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General relativistic gravity machine utilizing electromagnetic field

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Abstract

Robert Forward proposed a gravity machine according to the Einstein's general relativity theory. But It requires ultra dense matter, which has the density of a dwarf star, to produce a thrust and it cannot be realized by our conventional technologies. Thus the author propose a gravity machine utilizing an intense electromagnetic field that produces sufficient thrust to propoel the spaceship acording to the Einstein's general relativity.

Keywords

Gravity machine; Einstein's general relativity theory; Co-gravitational field; Torsion field.

INTRODUCTION

Robert L. Forward described the theoretical generation of dipole gravitational fields by accelerating a super-dense fluid through pipes wound around a torus. Such techniques, though theoretically sound, have been far beyond the reach of technology. His gravity machine utilizes a mass flow through a pipe wound around a torus, which causes a co-gravitational field in a torus. If mass flow is accelerated, the co-gravitational field increases with time and the dipole gravitational field is created. If the pipe is filled with massive liquid and the liquid is moved back and forth in the pipe rapidly enough, then an alternating push-pull gravity field will be generated at the center of the ring. If the machine was big enough and the liquid was dense enough and moving fast enough, we have a gravity catapult that could launch and retrieve spaceships by its gravity repulsion and attraction. It is in the form of a ring of ultradense matter, which has the density of a dwarf star, and the flying body is expelled out the other side of the hole with a greatly increased velocity. But it is far beyond the conventional technologies and the author proposed the system which generates a thrust by the intense electromagnetic field inside the torus instead of a dense material according to the Einstein's general relativity theory.

FORWARD'S GRAVITY MACHINE

It is known that there is a analogical relation between electromagnetic field and gravitational field by research papers by Harris and Braginsky[1,2] shown as follows. A particle mass m moving in a gravitational and electromagnetic field has the equation of motion as

$$\frac{\mathbf{d}^2\mathbf{x}^\mu}{\mathbf{d}\tau^2}+\Gamma^\mu_{\alpha\beta}\left(\frac{\mathbf{dx}^\alpha}{\mathbf{d}\tau}\right)\cdot\left(\frac{\mathbf{dx}^\beta}{\mathbf{d}\tau}\right)=\frac{\mathbf{e}}{\mathbf{mc}}\mathbf{F}^\mu_\nu\left(\frac{\mathbf{dx}^\nu}{\mathbf{d}\tau}\right), \quad (1)$$

where e is the charge of a mass, $\Gamma^\mu_{\alpha\beta}=g^{\mu\sigma}(\partial_\alpha g_{\sigma\beta}+\partial_\beta g_{\alpha\sigma}-\partial_\sigma g_{\alpha\beta})/2$ and $F^{\mu\nu}$

is a electromagnetic field tenor.

With the Einstein's field equation of gravitation given by

$$\mathbf{R}_{\mu\nu} = -\frac{8\pi G}{c^4}\left(\mathbf{T}_{\mu\nu} - \frac{1}{2}\mathbf{g}_{\mu\nu}\mathbf{T}\right). \quad (2)$$

From which, Harris has obtained equations for the case when the particle is slowly moving compared with the light speed and the gravitational field is sufficiently weak that nonlinear terms in Einstein's field equations can be neglected.

$$\nabla\cdot\mathbf{g} = -4\pi G\rho, \quad (3)$$

$$\nabla\cdot\mathbf{K} = 0, \quad (4)$$

$$\nabla\times\mathbf{g} = 0, \left(\nabla\times\mathbf{g} = -\frac{\partial\mathbf{K}}{\partial t}\right) \quad (5)$$

$$\nabla\times\mathbf{K} = -\left(\frac{4\pi}{c}\right)\cdot(4G\rho\mathbf{v}) + \frac{4}{c}\frac{\partial\mathbf{g}}{\partial t}, \quad (6)$$

$$\mathbf{F} = \mathbf{e}\left(\mathbf{E} + \frac{\mathbf{v}\times\mathbf{B}}{c}\right) + \mathbf{m}\left(\mathbf{g} + \frac{\mathbf{v}\times\mathbf{K}}{c}\right) + \frac{\mathbf{mv}}{2c}\frac{\partial\varphi}{\partial t}, \quad (7)$$

where G is a gravitational constant, g is a gravitational field, K is a co-gravitational field or gravitomagnetic field, ρ is a mass density and φ is a scalar potential of electromagnetic field. This is similar to the magnetic field in the electromagnetic theory.

Analogous to Harris's equations, following equations were also given by Heaviside and Jefimenko[3], those are given by

$$\nabla\cdot\mathbf{g} = -4\pi G\rho, \quad (8)$$

$$\nabla\cdot\mathbf{K} = 0, \quad (9)$$

$$\nabla\times\mathbf{g} = -\frac{\partial\mathbf{K}}{\partial t}, \quad (10)$$

$$\nabla\times\mathbf{K} = -\frac{4\pi G}{c^2}\mathbf{J} + \frac{1}{c^2}\frac{\partial\mathbf{g}}{\partial t}, \quad (11)$$

$$\mathbf{F} = \mathbf{m}(\mathbf{v}\times\mathbf{K}). \quad (12)$$

By using analogy to electromagnetism, Forward has shown in his paper that it is possible to built a machine to create a gravitational field by the system of accelerated masses[4,5].

Time varying magnetic field creates a dipole field, the value of the electric field at the center of the torus is

$$\mathbf{E} = -\dot{\mathbf{B}} = \frac{\mathbf{d}}{\mathbf{dt}}\frac{\mu\mathbf{NIr}^2}{4\pi\mathbf{R}^2}, \quad (13)$$

where R is the radius of the torus, r is the radius of one of the loops of wire wound around it and N is the total number of turns.

If we replace the wires with pipes carrying a massive liquid, then the known analogy between the electromagnetic and gravitational field can be applied. Then the equivalent gravitational quantities can be given by

$$\mathbf{g} = -\dot{\mathbf{K}} = -\frac{\mathbf{d}}{\mathbf{dt}}\left(\frac{\eta\mathbf{NTr}^2}{4\pi\mathbf{R}^2}\right), \quad (14)$$

where is the gravitational field generated by the total accelerated mass as shown in Figure 1.

Supposing that the gravitational permeability has the

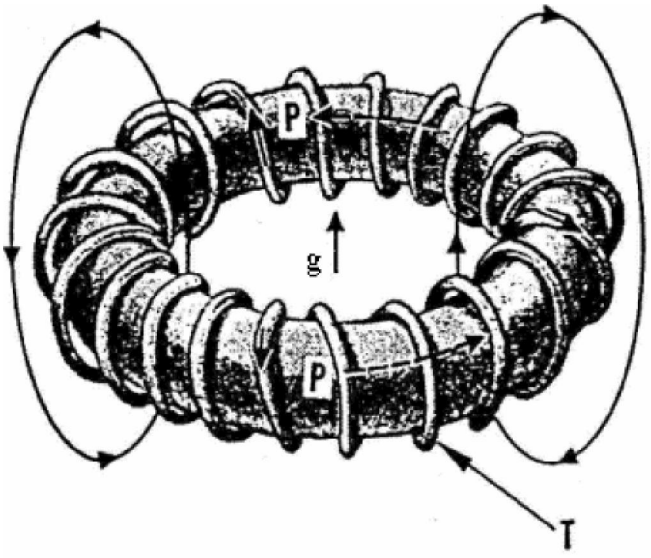

Figure 1 : Generator of a dipole gravitational field

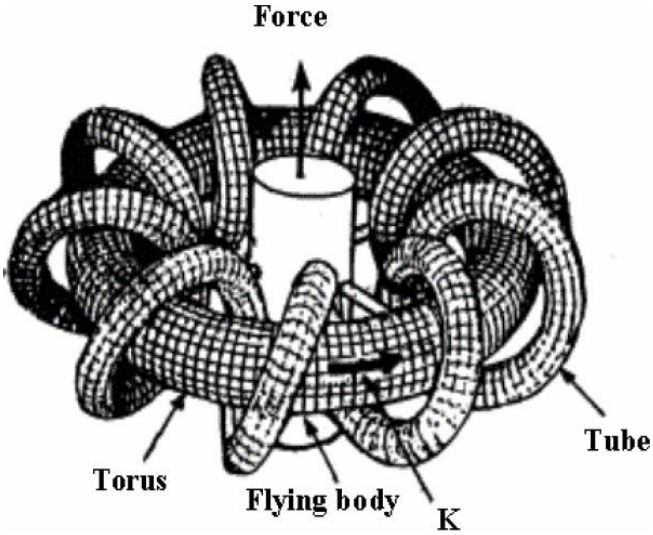

Figure 2 : Gravitational machine according to forward's idea

value of $\mu = 3.73\times10^{-26}\ m/kg$, we have $g \approx 10^{-10}a$ (a : amount of acceleration) at the center of the torus as shown in Figure 1, for the case when the density of a dwarf star through pipes wide as a football field wound around it with kilometer dimensions according to Forward, which is far from present capabilities. By utilizing this gravitational machine, constant upward gravitational field can be generated which can be used as a gravity catapult that pushes a body as shown in Figure 2.

Instead of this gravity machine, another gravity machine utilizing an intense electromagnetic field can be considered.

GRAVITATIONAL MACHINE BY UTILIZING THE LECTROMAGNETO-TOROIDAL STRUCTURE

As early as in 1951, P.A.M. Dirac published two pa-

pers where he pointed out that we should take into account quantum fluctuations in the flow of the aether[6,7]. Inspired by the Dirac ideas, K.P. Sinha, C. Sivaram and E.C.G. Sudarshan published in 1975 a series of papers that suggested a new model for the aether according to which it is a superfluid state of fermion and anti-fermion pairs, describable by a macroscopic wave function[8-10]. In their papers, they decided to treat the superfluid as the relativistic matter - by putting it into the stress-energy tensor of the Einstein field equations. This allows us to make an important step - describe the relativistic gravity as one of the small fluctuations of the superfluid vacuum as well. Based on their ideas, we can consider the possibility of a space propulsion by utilizing the co-gravitational field from the standpoint of hydrodynamics, such a term implies various fluid dynamics which includes linear flow, separated flow as well as a creation of vortices vortices.

At first, we consider the gravitational theory proposed by Heaviside and Jefimenko given by Eqs.(8)-(12). For a quasi-static field, Eq.(11) becomes $\mathbf{rotK} \approx -(4\pi G/c^2)\mathbf{J}_g$. By replacing J_g by the electromagnetic momentum generated by Poynting's vector S as shown in Figure 3, we have

$$\int_C \mathbf{K}\cdot\mathbf{ds} \approx \frac{4\pi G}{c^2}\iint_S \mathbf{J}_e\cdot\mathbf{dS}\,. \qquad (15)$$

From the equation , where is the applied voltage, and are the inner and outer radii of the cylinder shown in Figure 3, we can obtain[11]

$$\mathbf{K} \approx \frac{4\pi\varepsilon_0 G}{c^2}\mathbf{V}\cdot\mathbf{B}\,, \qquad (16)$$

if we suppose there in no field of co-gravitational field. We consider the torus-shaped structure composed of the co-axial condenser and coils rolling around the outer surface of the torus shown as follows:

A high intensity electromagnetic field can be generated by the structure as shown in Figure 4.

As shown in this figure, an impulsive strong magnetic field is induced by an impulsive electric current through the coils embedded in the dielectric material under the intense electric field and the strong co-gravitational field is generated.

As the co-gravitational field is similar to the vorticity of the fluid dynamics is generated inside the torus shown in Figure 5, this torus-shaped bundle of vortex lines causes the forward motion of the ring, and we may think that the forward thrust for the torus-shaped structure may be generated similar to the fluid dy-

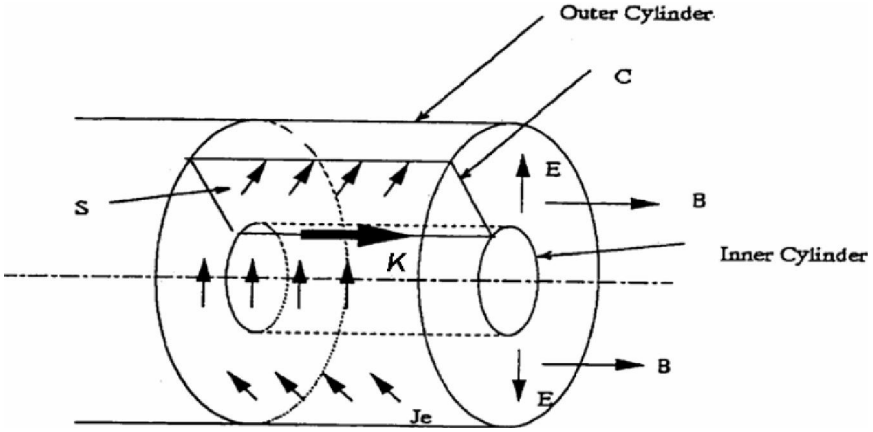

Figure 3 : Generation of K by the electromagnetic fields inside the tube structure

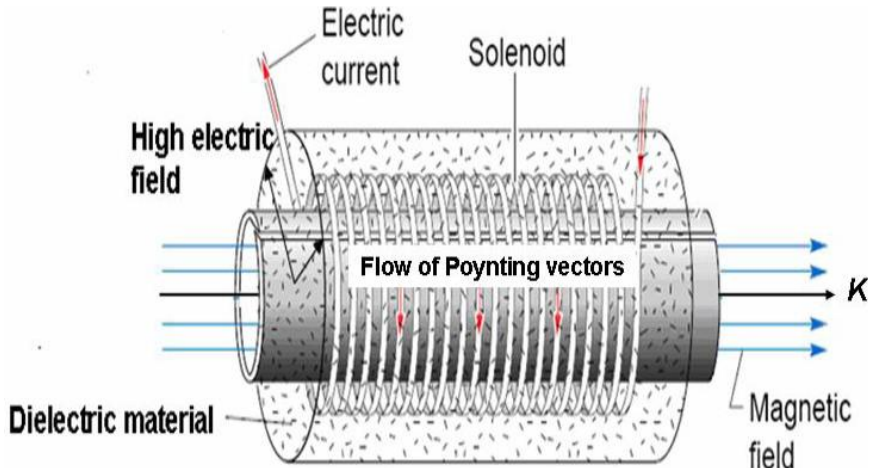

Figure 4 : Schematic diagram to generate an impulsive electromagnetic field inside the Torus

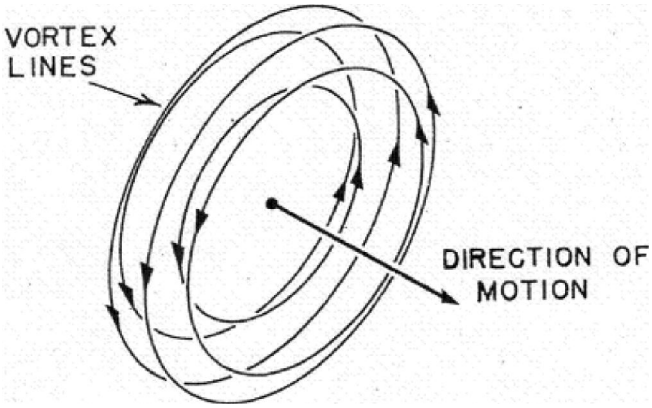

Figure 5 : Moving vortex ring in a fluid

namics.

As the electrical toroidal devise is a kind of fluid accelerator, as shown[12]

$$\mathbf{f} \cong \frac{\varepsilon_r \mu_r}{c^2} \frac{\partial}{\partial t}[\mathbf{E} \times \mathbf{H}], \tag{17}$$

we have

$$\mathbf{f} \cong \varepsilon_r \varepsilon_0 \frac{\partial}{\partial t}[\mathbf{E} \times \mathbf{B}], \tag{18}$$

which is shown in Figure 6.

By corresponding electromagnetic and gravitational symbols and a constant given by $E \to g$, $B \to K$ and $\varepsilon_0 \to -1/4\pi G$, we have

$$\mathbf{f} \approx -\frac{1}{4\pi G} \frac{\partial}{\partial t}[\mathbf{g} \times \mathbf{K}]. \tag{19}$$

When we let $g = r\omega^2$ (; radius of the toroidal structure, ω: radial frequency of the spinning structure), we have

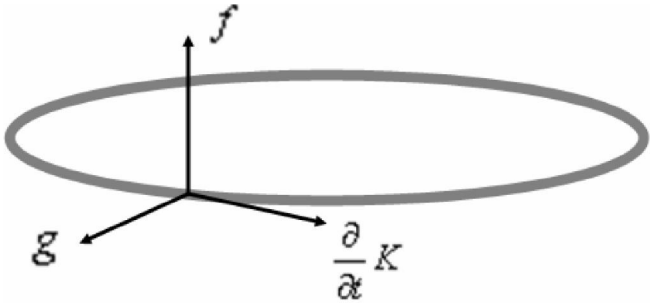

Figure 6 : Generated force analogous to the fluid dynamics

$$|\mathbf{f}| \approx \frac{\varepsilon_0}{c^2} r\omega^2 \left(\mathbf{V} \frac{\partial}{\partial t} \mathbf{B} + \mathbf{B} \frac{\partial}{\partial t} \mathbf{V} \right), \tag{20}$$

If , $B = const$ we have

$$|\mathbf{f}| \approx 9.8 \times 10^{-29} \frac{\mathbf{v}^2}{\mathbf{r}} \mathbf{B} \frac{\partial}{\partial t} \mathbf{V}, \tag{21}$$

where v is a speed of the rotating toroidal structure. From which, there is a possibility to generate a new gravitational field by applying impulsive high electromagnetic field applied to the troidal devise.

NUMERICAL CALCULATION FOR THE ROTATING TOROIDAL GRAVITY MACHINE

If we can attain that the velocity of the rotating toroidal structure be one percent of the light speed and we let $r = 5m$, B = 100 Tesla, $V = 1$ Giga volt and the duration of time for applying impulsive high voltage electric field be 1.0 pico second, we have $f = 1.8 \times 10^7$ N, which is sufficient large for thrusting a space craft. Hence it is considered that we can construct the antigravity machine shown as follows:

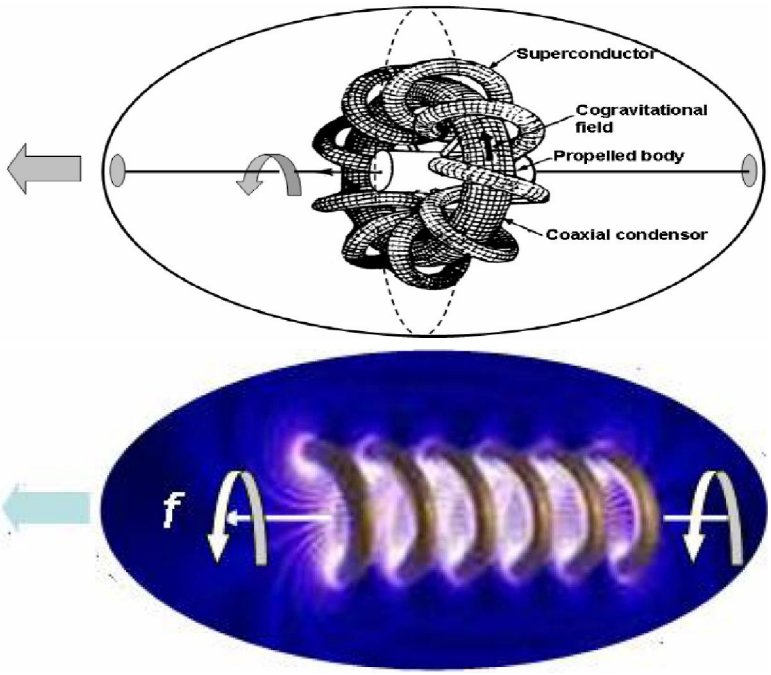

Figure 7 : Conceptual figure of the propulsion system

It is composed of the co-axial condenser which surface is winded by the superconductor coil, that generated a gravitational vortex around the cylindrical body. Instead of the Forward's gravity machine which utilizes the circulation of a superfluid through a spiral tubing array, this system uses only high intensity electromagnetic field generated by the co-axial condenser and coils to create a gravitational vortex.

Murad pointed out in his papers that Jefimenko's co-gravitational field is the elusive spin or torsion field identified in Russian scientific literature[13,14]. This idea was first introduced by the French mathematician R. Cartan in 1913, then by Albert Einstein. Within the framework of Cartan-Einstein theory, the existence of these fields has been permitted. Scientists today are recognizing that "spinning fields" really do exist. Just as electromagnetic fields are caused by a charge and gravitational fields are caused by weight, torsion fields are created by any rotating objects.

Figure 7 shows the conceptual diagram of the gravity machine to propel the spaceship. By the pulsed electromagnetic field generated by the superconducting coil, strong co-gravitational field can be generated inside the toroidal structure in Figure 7. When this toroidal structure is rotated at very high speed around the axis, the thrust can be generated to propel the spaceship.

CONCLUSION

In this paper, the gravity machine utilizing an intense electromagnetic field according to the Einstein's general relativity theory has been proposed.

From the numerical calculation, this system can produce a sufficient thrust to propel the space ship compared with the Forward's gravity machine.

From this result, we may find a way to the stars in the future from unusal approaches based on conventional physics in developing new directions in space sciences.

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