Advances in Aerospace Science and Applications.
ISSN 2277-3223 Volume 3, Number 3 (2013), pp. 149-154

http://www.ripublication.com/aasa.htm

# Advanced Trends in using Electro – Anti-gravitational Propulsive Unit with Magnetically Levitated Runways in Space Missions

**Prem Chand C. P[1], Pradeep T.S[2], Thirumal M[3] and Vignesh G[4]**

[1, 2, 3, 4] *Students, Department of Aeronautical Engineering, PCET, Coimbatore-59.*

**Abstract**

Aviation Industry is one of the busiest industries in the world. At any given time, average of about 2,60,000 people are boarded air-borne. A survey report of NTSB (National Transportation Safety Board) states that 32% of aircraft accidents occur during the take-off and the landing phases. Even many spacecraft accidents have occurred due to the gravitational pull of the earth.

In an attempt to provide a safer means of cruise, this paper explores the possibility of an Electro - Antigravitational Propulsive Unit with Magnetically Levitated Runway. The underlying principles of this innovative concept are Theory of General Relativity and Meissner effect which is the expulsion of a magnetic field from a superconductor during its transition to superconducting state.

The factors to be considered while implementing this method has been discussed in this paper.

**Keywords**: Relativity, Meissner effect, Transition temperature, Superconducting materials, Cuprate based materials, Magnetic shield, Integrated Propulsion Unit.

## 1. Introduction:

### 1.1 Ideology

The mystery of general Theory of Relativity and Meissner effect unlocks the idea of levitating a superconductor by Electro Antigravity i.e. interaction of antimatters by a strong electric field. When a superconducting material such as BSCCO (Bismuth Strontium Calcium Copper Oxide) is cooled below its transition temperature, the material cancels nearly all its interior magnetic field. This causes the material to be levitated above the applied magnetic field.

Here the conventional runway is replaced with a series of electromagnets which are arranged with alternating polarity along the width of the runway. Thus, along the width there will be three magnetic blocks, a north polarity on either side of the south polarity.

The magnetic lines of forces on this field resembles 'M' shape. Superconducting magnets are suitably placed on the belly of the space craft. When this superconducting material interrupts this field, it creates a region of repulsion around the space craft. This levitates the space craft above the runway as shown in Fig.1 and propels by the force produced by antimatter collision.

## 2. Physical Laws and Interactions

The laws of physics can tell us how it levitates. As per the standard trick of levitating a magnet above a superconductor (or vice versa), what is needed is an upward repulsive magnetic force capable of balancing the downward force due to gravity, and the origin of that magnetic force is diamagnetism. However, the diamagnetic susceptibility of a superconductor is -1. But, when compared to a person, the diamagnetic susceptibility is only about -.00001. So some order-of-magnitude calculations can tell us what we'll need.

When coming onto the propulsive unit, first we have to calculate the downward gravitational force on an object or space craft per unit volume which is ρg, where ρ is the density and g is the acceleration due to gravity. The density of a space craft is about that of its mass by volume, and g is approximately 9.81 $m/s^2$. So to balance the force of gravity, we will need a greater upward magnetic force per unit volume.

Of course, there will be no magnetic force in a uniform magnetic field. The magnetic force will equal the upward derivative of the magnetic energy,

i.e., $d(B^2)/dx=2B(dB/dx)$ $10000\ d(B^2)/dx$ (1)

This must equal the gravitational force to produce levitation. So we'll need

$$B \cdot \frac{\Delta B}{\Delta z} = -\frac{\mu_0 \cdot \rho \cdot g}{\chi} \quad \text{where,} \quad B = \frac{\mu_0 N a^2 I}{2\left(a^2+z^2\right)^{3/2}}, \qquad (2)$$

These Equations (1), (2) give us an amazing prediction that magnetic fields of 10000T or more can be produced with superconducting solenoids or copper-wound "Bitter" magnets of the type. These require Megawatts of power and lots of cooling water. With B=10000T, you will need a field gradient dB/dx of about 500 T/cm.

## 3. Implementation

Implementation of this method also possess challenges, which are to be tackled. They are also discussed as a subject of this paper.

One of the challenges is to safeguard magnetic data storage media and space craft electronics from the magnetic field. This could be done by providing a ‘magnetic shield' and which should also be a ‘gravitational shield'

In fact, magnetic shielding is essential to protect the crew and electronic equipment. But shutting out a static magnetic field to protect an object isn't that hard. All we need to do is that, when the object in a space craft is made of a "superconductor", the material will carry an electrical current without any resistance and later it is cooled sufficiently close to absolute zero. If the space craft encounters a magnetic field, the current flow within the conductor will generate a field that counteracts the applied field. In an ordinary conductor, the resistance of the metal quickly snuffs out the current flow.

Outside the space craft, the field produced by the superconductor will alter the applied field and reveal its presence. In a nutshell, the field is experienced as a distribution of lines of force that vaguely resembles a weather map of winds. The superconducting shield pushes the magnetic field lines outward, creating a hole in the field. So the trick is to make a shielding for the static magnetic fields to counteract that distortion. A shield could be made of a material that repels magnetic fields in one direction and attracts them in the opposite direction. Unfortunately, these self-contradicting materials do not exist.

Some layers are easily magnetized and will essentially pull the external magnetic field lines around the space craft, those layers alternate with shells of superconducting plates that push on the field, preventing it from coming straight towards the center. The attracting layer would be made of tiny magnetic particles, like submicroscopic iron filings, mixed into a non-magnetic material such as plastic.

The shield could handle fields of any shape and strength within what the superconductor can stand. If the external field gets too strong, the magnetically induced current becomes so powerful that it knocks the superconductor out of its resistance-free state and ruins its field-repelling qualities. Computer simulations showed that the shield could work with as little as four layers, but with 10 layers it would guide a magnetic field nearly with a perfect shield.

Another challenge is to account for the slight increase in weight of the space craft. This can be compromised by lesser maintenance cost for the space craft.

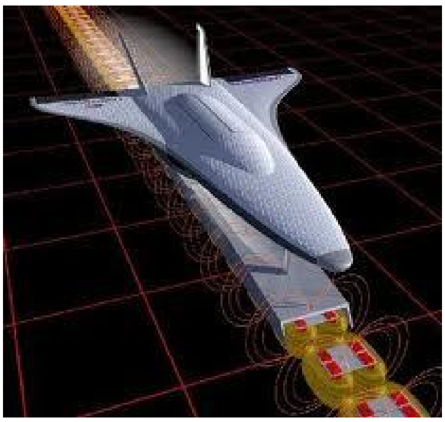

**Figure 1**: MAGLEV Space craft

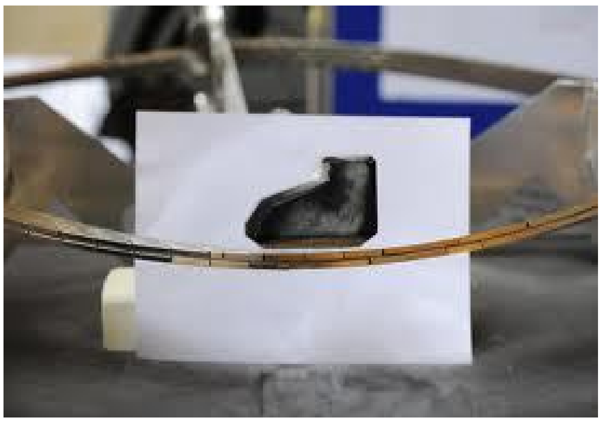

**Figure 2**: An object levitating over a magnetic field

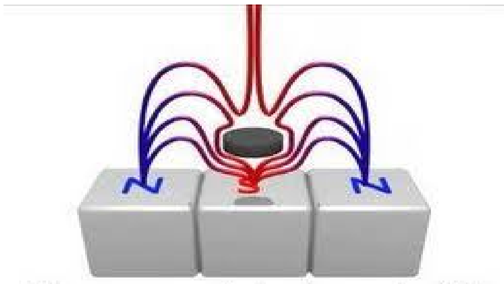


**Figure 3**: Diagramatic view of magnetic fields over the object.

## 4. Conclusion

By the collision of antimatters the strong propulsive force is generated. This force makes the space craft to propel through the space. Since this space vehicle is reusable to avoid damages the method of superconductor levitation is provided.

As this method provides levitation, the impact is much more less than actual impact. So, the Landing gear failure does not occur due to the impact upon landing. As a matter of fact, this method can provide a feather touch-down.

This method provides advantage that the precious fuels need not be dumped during the emergency landing of any aircraft and space craft. This method does not imply the elimination of landing gear system. Rather it is a supplementary system, which assists in a smooth and safer operation of space craft during cruise phases. This technology can be implemented both in aircrafts and space vehicles.

On the whole, this paper presents "Electro Anti-gravitational Propulsive Unit with Magnetic Levitating Runways" as a promising future technology, where crew members will no longer be uncomfortable during cruise and really feel that they are floating in air. This makes the vehicle to travel through a longer distance.

## References

[1] Bertolami, O. & Paramos, J. & Turyshev, S. G. (2006), "General Theory of Relativity: Will it survive the next decade?", in H. Dittus, C. Laemmerzahl, S. Turyshev, Lasers, Clocks, and Drag-Free: Technologies for Future Exploration in Space and Tests of Gravity: 27-67

[2] Dr. John Rather, prior Assistant Director for Space Technology Program Development at NASA. "Transformational Technologies to Expedite Space Access and Development". Retrieved 28 April 2011.

[3] Forward, R. L. (1990, Jan.-Feb.), "Negative matter propulsion," Journal of Propulsion and Power, Vol. 6 (1), pp. 28-37; see also commentary Landis, G.A. (1991) "Comments on Negative Mass Propulsion," 'Journal of Propulsion and Power, Vol. 7, No. 2, p. 304.

[4] Unnikrishnan, Mohapatra, Gillies (2002), "Anomalous gravity data during the 1997 total solar eclipse do not support the hypothesis of gravitational shielding" Physical Review D, vol 63

[5] Wu, N. (2004). "Gravitational shielding effect in gauge theory of gravity". Communications in Theoretical Physics, 41(4), 567-572.