to purchase 50-gauge stainless wire from American Antigravity in the near future. When we have a source ready, we will announce sales of 50-gauge wire in quantities to allow Lifter-researchers to improve their designs dramatically.

Lifter Airflow Enhancement

To demonstrate the effects of the airflow present from the ion-wind component of Lifter thrust, smoke-tests have been performed by American

Antigravity to provide a more clear understanding of Lifter airflow dynamics in the high-voltage air-gap.

Why Smoke-Testing?

Smoke testing for the Lifter technology demonstrates a pronounced effect on nearby air-molecules by the electric-fields present in the Lifter's air-gap during flight. These fields and associated high-voltage charge transfer through the air create an airflow in which the direction of air-movement is down through the vertical axis of the Lifter, creating an upward thrust along the center axis.

The presence of smoke particles allows the movement of the air to be easily observed and documented in order to better understand the operation of Lifter technology.

Biefeld-Brown versus Ion-Wind

While the movement of the air due to high-voltage charge transfer in the Lifter does demonstrate that an atmospheric effect is producing some measure of thrust, the Biefeld-Brown effect may still be producing a considerable amount of thrust in the Lifter as a method of pure "Field-Effect Propulsion". The only manner in which to truly measure this type of propulsion would be to operate the Lifter in an environment of "perfect vacuum", as partial-vacuum experiments still show considerable ion-wind effects.

Atmospheric Charge-Transfer

Atmospheric charge-transfer occurs between the high-voltage emitter and the ground-potential voltage of the collector in the Lifter. In this method of operation, the emitter collects electrons from nearby air-molecules, after which they become ionized and seek a ground potential to regain their neutral charge.

As ionized molecules, the charged air molecules are attracted to the collector as a source of electrons to become neutral, and actually flow through the air from the emitter to the collector. This travel of ions through the air is what creates the air-movement between the emitter and collector.

Enhancing the Ion-Wind Effect

By enhancing the effectiveness of ion-travel through the air from the emitter to the collector, it may be possible to obtain higher-levels of efficiency from Lifter technology using the same amount of electrical power. Different methods involved in this approach may include possible enhancements to the surrounding atmosphere (such as electrical pre-ionization), or could alternatively include a method of modifying the emitter to emit electrons at a lower voltage. This second method of low-power ion-emission could be achieved through a variety of means, one of which being the use of very a thin carbon-fiber electron emitter.



Fig. 11

Smoke Chamber Testing

The American Antigravity smoke chamber allows testing of the Lifters in an environment where the effects of smoke and airborne pollutants can be examined. This allows detailed examination of the airflow for the ion-wind component of thrust, in addition to sedimentation research!

Lorentz Force Propulsion

The Lifter-4 indoor tests were performed using the Hvolt series power-supply from Information Unlimited. The critical voltage required to achieve lift is 17.5 kV - however, increasing the voltage correlates with an increase in thrust. American Antigravity conducted extensive Lifter-4 testing from August to October of 2002.

Due to lightweight construction materials and adverse humidity effects, our initial Lifter-4 prototype was retired in late November. The construction of a second Lifter-4 prototype required 4 days of effort, and was completed in mid January 2003. This prototype features a more durable and robust chassis, as well as having an air-gap 7 centimeters tall (the first prototype was wired with a 5cm air-gap).

Force was measured during testing by the use of , the higher-thrust provided by the Lifter 4 reduces the degree of error inherent in all calibrated measurements.

Polarized Air-Molecules

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Follow-Up Information

The Lifter-4 indoor tests were performed using the Hvolt series power-supply from Information Unlimited. The critical voltage required to achieve lift is 17.5 kV - however, increasing the voltage correlates with an increase in thrust.

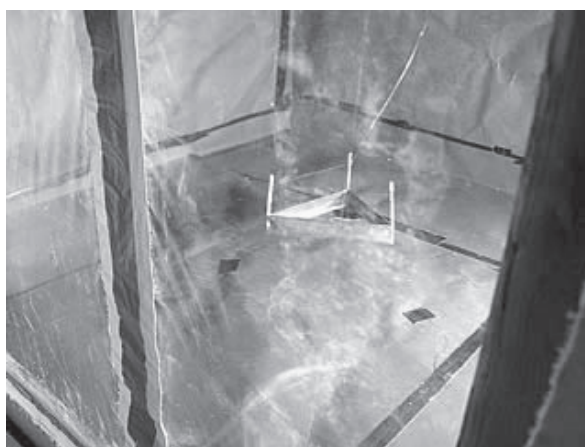


Fig. 12

News

Creating Recyclable Hydrogen Storage for Cars

From: RenewableEnergyAccess.com

Researchers and engineers have put a fuel cell in a vehicle and made it run, but the perfect solution to on-board storage of hydrogen is far from certain. Many different options are available today and new approaches are constantly in the works.

RTI International of Research Triangle Park, N.C., was awarded \$1.6 million to develop a hydrogen-fuel storage technology that will provide a stable and recyclable hydrogen source for environmentally clean fuel cell powered vehicles.

The project is funded through a cooperative agreement with the U.S. Department of Energy (DOE), and makes use of a material called aminoborane that decomposes when it's heated and releases nearly 20 percent of its weight as pure hydrogen.

Over the next four years, Ashok Damle will lead RTI researchers in an effort to design an on-board fuel system for hydrogen-powered vehicles, and develop a cost-effective manufacturing process for recycling the storage material once the hydrogen content is depleted.

"Through such projects, we hope to reduce dependence on foreign oil and facilitate utilization of our renewable energy resources," Damle said.

Collaborating with RTI on the project are the State Scientific Research Center (GNIChTEOS, Moscow) of the Russian Federation, which will provide expertise in the synthesis of the basic storage material, and ATK/Thiokol of Utah, which will provide industry support for production processes that could lead to commercial use. The team will also

prepare a technological and economic feasibility analysis that will recommend whether to move forward with a second phase of research based on the initial outcomes.

"We're proud to be participating in this important research," said Raghbir Gupta, director of the Center for Energy Technology at RTI International. "Developing these types of technologies will help enable American industry to advance beyond gasoline-powered automobiles."

Monoatomic Gold Water Generators

Paul LeBreton, CEO

*Psitronics Group Systems International
LeBreton01@earthlink.net*

Company Psitronics Group Systems International is purchasing the Water Cooler line of White Gold Water generators from Miracle Water, Inc. of Mexico.

Ron Talmage, CEO, is arranging for the company to purchase a factory building 35 miles S of Yuma, Arizona next door to his factory to build these in. They will train staff and provide tooling and contact information; and will continue to advertise the Coolers on their website: www.miraculewater.com (read about their products).

We will upgrade these coolers (which provide both hot and cold water) to an 80% concentration of Monoatomic Gold and with their Infinity Synthesizer - and market them at our cost to lightworkers of the world.

Saint Germain lived in his physical body for over 300 years by taking Monoatomic Gold. And the Synthesizer provides even more benefits (read the website).

New Energy Technologies CD

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- Parametrical Generation of Alternating currents by N.D. Papaleksi, Alexander V. Frolov.

- Gerlovin's Theory of Activation.
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 - Commercial Antigravity, Tim Ventura
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 - Nikola Tesla's Later Energy Generator Designs, Oliver Nicholson
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 - Review on the Tilley Electric Car, E. Mallove
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- Patents on Inertial Propulsion Systems
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2004, №2 (17)

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2004 #3(18)

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2004 #4 (19)

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- New about Tilley car
- Bessler machine
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- Nature of time. L. Price.
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- Time control by means of scalar waves. G.Roberts.
- Electromagnetic engine by Ignatyev
- Electromagnetic drive. R.Cornwall
- Magnet motor. A.A.Kalinin
- Global energy sources. Ph.M.Kanarev
- High efficiency electrolysis by Stanley Meier
- Water vortex heat generator (product for sale)
- Autonomous power plant (product for sale)
- Magnet motor TS2000
- Ball lightning. N.G. Shabanova and G.D.Shabanov
- Antigravity research
- Time control experimenal device
- Perpetuum mobile of 18 m diameter
- RQM technology