Experimental Verification of Superconducting Self Propulsion

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The object of this paper is to describe the experimental verification of a self-propulsive force created by means of a superconducting device. This device is a converging nozzle made of a superconductor like YBCO and two permanent magnets, acting as a self-propulsion mechanism with direction towards the converging area. This device is activated when it is immersed within a coolant as the liquid nitrogen. The force is measured through the slope of a pendulum created by the device mentioned hanged by means of a string from a constant point.

1. Introduction

Object of the present paper is the description of a device for the development of a self-propulsive thrust consisting of two permanent magnets and a shielding made from a superconductor having high magnetic field trapping capacity. This superconductor shielding is a converging nozzle, which conjointly with the permanent magnets mentioned act as self-propulsion mechanism with direction towards the converging area. The whole device proposed is depicted in Fig. 1 [1].

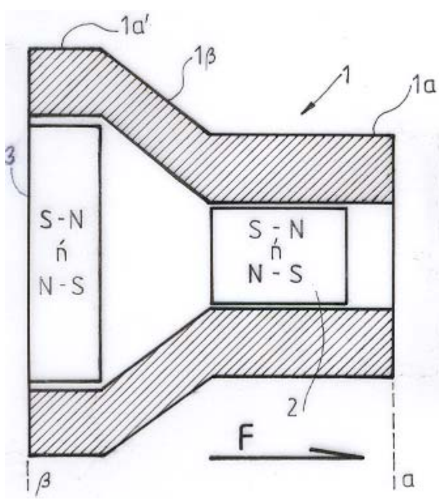

Fig. 1. Superconducting Nozzle Arrangement

On the basis of the magnetic field classical theory the force exerted on a closed surface S is [2]:

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

where $\mathbf{H}$ is magnetic field intensity, $\mathbf{B}$ is the flux density, $\mathbf{n}$ is the perpendicular vector to the surface S under consideration, which faces outwardly from it.

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 be equal to:

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

2. Principle of Operation

Because of Eq. (2) the force on the nozzle under discussion will be:

$$\mathbf{F} \cong \frac{\mathbf{n}_\alpha}{2\mu_0}\left(A_\alpha B_\alpha^2 - A_\gamma B_\gamma^2\right) = \frac{\Phi\mathbf{n}_\alpha}{2\mu_0}\left(B_\alpha - B_\gamma\right) \qquad (3)$$

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

We may notice that the magnetic arrangement works because of the magnetic field trapping by a superconductor. Therefore, if the system works, we should have an interaction between the magnetic field and the gravitational one since the system motion implies a mass creation (relativity). 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 [1, 3, 4, 5]. These fields are interacting through photons so exchanging energy and momentum.

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** β **)**. Thus, we have the creation of a new magnetic field (quantum field) cancelling the main magnetic field of the nozzle. This magnetic field, according to the Minimum Contradictions point of view, can be created through the conversion of the environment gravitational field into a magnetic one. On this basis, the conditions of Eqs. (1) and (2) are created to produce the propulsion of the nozzle. This has as result the conversion of the magnetic field mentioned into the gravitational-mass field required in order for the motion to exist.

3. Experimental Verification

The first results of the Fig. 1 arrangement operation have been given with the aid of the magneto-static field software Quick Field [2]. These results are similar to those of Eq. (3). It is noted that the propulsion found either by Eq. (3) or the Quick Field magneto-static analysis derives on the basis of the classical laws. Thus, we may assume that the self-propulsion is due to the superconducting material simulated by zero magnetic permeability which it seems to be non compatible with the classical laws.

The basic verification has been done experimentally. More specifically a converging superconducting YBCO nozzle (1) has been constructed and connected, by means of teflon string, with two permanent magnets (2), (3) made from NdFeB as indicated in Fig. 1. The whole system has been hanged, through a teflon string, from a constant point O_1 forming so a first pendulum P_1 which has been immersed within liquid Nitrogen of the vessel (4) as indicated in Fig. 2. The YBCO nozzle (1) acquires superconducting properties and this results to a self-propulsion creation visible through the slope φ of the first pendulum P_1. In Fig. 2 one can see a second pendulum P_2 which is used in order to show the vertical direction. The slope φ is the angle formed from the pendulum P_1 and pendulum P_2; this slop is better observed on a black element (5) mounted on the frame (3) since the strings of pendulum P_1 and P_2 are white.

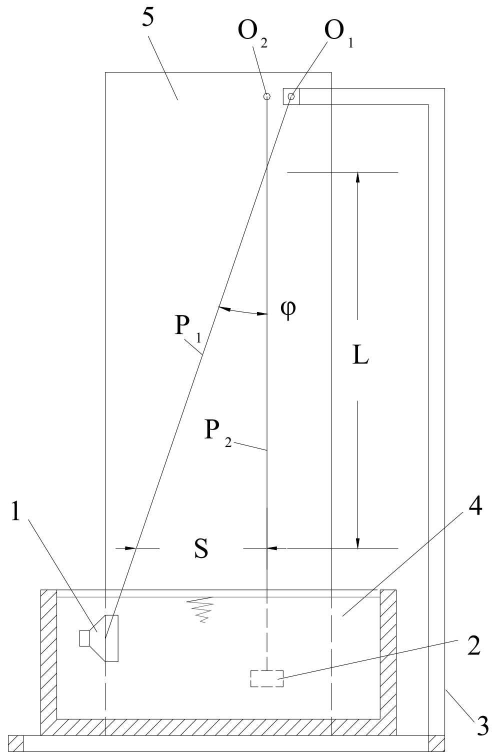

Fig. 2. Self propulsion test arrangement

For a pendulum length of $L = 80$ cm we have measured a slope angle φ corresponding to a horizontal displacement S of the YBCO nozzle equal to 2 cm. This displacement shows the existence of the self-propulsion promised in this paper.

The self propulsion force **F** created, according to the force analysis, is estimated to be:

$$\mathbf{F} = \mathbf{F}_g \frac{S}{L} \tag{4}$$

where $\mathbf{F}_g$ is the weight of the superconducting system including the weight of the magnets (1) and (2). For $\mathbf{F}_g = 2$ N, $L = 80$ cm and $S = 2$ cm we obtain $\mathbf{F} = 0.05$ N.

The dimensions of the YBCO nozzle we used can be estimated from Fig. 1 for diameter of the part 1 α' equal to 4 cm.

Applying Eq. (3) for:

$$A_\alpha = 1.25 \text{ cm}^2, \quad A_\gamma = 5 \text{ cm}^2, \quad B_\alpha = 0.07 \text{ Tesla}$$

we obtain $\mathbf{F} = 0.14$ N, which is comparable to the result of Eq. (4). The difference is attributed to magnetic flow leakage since YBCO is a superconductor II (see remarks). Besides the main result of this paper is the existence of the self propulsion force itself; not its magnitude.

Because of Eq. (3) we conclude that we can increase the self propulsion force by increasing the magnetic flow density **B**. This can be done with the arrangement of Fig. 3 where the magnetic field is developed through the superconducting solenoid (6). From the existing technology it is known that the superconducting solenoids can develop a magnetic flow density much more than 5 Tesla. It is noted that there are materials which can trap-shield such a magnetic flow density [6, 7]. This implies, at a fist sight, the existence of good possibilities for the increasing of the self propulsion under discussion.

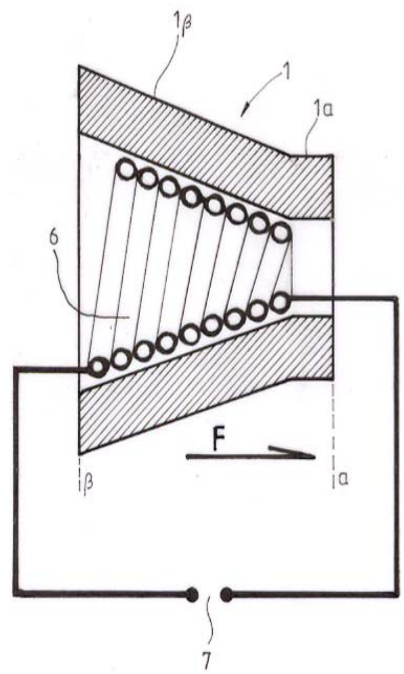

Fig. 3. Propulsion by Means of a conical Superconductor and Solenoid

4. Conclusion

1. The system of Fig. 1, has to be under a minimum critical temperature T_{C1} for a given magnetic field intensity H_{C1} in order that the superconductor (1) is able to work properly. This is possible by the immersion of the whole system in liquid N. The system can operate even with less efficiency - due to magnetic field leakage within critical field strengths H_{C1}, H_{C2}, in the case of a superconductor II as the YBCO is [8].
2. The various sizes of the magnetic fields may be calculated on the basis of Quick Field as in [2].
3. In Fig. 1 and Fig. 3 the superconductor (1) consists of the parts **(1 α)**, **(1 β)**, **(1 γ)**. In the experiment mentioned these parts are separated and this facilitates their easier construction.

4. The colour of the element (5) in Fig. 2 is black in order that the angle φ to be better visible since the strings of pendulum P_1 and pendulum P_2 are white.

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