Essay

A Non-Traditional Anti-Gravity Method Is Theoretically Analyzed and Demonstratedand the Technical Realization Path Assumption

Shandong Zhao [*] and Yijia Zhao

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A Non-Traditional Anti-Gravity Method Is Theoretically Analyzed and Demonstrated and the Technical Realization Path Assumption

Shandong Zhao [1],* and Yijia Zhao [2]

[1] Hunan Supercomputing Science Society, Changsha, China
[2] China Machinery International Engineering Design & Research Institute Co., Ltd., China;
   zhaoyijia0215@163.com
* Correspondence: Correspondence: 15807440010@163.com

Abstract: The thesis proposes a argument that a mass point moving in a horizontal circle on the Earth's surface can generate a radial centrifugal force of the Earth's center of mass, thus realizing an unconventional anti-gravity path. Based on the author's theory of absolute airspace and its reference system, and through the theoretical analysis of the difference in the distribution of gravitational acceleration at different latitudes caused by the rotation of the earth, and the centrifugal force of a mass point moving in a horizontal circle on the earth's surface is analyzed, the validity of the argument is demonstrated. At the same time, the paper puts forward two possible basic principles, and makes theoretical analysis and demonstration. Conceive of the concrete experimental verification of principle two is proposed. Four technical schemes for anti-gravity ascent are proposed and basic analysis is made. On the premise of not fully considering the practical technical ability, it is theoretically proved that three of them have realistic operability and development potential. In theory, this paper opens up a different way of anti-gravity for human beings, which will bring new ideas and prospects for human beings to get rid of the bondage of gravity.

Keywords: Absolute airspace; Gravitation; Centrifugal force; Gravity; antigravity

1. Introduction

Getting rid of the gravitational pull of the Earth or the sun is an important human aspiration.

In addition to some traditional antigravity pathways, are there other antigravity pathways? The answer is that there must be, but it is limited to the level of scientific understanding and technological development of mankind, and it has not been discovered or can not be done.

We are going to discuss the problem of anti-gravity, the essence of which is how to achieve human space freedom, will not be able to avoid the physical properties of space this central key.

The space concept of classical physics and modern physics and the theory of reference frame exist many contradictions in physical reality and physical experiment. The author makes a detailed analysis and demonstration of the Hafele-Keating experiment and the geostationary orbit satellite problem [1]. It is proved that "every star (or matter) has a local, relatively independent physical property, spherical absolute space with its center of mass as the origin and the corresponding absolute (only relative to the star or matter) stationary space coordinate reference system." The concept of absolute airspace and the theory of local absolute stationary reference system (hereinafter referred to as: absolute airspace reference system) are established. This theory can perfectly explain the experiments and phenomena of space problems in physical reality [2–4].

Due to the rotation of the Earth, surface mass points at different latitudes will have different absolute linear velocities in the absolute airspace reference system of the Earth, and form different degrees of radial centrifugal force of the earth's center of mass, resulting in a difference in the acceleration of gravity (this is just one of the important reasons). This paper will make a theoretical demonstration to prove this point of view.

In the absolute airspace reference system of the Earth, the horizontal circular motion of mass points on the Earth's surface is exactly the same geometrically as the motion of surface mass points at different latitudes caused by the rotation of the Earth. In the analysis and calculation of geometric mechanics, the law is completely equivalent.

Therefore, through a series of geometric and mechanical analysis and demonstration, it can be concluded that the mass point moving in a horizontal circle on the Earth's surface can generate the radial centrifugal force of the Earth's center of mass, so as to achieve a non-traditional anti-gravity path.

The thesis of this paper is mainly to explore a new anti-gravity way in theory, maybe there are still great difficulties in realizing it technically. However, if this idea is feasible through theoretical analysis and experiment, human beings can continue to make breakthroughs in technology to achieve it. To this end, the author also put forward four anti-gravity technology path implementation scheme, and the corresponding application feasibility analysis is carried out. On the premise of not fully considering the practical technical ability, from the theoretical point of view, it proves that three of the technical solutions have practical operability and development potential.

If the anti-gravity principle proposed by the author can be verified by the experiment, it is proved to be valid. Then, mankind will get a different way of anti-gravity, will open up new prospects for mankind to get rid of the bondage of gravity.

2. Theoretical Analysis and Demonstration

The paper needs to be analyzed and demonstrated: in the absolute empty reference frame of the Earth, mass points moving in a horizontal circular motion on the Earth's surface (in a conical plane circular motion around the Earth's center of mass) can generate radial centrifugal forces on the Earth's center of mass, thus achieving an unconventional anti-gravity path.

Therefore, this paper makes a theoretical analysis and demonstration from four aspects.

2.1. Absolute Airspace and Its Reference System

"Absolute airspace" means: Every star (or matter) has a local, relatively independent physical property, spherical absolute space with its center of mass as the origin and the corresponding absolute (only relative to the star or matter) stationary space coordinate reference system.

The physical laws of the motion of a substance in absolute airspace can only be most accurately described by the absolute airspace reference system. All the so-called inertial reference systems cannot exist independently from the corresponding absolute airspace, nor can it be physical laws equal rights to the absolute airspace reference system. However, the physical laws between different absolute airspace reference systems are equal.

For a detailed discussion of absolute airspace and its reference system, see references [1–4].

2.2. Analysis of the Acceleration of Gravity at Different Latitudes of the Earth

The acceleration of gravity is different at different places on the Earth's surface. There are many factors affecting it, but from the analysis of the factors of the earth itself, there are three main reasons. First, the earth is not a standard normal sphere, and the radius of the earth's center of mass at different points on the surface is not the same, resulting in a slight difference in the acceleration of gravity. Second, due to the rotation of the earth, the linear velocity of the fixed mass point on the surface of the earth at different latitudes is not the same, forming the difference in centrifugal force (centripetal force), resulting in some differences in the acceleration of gravity. Third, the uneven distribution of the earth's mass leads to some differences in the acceleration of gravity in different regions.

This paper will mainly analyze the physical principle of the difference in the acceleration of gravity at different latitudes due to the rotation of the earth.

Due to the rotation of the earth, there are two basic geometric motion morphology of fixed mass points on the Earth's surface under the absolute airspace reference system of the earth.

First is the geometrical morphology of two-dimensional planar circular motion around the Earth's center of mass. The so-called two-dimensional planar circular motion around the earth's center of mass means that the center point of the circular motion overlaps with the earth's center of mass to form a two-dimensional plane. For example, the rotation of the Earth creates the geometry of circular motion of mass points on the surface of the equator.

The second is the geometric morphology of conical form of plane circular motion around the earth's center of mass. The so-called conical form of plane circular motion around the earth's center of mass means that the plane circular motion and the earth's center of mass constitute a three-dimensional right circular cone (The front view and side view of the right circular cone are isosceles triangles). With the exception of the equator, the motions of fixed mass points on the surface of the Earth caused by its rotation are all in this geometric morphology.

These two basic geometric motion morphology will have an impact on the acceleration of gravity, and the physical principle is the same. All are due to mass points the different linear velocities around the Earth's center of mass, resulting in it's different radial centrifugal forces of the Earth's center of mass, resulting in it's different gravitational acceleration.

In the absolute airspace reference system of the earth, the geometry of a mass point moving in a horizontal circle on the Earth's surface is exactly the same as that of a fixed mass point at a certain latitude caused by the earth's rotation. That is, they all belong to the geometric morphology of Conical form of plane circular motion around the Earth's center of mass. Therefore, they should also be equivalent in terms of the physical principles that produce the radial centrifugal force at the center of the Earth's mass.

For this reason, if "due to the rotation of the earth, the linear velocity of the fixed mass point on the surface of the earth at different latitudes is not the same, the difference in the radial centrifugal force of the Earth's center of mass is formed, resulting in some differences in the acceleration of gravity" this view is valid. Thus, it can be shown that "a mass point moving in a horizontal circle on the Earth's surface (Conical form of plane circular motion around the Earth's center of mass) can produce a radial centrifugal force on the Earth's center of mass." The argument holds.

Therefore, the key to all problems is to prove: "due to the rotation of the Earth, the mass points at different latitudes on the surface of the Earth can produce radial centrifugal forces at the center of the Earth's mass." Whether this argument holds.

At present, there are two main methods to calculate the gravitational acceleration of surface mass points at different latitudes of the earth. First, it is calculated by the 1967 international gravity calculation formula (which belongs to the empirical formula); The second is the combination of Newton mechanics and geometry, and the calculation formula is derived from pure theory. The results of the first method are relatively accurate, but it is impossible to directly analyze and understand its physical principles. Because the second method only considers the latitude and radius from the Earth's center of mass, it ignores the difference in mass distribution, and the radius is not accurate, so the error is relatively large, but it can understand its physical principle. Therefore, this paper adopts the second method to do two different forms of analysis.

2.2.1. General Traditional Method Analysis

Generally, the traditional analysis is based on universal gravitation, Newton's second law and the centrifugal force (or centripetal force) generated by the axis of rotation around the Earth through the parallelogram rule (axiom) of geometric mechanics to derive the theoretical calculation formula [5]. This is shown in Figures 1 and 2.
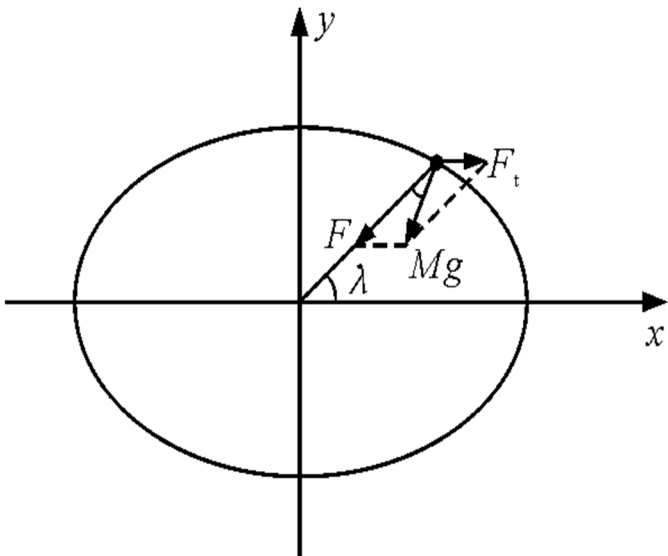
Figure 1. Y-axis is the Earth's axis of rotation, F is gravitation, F_t is the centrifugal force of the Earth's axis of rotation, Mg is the theoretically calculated gravity, and λ is the Earth's latitude.
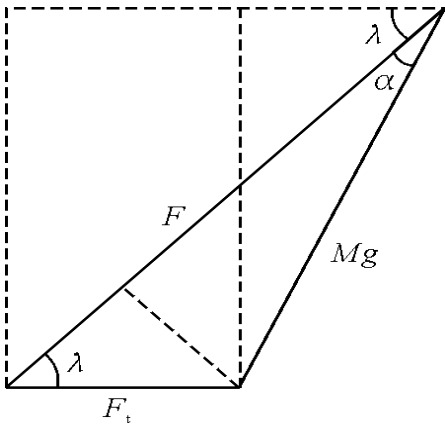
Figure 2. Geometric relationship of F, Ft and Mg. Note: Figures 1 and 2 are from Figures 1 and 3 of p63 [5].
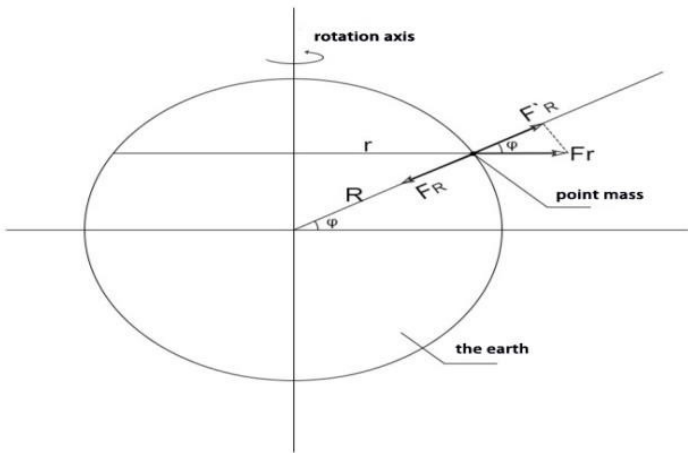
Figure 3. Schematic diagram of the force vector structure of fixed surface mass points at different latitudes caused by the Earth's rotation.

According to the parallelogram rule, through theoretical derivation, the formula can be obtained:

$$g=GM/R^2-R\Omega^2\cos^2\lambda \qquad (01)$$

Note: (01) is derived from [5] p63, (11); The author has made some changes in the expression form (the R-value of the original formula is expressed by elliptical calculation), and the essence has not changed.

Where: G is the universal gravitation constant; M is the mass of the Earth; R is the distance (radius) from the mass point to the Earth's center of mass; Ω is the angular speed of the Earth's rotation.

Due to:

$$\Omega=2\pi/T$$

T is the rotation period of the Earth, then:

$$g=GM/R^2-4R(\pi\cos\lambda/T)^2 \qquad (02)$$

The above theoretical analysis and derivation method has another form, that is, according to the axial centripetal force generated by the mass point around the earth's rotation axis; However, it is still analyzed and derived by the parallelogram rule, and the conclusion is the same. Its physical principles and mathematical methods are generally accepted. Therefore, the above conclusions can be used as a correct theoretical blueprint for comparison.

According to the above conventional analysis method, it can only be concluded that the mass point produces axial centrifugal force (centripetal force) F_t around the earth's rotation axis. Although it is intuitive to think that the $-4R(\pi\cos\lambda/T)^2$ part of formula (02) should be the centrifugal (centripetal) acceleration caused by generated by the mass point there the radial centrifugal force of the Earth's center of mass. However, it is not possible to directly draw and understand the conclusion that the mass point here can produce the radial centrifugal force of the earth's center of mass.

Therefore, the author based on Newtonian mechanics, through vector method to do another form of derivation and analysis.

2.2.2. Vector Analysis with the Radial Centrifugal Force of the Earth's Centroid as the Target

Let a stationary mass point m on the ground at latitude φ of the Earth, Its radius from the Earth's axis of rotation is r, The radial centrifugal force vector at the center of a fixed masspoint moving in a circle around the axis of rotation due to the rotation of the earth is $\mathbf{F_r}$, The resulting radial centrifugal force vector of the Earth's center of mass is $\mathbf{F'_R}$, The universal gravitation of the Earth's center of mass on mass point m is $\mathbf{F_R}$, As shown in Figure 3.

$\mathbf{F_r}=ma$

Among them:

$$a=v_m^2/r$$

So:

$$\mathbf{F_r}=mv_m^2/r \qquad (03)$$
$$\mathbf{F'_R}=\mathbf{F_r}\cos\varphi \qquad (04)$$

Because:

$$\cos\varphi=r/R$$

So:

$$\mathbf{F'_R}=mv_m^2/R \qquad (05)$$

Where:

v_m is the linear velocity of the mass point (caused by the rotation of the Earth).

$v_m=2\pi r/T=2\pi R\cos\varphi/T$ (06)

T is the time it takes the earth to rotate once; R is the distance (radius) of the mass point from the Earth's center of mass.

Then the actual gravitational force F_φ and gravitational acceleration g_φ of a mass point at the earth latitude φ are:

$$\mathbf{F_\varphi}=\mathbf{F_R}-\mathbf{F'_R} \qquad (07)$$

$$\mathbf{F}_R=GMm/R^2$$
$$\mathbf{F}_\varphi=GMm/R^2-mv_m^2/R=mg_\varphi \qquad (08)$$
$$g_\varphi=GM/R^2-v_m^2/R=GM/R^2-4R(\pi\cos\varphi/T)^2 \qquad (09)$$

Although the above derivation and analysis methods do not conform to the parallelogram rule in mechanics and geometry. However, it is very obvious that formula (09) is exactly equivalent to formula (02) or formula (01). Therefore, as long as the mathematical analysis and derivation process of formula (09) is not wrong, then the analysis and derivation method of formula (09) is also correct.

This analysis and derivation method can directly draw the conclusion that a mass point moving in a conical plane around the earth's center of mass (the conical vertex is the Earth's center of mass) can produce the radial centrifugal force of the Earth's center of mass, thus affecting the weight of the mass point. At the same time, it is also proved that "a mass point moving in a horizontal circle on the earth's surface (moving in a conical plane circle around the Earth's center of mass) can generate a radial centrifugal force on the Earth's center of mass." The argument holds.

2.2. Centrifugal Force Analysis of Mass Points in Horizontal Circular Motion on the Earth Surface

According to the above conclusions, it is inferred that a mass point moving in a horizontal circular motion on the Earth's surface is also a conical horizontal circular motion around the Earth's center of mass, and the geometry of its motion is exactly the same as that of a fixed mass point on the surface formed by the earth's rotation under the same frame of reference. Therefore, this mass point will also produce the radial centrifugal force of the Earth's center of mass, and the physical principle of producing the radial centrifugal force of the Earth's center of mass is the same. As shown in Figure 4:
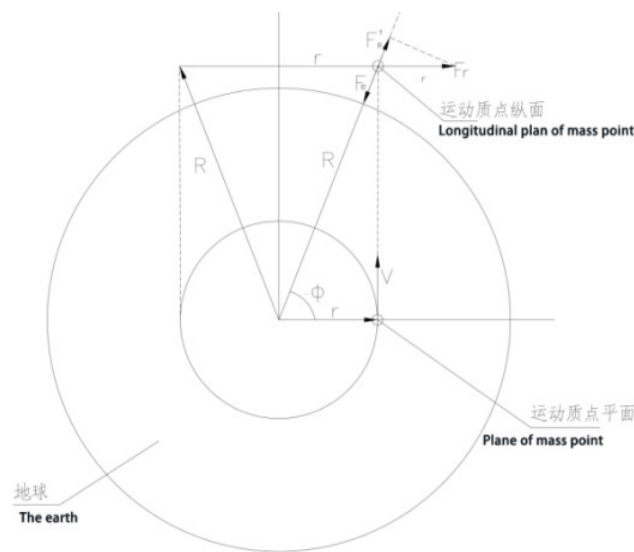
Figure 4. Schematic diagram of the force structure of mass points in horizontal circular motion on the earth surface.

Therefore, formula (05) is also suitable for calculating the magnitude of the radial centrifugal force of the Earth's center of mass for a mass point moving horizontally in a circle on the Earth's surface.

According to the formula $\mathbf{F}'_R=mv_m^2/R$ (05), the magnitude of the radial centrifugal force of the Earth's centroid of a mass point moving in a horizontal circle on the earth's surface is determined by three parameters: the mass m of the mass point, the linear velocity v_m of the mass point (the velocity is expressed as v on the line of Diagram 4) and the distance R of the mass point from the Earth's centroid. And there is no direct relationship with the radius r of the circumference of the horizontal circular motion. Formula (03) and formula (05) are exactly the same except for the radius (distance) parameter. It is also proved that the different radial centrifugal force vectors generated by the circular

motion of two different geometric forms are equivalent in physical principle. It's just that the parameters of the radial radius distance are different.

Set up an efficiency parameter, that is, the ratio of the radial centrifugal force $\mathbf{F}'R$ of the Earth's centroid generated by the mass point to the weight of the mass point, referred to as the gravity ratio ϱ :

$$\varrho = \mathbf{F}'_R/mg = v^2/gR = v^2R/GM \tag{10}$$

g is the gravitational acceleration.

It is obvious that only when $\varrho \geq 1$, the mass point that produces the radial centrifugal force of the earth's center of mass may be suspended or soar because the centrifugal force is greater than or equal to the gravitational force (mass point weight), so as to achieve the purpose of anti-gravity.

Set $\varrho \geq 1$, from the equation (10) can be obtained:

$$V_0 \geq (gR)^{1/2} = (GM/R)^{1/2} \tag{11}$$

V_0 is the critical velocity for suspension.

The formula (11) is exactly consistent with the formula for calculating the velocity of the first universe. It shows that, theoretically speaking, the radial centrifugal force generated by the conical plane circular motion of a mass point around the Earth's center of mass and the two-dimensional plane circular motion around the earth's center of mass are exactly equivalent when other parameters are the same.

2.3. Analysis of Two Possible Basic Principles

According to the above analysis,there maybe two basic principles for the radial centrifugal force generated by the conical plane circular motion of a mass point around the Earth's center of mass:

Principle 1: The radial centrifugal force $\mathbf{F}'_R$ of the Earth's center of mass of a mass point is a component of the radial centrifugal force $\mathbf{F}_r$ of the center of its horizontal circle; That is, $\mathbf{F}'_R$ is determined by $\mathbf{F}_r$, and $\mathbf{F}'_R$ is not an independently generated centrifugal force.

Principle 2: The radial centrifugal force $\mathbf{F}'_R$ of the Earth's center of mass of a mass point and the radial centrifugal force $\mathbf{F}_r$ of its horizontal circle are two relatively independent centrifugal forces. There are three reasons for this:

First, the essence of centrifugal force is that the linear velocity of a mass point is always perpendicular to the radial direction of the earth's center of mass or the radial direction of the horizontal circle.When a mass point moves in a conical plane circle around the Earth's center of mass, the linear velocity of the mass point is always perpendicular to the Earth's center of mass and also perpendicular to the center of the horizontal circle. Therefore, two independent radial centrifugal forces should also be generated separately.

Second,according to formula(05), the radial centrifugal force $\mathbf{F}'_R$ of the Earth's centroid of a mass point has no direct relationship with relevant parameters of the horizontal circumference (such as the radius r of the horizontal circumference). It is only directly related to the mass of the mass point, the linear velocity of the mass point and the distance of the mass point from the Earth's center of mass. Therefore, the radial centrifugal force $\mathbf{F}'_R$ of the Earth's center of mass of a mass point should be independently generated.

Thirdly, according to the analysis in 2.3, the radial centrifugal force generated by the conical plane circular motion of a mass point around the Earth's center of mass is equivalent to that generated by the two-dimensional plane circular motion around the Earth's center of mass when other parameters are the same. Therefore, the conical plane circular motion of a mass point around the Earth's center of mass can be regarded as the same as the two-dimensional plane circular motion around the Earth's center of mass, and the radial centrifugal force of the Earth's center of mass can be independently generated.

Either of them principle one or principle two must be true. Although the formula for calculating the radial centrifugal force of the particle center of the Earth in Principle 1 and Principle 2 is the same, the physical meaning generated by the two principles is different.

Under normal circumstances, principle one is relatively easy to understand and easy to be accepted by everyone.Principle two is more difficult to understand and requires a proper experiment to verify.

3. Experiment to Verify the Hypothesis of Principle

Whether principle 2 is true or not has extremely far-reaching theoretical value and physical significance for the in-depth research and development of macro and micro physics (this issue is not the subject of this paper, and will not be further discussed in this paper). Therefore, it is necessary to carry out experimental verification.

3.1. Basic Assumptions of the Experiment

Make a rigid body ring with an inner radius of r and a stationary weight of m (as shown in Figure 5). If a rigid body ring moves in a horizontal circle around its center, each particle on the rigid body ring must generate centrifugal force in the radial direction of the circle center. However, due to The binding of the rigid body,the radial centrifugal force of the center of the ring will form the internal stress between the molecules inside the rigid body, but will not form the external centrifugal force.Therefore, if principle 2 is not true, because the radial centrifugal force outside the rigid body ring does not exist, then the rigid body ring does not produce the radial centrifugal force component of the Earth's center of mass. If the second principle is true, then the radial centrifugal force of the earth's center of mass is generated by the ring stiffness, which reduces the weight of the rigid body ring.
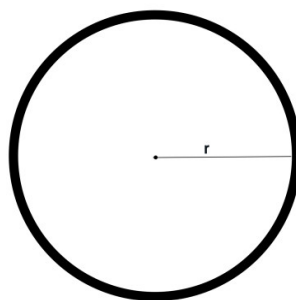
Figure 5. Schematic diagram of a rigid ring.

3.2. Composition of Experimental Device

The experimental facility consists of two sets of systems (devices), a high-speed rotating circular rigid body system device and a weight measurement system device.

The high-speed rotating circular ring rigid body system device comprises a rigid body ring, a connecting rod and a shaft sleeve connected with a rotating shaft; Power drive system; Independent power supply system; Horizontal Angle adjustment device of rigid ring; Rotary speed recording, display and adjustment device for rigid ring.

The weight measuring system device is a suitable electronic scale. The main requirements are appropriate weighing range and weighing accuracy.

3.3. Basic Requirements

To ensure the accuracy of the experiment and the reliability of the data, reduce various interference factors. In addition to some of the device requirements mentioned above, there must be some basic requirements for the experimental device:

First is to try to avoid the experimental error caused by mechanical vibration. Therefore, the high-speed rotating circular rigid body system device should have higher machining accuracy and vibration reduction measures.

Second, try to avoid the error caused by air disturbance to the experiment. Therefore, the high-speed rotating circular rigid body system can not produce lift or fall force brought by air; And try to take internal and external air isolation measures to avoid errors caused by air disturbance.

Third, the material of the rigid ring should be able to withstand the radial centrifugal force.

3.4. Parameter Setting and Calculation of the Experiment

The rest weight of the rigid ring is considered 10-40 kg, With a radius of 0.5 to 1 meter; The speed should consider that the mass point line speed on the rigid ring is lower than the sound speed to avoid unnecessary influence on the experiment.

Assuming that the rest weight of a rigid ring is m_0=20kg, radius r=0.5 m, GM=3.986004418×10^{14}(m^3/s^2), the linear velocity of the mass point is 0.9 times the sound speed v=306 meters, then the rotation speed of the ring rigid body n=v/2πr=97.4 RPM/s, take the integer n=100 RPM/s.

$$\Delta m = -F'_R/g = -m_0 v^2/gR = -4m_0(\pi rn)^2/gR = -4m_0R(\pi rn)^2/GM \qquad (12)$$
$$\Delta m = -0.03145kg = -31.45g$$

Where: R is the distance between the rigid ring and the Earth's center of mass, taking 6378 km.

The above calculation does not take into account the error caused by other factors such as mechanical vibration and air disturbance, as well as the error caused by the radial thickness of the rigid ring and the omission of the connecting rod and the sleeve. According to the technical and economic conditions of the experimenter, the above parameters can also be adjusted and calculated accordingly.

According to the above parameter experiments, if the total weight of the high-speed rotating circular rigid body system is reduced by about 30 grams than its static state, principle 2 must be true. If the total weight of the high-speed rotating circular rigid body system is reduced by very little compared to its rest state, within the possible margin of error, then principle 2 is not true.

4. Anti-Gravity Technology Realization Path Assumption

This paper mainly constructs the realization path of anti-gravity technology in theory, and does not discuss the practical technology and capability. At present, it is not possible to confirm which of the two basic principles is correct, so the realization path of anti-gravity is synthesized according to the two principles.

In addition, an antigravity system is composed of a variety of devices, the total weight of the system must exceed the weight of the horizontal circular motion of the object providing the antigravity. For this purpose, a gravity ratio parameter Q_z considering the total weight M of the antigravity system is set up.

$$Q_z = mv^2/gMR \qquad (13)$$
$$v \geq (gMR/m)^{1/2} \qquad (14)$$

At the same time, set up an anti-gravity lift-to-weight ratio parameter (similar to the thrust-to-weight ratio of aircraft engines) Q:

$$Q \leq M/m = (v/v_0)^2 \qquad (15)$$

4.1. Technical Path of Horizontal Circular Motion of a Rigid Body Particle

According to formula (11), when a rigid body mass point does horizontal circular motion, its linear velocity must reach 7905.45 m/s or more, in order to have actual anti-gravity value. Its critical speed is 23.3 times the speed of sound. In the range of the Earth's atmosphere, there may be too much drag and high temperature to achieve. Therefore, it is necessary to consider the horizontal circular motion of a rigid mass point in a vacuum environment.

There are two options.

Scheme1: In the vacuum of the circular pipe, according to the electromagnetic gun and magnetic levitation principle (can also consider the application of super conducting technology), by the number of n independent rigid body mass points, in accordance with the equidistant queuing way to do horizontal circular high-speed movement.

The advantage of scheme 1 is that it can be applied regardless of whether Principle 1 or principle 2 is true.

Technical difficulties:

First, how much is the speed limit of rigid mass point; According to reports, the speed of the electromagnetic gun can reach 11 km/s, and the potential speed is about 100 km/s. In a vacuum environment, and the rigid mass points can be accelerated for a long time, its potential velocity should be very large.

The second problem is the control of the motion trajectory of the rigid mass points. That is, the rigid mass points must be in a magnetic levitation state in all directions, and can not collide and friction with the tube wall and the rigid mass points.

Third, in the case of ultra-high speed, the rigid body mass points will inevitably produce a great centrifugal force in the radial center of the circular motion, and what is the limit of this centrifugal force borne by the system.

Assume that the weight of each rigid body mass point is 6 kg, the circle radius of the vacuum circular ring pipe is 2 meters, the distance between the rigid body mass points is 6 cm, the total number is about 200, the total weight is 1200 kg; The maximum linear speed is 50 km/s. Then:

$$Q=(v/v_0)^2=(50/7.92)^2=39.85$$

$$M \leq 1.2 \times 39.85 = 47.8 \text{ tonnes}$$

Its physical meaning is that under the conditions of the above parameters, it can theoretically drive the anti-gravity system with a total weight of less than 47.8 tonnes to achieve suspension and flight. Therefore, without considering the technical realization ability, scheme I has operability and development potential.

In addition, in order to control the rotation of the anti-gravity system in suspension state as a whole, the device for horizontal high-speed circular motion of rigid body mass points should be configured with two sets of devices with opposite rotation directions. That is, one set of devices does clockwise horizontal rotation, and the other set does counterclockwise horizontal rotation. Alternatively, the rotation of the anti-gravity system can be controlled by other means.

Scheme2: In the vacuum circular pipe, according to the principle of electromagnetic gun and magnetic levitation (can also consider the application of superconducting technology), a rigid body ring is placed and the horizontal high-speed rotation movement is done.

The advantages of scheme 2 are: first, the ability to resist the radial centrifugal force of circular motion is greatly improved; A rigid ring and an electromagnetic device can be combined to resist the radial centrifugal force of the center of the circle in circular motion. Secondly, it is much easier to control the motion path of rigid ring than scheme 1. The disadvantage is that scheme 2 only applies to the premise that principle 2 is established, if principle 2 is not established, scheme 2 cannot be established. Other technical parameters are the same as scheme 1. Scheme 2 also has operability and development potential under the premise that Principle 2 is established.

4.2. Path of Charged Particle Ring Accelerator

Scheme3: In a horizontal ring particle accelerator [5], due to the high speed of particles that can be obtained in the accelerator, according to the above principle analysis, high-speed particles should not only generate radial centrifugal force at the center of the ring, but also radial centrifugal force at the center of the Earth's mass, so as to achieve the purpose of anti-gravity.

At present, particle speeds close to the speed of light can be obtained in particle accelerators. In order to obtain the best performance, the ratio of the total weight of the device to the total mass of the high-speed particles in the accelerator must be resolved in the best performance state.

It is assumed that the maximum speed of particle acceleration is limited to 0.4C, and the optimal beam density of particles in the accelerator is n particles/unit volume, the total resting mass of particles in the accelerator is nm_0U, m_0 is the rest mass of a single particle, and U is the total volume of the vacuum pipe of the ring accelerator. Then:

$$v=0.4C=1.2×10^8（m/s）$$

$$v/v_0=15151.5$$

$$Q=M/m=2.3×10^8$$

$$m=nm_0U/(1-v^2/c^2)^{1/2} \qquad (16)$$

Therefore, the beam density n is one of the most important parameters.

From the basic data of the above analysis, it is assumed that scheme 3 has a very high development potential without taking into account other physical and technical factors.

Of course, there will be many other technical problems, but what is to be considered in the envisioning phase is the theoretical possibility of the path being realized. Therefore, whether it can be done technically can not be considered for the time being.

4.3. Path of a Circular Superconductor Coil (or a Combination Thereof)

Scheme 4: A circular superconductor coil (or a combination thereof) in the horizontal state inputs a large amount of current. Because the electrons have mass, and the drift speed in the superconducting toroidal coil is relatively high. Therefore, according to the above principle analysis, in addition to the radial centrifugal force of the ring, the radial centrifugal force of the earth should also be generated, so as to achieve the purpose of anti-gravity.

According to informal data, electrons drift through superconductors at a speed of about 52 meters per second, v/v_0 is only about $6.5×10^{-3}$, $\varrho=8.3×10^{-7}$. It is obvious that this proposed path does not achieve anti-gravity operability in reality from the current theoretical and technical point of view.

Of course, it is also possible that there are instantaneous continuous high speed fluctuations of microscopic distances of electrons in the superconductor, and although the distance of the fluctuations may be short, the instantaneous high-speed continuous fluctuations of microscopic distances of a large number of electrons should also produce radial centrifugal forces at the center of mass of the Earth. Therefore, the possibility of this technological path cannot be completely ruled out and needs to be verified by experiments.

5. Conclusions and Recommendations

5.1. Starting with the theoretical analysis of the difference in the distribution of gravitational acceleration caused by the earth's rotation, this paper draws the conclusion that a mass point making a conical plane circular motion around the Earth's center of mass (the conical apex is the Earth's center of mass) can produce radial centrifugal force of the Earth's center of mass, thus affecting the weight of the mass point.

5.2 Through further theoretical analysis of mass points moving horizontally in circular motion on the Earth's surface, it is concluded that the radial centrifugal force generated by conical plane circular motion around the Earth's center of mass and two-dimensional plane circular motion around the earth's center of mass are equivalent when other parameters are the same.

5.3 Through comprehensive analysis, it is proposed that there may be two basic principles for the radial centrifugal force of the Earth's center of mass generated by the conical plane circular motion of a mass point around the earth's center of mass, and one of the two principles must be valid. The possibility of principle 2 is analyzed, and the theory proves that principle 2 should be established.

5.4 For principle 2, the hypothesis of experimental verification is proposed. The method and basis for judging whether the principle 2 is true are put forward.

5.5 According to the theoretical basis of this paper, four anti-gravity technology paths are proposed. And the corresponding application feasibility analysis is carried out. On the premise of not fully considering the practical technical ability, from the theoretical point of view, there are three

schemes with operability and development potential. However, the feasibility of another scheme cannot be completely ruled out and needs to be verified by experiment.

Due to the preliminary discussion and assumption, the breadth and depth of theoretical analysis are far from enough, and the discussion, analysis and assumption are only broad lines, and many problems are not taken into account.I hope that aspiring colleagues can put forward more criticism and suggestions, and jointly in-depth research and development.

In addition, the second principle proposed in this paper is very valuable for in-depth research and development of physics. It provides a new research direction for the study of the repulsive force of macroscopic universe and microscopic particles. It is hoped that capable units or individuals can complete the experimental verification of principle 2 in this paper.

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