A Proposed Experiment to Verify Gravitational Electromagnetic Interaction

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This paper describes an experimental device to create a propulsive force verifying gravitational electromagnetic interaction. The device consists of a converging nozzle made of a superconductor, conjointly with a permanent magnet, to form a self-propulsion mechanism directed toward the converging area.

1. Introduction

This paper will describe a device for the development of a propulsive thrust, verifying gravitational electromagnetic interaction, consisting of a permanent magnet and a shielding made from a superconductor, having high magnetic field trapping capacity, like the superconductor II type (like the superconductor Sm - Ba - Cu – O). This superconductor shielding is a converging nozzle, which conjointly with the permanent magnet mentioned act as self-propulsion mechanism with direction towards the converging area. The whole device proposed is depicted in Fig. 1. The superconductor Sm - Ba - Cu – O is able to trap magnetic fields of the size of 10T [1, 2].

On the basis of the magnetic field classical theory the force exerted on a closed surface S is [3]:

$$\mathbf{F}=\frac{1}{2}\oiint_S\left[\mathbf{H}(\mathbf{n}\bullet\mathbf{B})+\mathbf{B}(\mathbf{n}\bullet\mathbf{H})-\mathbf{n}(\mathbf{H}\bullet\mathbf{B})\right]dS \qquad (1)$$

where $\mathbf{H}$ is magnetic field intensity, $\mathbf{B}$ the flux density, $\mathbf{n}$ the perpendicular vector to the surface S under consideration, facing outward.

We define as shielding in the frame of the present paper, the boundary of a solid body in the magnetic field, the magnetic permeability of which is equal to zero [4, 5]. Such a body does not allow the magnetic field to come into and break through it. Practically, the superconductors function as a magnetic field shielding, but they lose their properties when the magnetic field becomes strong. With this problem are confronted the superconductors of type II which have high magnetic field trapping ability, like the superconductor Sm - Ba - Cu – O.

2. Principle of Operation

Due to Eq. (1), we have that the force exerted on a magnetic field shielding, where $\mathbf{n}\bullet\mathbf{B}=0$ and $\mathbf{n}\bullet\mathbf{H}=0$, will equal:

$$\mathbf{F}=-\frac{1}{2}\oiint_S\mathbf{n}(\mathbf{H}\bullet\mathbf{B})dS \qquad (2)$$

Thus, the force exerted on an elementary section dS will equal:

$$d\mathbf{F}=-\frac{1}{2}\mathbf{n}(\mathbf{H}\bullet\mathbf{B})dS \qquad (3)$$

Consequently, a magnetic field with properties **H** and **B** in the area of an element dS of a shielding of the magnetic field acts in the form of a pressure p on the element, such as [4, 5]:

$$p=\frac{d\mathrm{F}}{dS}=\frac{1}{2}(\mathbf{H}\bullet\mathbf{B})=\frac{1}{2\mu_0}B^2 \qquad (4)$$

This indicates that, as it is already said, by means of a magnet and a magnetic field shielding it is possible to create magnetic machines, the propulsive force of which is the pressure of Eq. (4).

For a steady state magnetic and incompressible flow field the same equations are valid, i.e.

$$\Delta\psi=0,\quad \mathbf{B}=\nabla\psi \quad \text{and} \quad \Delta\phi=0,\quad \mathbf{V}=\nabla\phi \qquad (5)$$

where ψ,ϕ are the magnetic and flow field potentials [3].

Due to the fact that the differential equation of the magnetic field is the same with that of the incompressible fluid, it results that, the same machine, when it is manufactured from a material behaving as a magnetic field shielding, can behave either as a magnetic machine by means of a magnet or as a hydrodynamic machine. This helps in the creation of magnetic machines on the basis of the knowledge we have on the hydrodynamic machines.

In the case where the magnetic machine is a converging nozzle like the element **(2)** of Fig. 1 then the following happen [4, 5]:

1. The magnetic field is created by the magnet **(3)** and has flux lines inside the nozzle **(2)** similar to those of an incompressible fluid which flows through the same nozzle, given that the superconductor **(1)** functions as a magnetic field shielding.
2. The developing force has opposite direction to that of the incompressible fluid nozzle force with the same flux lines. According to what is aforementioned, the magnetic force $d\mathbf{F}$ on an element dS acts as pressure, creating the propulsion force $\mathbf{F}$.

More particularly, the following are applicable: According to fluid mechanics a convergent nozzle with a propeller or a MHD pump connected at its smaller section moves towards the bigger section when the system works. We have a similar magnetic system when a magnet stands for the pump and the convergent nozzle is made from a material with $\mu=0$. Such a material can be a superconductor of type I or II working on the basis of the Meissner Effect. Superconductors I cannot work under a high value of $\mathbf{B}$, therefore superconductors II are preferred. Superconductors II below a critical temperature and field intensity can trap the magnetic field imposed through vortex current pinning force created canceling the field. Such a material behaves as a solid limit of the magnetic field, i.e. as a solid body that is not penetrated by the magnetic field. On the basis of the classical theory of magnetic fields the force on a closed surface S is given by Eq. (1). Therefore, the force on the nozzle under discussion will be:

$$\mathbf{F} \cong \frac{\mathbf{n}_\alpha}{2\mu_0}\left(A_\alpha B_\alpha^2 - A_\gamma B_\gamma^2\right) = \frac{\Phi \mathbf{n}_\alpha}{2\mu_0}\left(B_\alpha - B_\gamma\right), \quad (6)$$

where, α, γ are the smaller and the bigger section (see Fig. 1), Φ the magnetic flow, and A the cross sectional area.

The above is a simulation of the reaction between the magnetic field and the shielding **(2)** made from the superconductor **(1).** In reality near the shielding of a magnetic field, there is a more complicated situation affected by quantum phenomena related to flux trapping. We notice that the force created is opposite to the one of hydro dynamically similar nozzle. This is due to the fact that the magnetic field $\mathbf{B}$ acts as a pressure on the magnetic field shielding in contrast to the fluid where velocity $\mathbf{v}$ affects the pressure according to Bernoulli's equation. Thus, on a superconductor II wing within a magnetic field we will have a thrust opposite to the one of a wing within an incompressible fluid flow.

Due to the similarity mentioned it is expected that the magnetic nozzle does work since it is sure that its hydro dynamically similar nozzle works. However, the magnetic arrangement, when driven by a permanent magnet, implies an over unity effect in contrast to its similar hydrodynamic arrangement. Thus, the question is raised of where the moving energy and momentum are coming from. We may notice that the magnetic arrangement works because of the magnetic field trapping by a superconductor type II. Therefore, if the system works, we should have an interaction between the magnetic field and the gravitational field, since the system motion implies a mass creation (relativity). We have an experience of such an interaction through the first thermodynamic axiom; through mechanical work heat can be produced and this constitutes electromagnetic radiation [6]. However, this interaction has not been until now accepted and theoretically stated according to the dominant theories as the GRT and the QM. This interaction can be interpreted on the basis of a minimum contradictions point of view according to which space time is matter itself either as mass or as charge field. These fields are interacting through photons exchanging so energy and momentum. This view is based on the claim for minimum contradictions, stated on the basis of a theorem, which permits us to choose a privileged set of axioms in physics instead of manipulating the experience which has been until now revealed. On this basis a space time QM can be derived which under certain simplifications can be reduced either to QM or to GRT or to Newtonian Mechanics while in general it provides a Theory of Everything (TOE) satisfying the requirements of Quantum Gravity. On this basis we can achieve over unity propulsion and energy production through (g) + (em) interaction which implies gravitation modification [6].

In the inner cone of Fig. 1 due to the Meissner effect, vortex currents are created in the surface of superconductor **(1)** (below a critical field and temperature) having as a result the creation of a magnetic field that does not permit the existing magnetic field (within the cone) to penetrate the superconductor **(1)**. Thus, we have the creation of a new magnetic field (quantum field), i.e. the creation of magnetic energy in a direction perpendicular to the cone. According to the conservation law an opposite energy should be created so that the balance to be kept [6]. This could take place through decreasing of the probability density $P(\mathbf{r},t)$ of the (g) space-time (in the area near the surface of the inner cone) and creation of a propulsion force towards the denser area which is compatible to the following Eq. (7) [6,7].

$$\mathbf{g}(\mathbf{r},t) = \frac{c^2}{P(\mathbf{r},t)} \nabla P(\mathbf{r},t) \quad (7)$$

Eq. (7) is a generalized unified formula of gravity and electromagnetism and describes the force per mass unit (real or imaginary) exerted due to the unified field and it is compatible, under certain simplifications, either to Newton or Coulomb or relativity gravitation formula [6].

3. Remarks

1. The system of Fig. 1, has to be under the minimum critical temperature T_{C1} for a given magnetic field intensity H_{C1} in order the superconductor **(1)** is able to work properly. It is possible either by immersion of the whole system in liquid N, or by forced circulation of liquid N. The system can operate even with less efficiency - due to magnetic field leakage – inside the critical temperature limits T_{C1}, T_{C2}, which correspond to the critical field strengths H_{C1}, H_{C2} [8].
2. The various sizes of the magnetic fields may be calculated on the basis of: Quick Field as in [3].

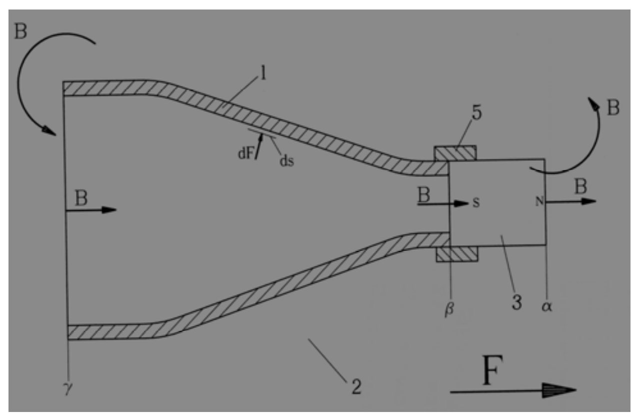

Fig. 1. Propulsion by Means of Superconducting Magnetic Field Trapping

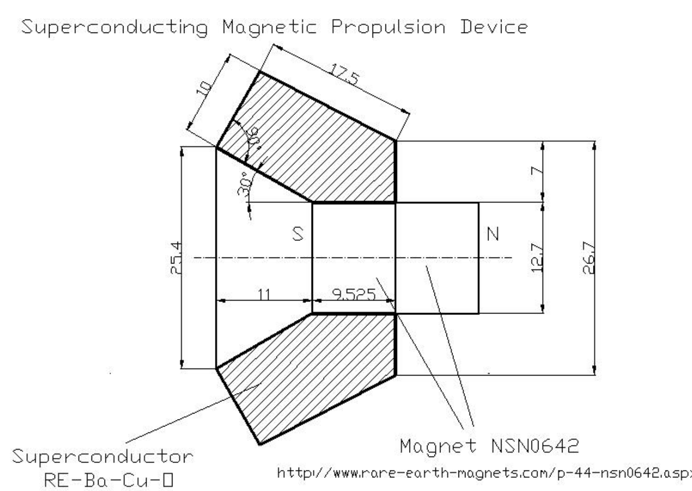

Fig. 2. Easily Applicable Arrangement

4. Example

In Fig. 2 an easily applicable arrangement of propulsion by means of superconducting magnetic field trapping is shown.

Because of Eq. (6) we have:

$$F \cong \frac{A_\alpha B_\alpha^2}{2\mu_0}\left(1-\frac{B_\gamma}{B_\alpha}\right)=\frac{A_\alpha B_\alpha^2}{2\mu_0}\left(1-\frac{A_\alpha}{A_\gamma}\right) \tag{8}$$

On the basis of the data in Fig. 2, we obtain:

$$A_\alpha = 1.61 \text{ cm}^2, \quad A_\gamma = 6.45 \text{ cm}^2, \quad B_\alpha = 0.5 \text{ Tesla} \tag{9}$$

If the system worked, it should be valid to produce a thrust more than 10 N; this obviously can be easily measured thus being able to verify whether the Gravitational Electromagnetic Interaction exists, which is the target of this paper.

References

[1] H. Ikuta, et al, "Melt-processed Sm - Ba - Cu - O Superconductors Trapping Strong Magnetic Field", *Supercond. Sci. Technol.* **11**: 1345-1347 (1998).

[2] S. Nariki, et al, "Field Trapping and Magnetic Levitation Performances of Large Single Grain Gd–Ba–Cu–O at Different Temperatures", in the **Proceedings of the 17th International Symposium on Superconductivity**, pp 654-659 (Elsevier, 2004).

[3] Author?, **Finite Element Systems, User's Guide**, Version 5.3 (Terra Analysis Ltd., 2005).

[4] A. A. Nassikas, "Magnetic Propulsion Method and Mechanism Using Magnetic Field Trapping Superconductors", International Patent WO/2010/131056 (2010).

[5] A. A. Nassikas, "Minimum Contradictions Physics and Propulsion via Superconducting Magnetic Field Trapping," *SPESIF-2010, AIP Conference Proceedings* **1208**: 339-349 (2010).

[6] A. A. Nassikas, **Miminum Contradictions Everything**, Rev. & Ed., M. C. Duffy and C. K. Whitney (Hadronic Press, 2008).

[7] A. A. Nassikas, "Santilli's Etherino as a (g)+(em) Interaction", *3rd International Conference on Lie-Admissible Treatments of Irreversible Processes* (*ICLATIP-3*, Kathmandu University, Nepal, 2011).

[8] Wikipedia, http://en.wikipedia.org/wiki/Superconductivity.