Rotating Coupling Experiments in Vacuum: New Evidence for "Ether" and New Insights into Gravity

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Abstract

This study is dedicated to exploring the potential unknown substances in space and their relationships with the gravitational mechanism. A series of rotating coupling experiments were conducted in a high - vacuum environment. After effectively eliminating the influence of residual gas molecules, by using couplings made of various materials, the motion states of feathers and dandelion fluffs around the couplings were systematically observed. The experimental results show that couplings of different materials can cause the fluff on feathers to have directional displacements, which are related to the vortex direction generated by the rotation of the couplings.

Keywords Space substances; Gravitational mechanism; Rotary coupling test

1 Introduction

In the field of physics, light can propagate in a vacuum without a medium, and the medium for the transmission of gravitational force remains unclear, and the nature of space is yet to be explored. Although the law of universal gravitation[1] and the theory of space-time distortion[2] play a crucial role in human cognition of the universe and establish an important theoretical framework, there are still many contradictions and puzzles that are difficult to explain between these theories and reality. From the perspective of daily life experience, the gravitational interaction between objects is usually difficult to be directly perceived, which shows a significant difference from the universality of gravity predicted by the theory. Cavendish verified the existence of universal gravitation through the torsion balance experiment[3], providing key evidence for this theory. However, due to the limitations of technical conditions and the experimental environment at that time, there were some interfering factors that were not fully considered during the experiment, and the universality of the experimental conclusion needs to be further tested. In view of the above problems, this experiment aims to explore whether there are undiscovered substances in space. If they exist, the characteristics of these substances will be studied, and the potential connection between these substances and the gravitational mechanism will be analyzed. It is expected that this research can provide new research ideas and directions for revealing the nature of gravity.

2 Experimental Methods

This experiment focuses on exploring the unknown substances in space and their potential connection with gravity. The main experimental methods are as follows:

2.1 Environmental Regulation and Interference Exclusion

Conduct the experiment in a specially designed acrylic vacuum chamber. Use a vacuum pump unit to evacuate the chamber to achieve a high vacuum degree. Monitor with relevant instruments to ensure that the vacuum degree meets the experimental requirements and reduce the influence of airflow. At the same time, use equipment such as a gaussmeter, an electrostatic measuring instrument, and a vibration tester to detect and exclude interference factors such as electromagnetic fields, static electricity, and vibrations to create a stable experimental environment.

2.2 Construction of the Experimental Device

Fix a brushless speed-regulating motor at the center of the vacuum chamber. Install eight cylindrical couplings made of different materials on the motor shaft, including metals, non-metals, and lightweight materials. Select lightweight feathers and miniature dandelion fluff as the observation objects, and suspend the feathers near the side of the coupling through an insulating bracket.

2.3 Planning of the Experimental Process

2.3.1 Vacuum Environment Test

After the vacuum chamber reaches the expected vacuum degree, start a hair dryer to blow air towards the feathers, observe the state of the feathers, and verify that the airflow has no impact on the experiment in the vacuum environment.

2.3.2 Rotation Drive Experiment

Control the motor to drive the couplings made of different materials to rotate forward and backward at a certain rotational speed, observe and record the movement of the feathers and dandelion fluff, and explore the relationship between the experimental phenomena and the materials of the couplings.

2.3.3 Occlusion Verification Experiment

Use a transparent acrylic hollow tube to fit outside the coupling, start the motor to rotate again, compare the movement differences of the feathers and dandelion fluff with and without occlusion, and study the role of physical occlusion.

3 Experimental Process

3.1 Detection of Environmental Parameters and Interference Factors before the Experiment

A systematic detection of the environmental parameters and potential interference factors inside the vacuum chamber before the experiment:

Electromagnetic Interference: A gaussmeter was used to detect the magnetic induction intensity inside the vacuum chamber. The result showed that the magnetic field intensity in the whole region was 0mT, confirming that there was no source of electromagnetic interference.

Static Electricity Interference: An electrostatic measuring instrument (with a precision of 1V) was used to measure the electrostatic potential on the surface of the chamber and equipment. The value fluctuated between 0 and 70V. The motor shaft and the outer shell were grounded (verified by a Fluke multimeter that the grounding resistance was < 0.1ohms), effectively eliminating the influence of static electricity.

Vibration Interference: A vibration tester (with a precision of 0.1mm/s) was used to detect the vibration amplitude of the experimental table. The displayed vibration speed was 0.0mm/s. Through error evaluation, it was found that the slight mechanical vibration had no significant impact on the experimental observation.

Airflow Parameters: The air volume of a small hair dryer was calibrated. The outlet wind speed measured by an air volume measuring instrument was stably maintained at 14 to 16m/s, meeting the experimental requirements.

Vacuum Degree Index: Vacuum degree index: After continuous air extraction by a vacuum pump unit, the acrylic vacuum chamber used in the experiment (internal dimensions: 200×200×200 mm, wall thickness: 20 mm) achieves a vacuum degree of approximately 10 Pa, meeting the requirements for high-vacuum environment experiments.

Ambient Temperature: 22°C

3.2 Construction of the Experimental Device and Control of Initial Conditions

Core Components: The motor was fixed at the center of the vacuum chamber, and the cylindrical coupling was rotated at a high speed. Eight different materials of test pieces were selected (parameters are shown in Table 1). The typical dimensions were a height of 30mm, a diameter of 25mm, and an aperture of 8mm (matching the motor shaft).

The aluminum alloy test piece had a mass of 36.45g, the iron test piece had a mass of 84.36g, and the sponge test piece had a mass of only 0.228g, covering the categories of metals, non-metals, and lightweight materials. A brushless speed-regulating motor (DC24V, power 120W, rated rotational speed 3000rpm) was equipped, supporting precise control of forward and reverse rotation within the range of 0 to 3000rpm

Observation Objects: A lightweight feather (with a mass of 0.05±0.01g, calibrated by an electronic scale with a precision of 0.01g) was selected as the motion tracer and suspended 1mm to 5mm away from the side of the coupling through an insulating bracket; miniature dandelion fluff (with a diameter of about 5mm) was hung on the feather to capture the tiny changes in the flow field.

Comparative Experiment: Eight different materials of couplings (such as aluminum alloy, iron, wood, etc.) were prepared to verify the universality of the experimental phenomena with respect to the materials.

3.3 Preliminary Test of the Vacuum Environment

Under a vacuum pressure of 10 Pa, a hairdryer was activated to continuously blow air onto a feather at a wind speed of approximately 16 m/s. No displacement deviation of the feather was observed. Calculations using the ideal gas law show that the residual gas molecular number density in the high-vacuum environment is approximately 2.5×10^{21} molecules/m^3, which is much lower than the molecular number density in atmospheric pressure environment (approximately 2.5×10^{25} molecules/m^3). Due to the extremely low molecular number density, the aerodynamic effects can be neglected, confirming that the motion phenomena observed in subsequent rotation experiments were not caused by gas convection.

3.4 Coupling Rotation Drive Experiment

3.4.1 Basic Rotation Observation

Taking the aluminum alloy coupling with a diameter of 25mm (with a mass of 36.45g) as the object, the motor was controlled to rotate forward at a speed of 3000rpm. The feather installed near the coupling stretched orderly along the direction of the vortex generated by the rotation of the coupling. The distance between the tip of the feather fluff and the outer surface of the coupling fluctuated within the range of 0 to 5 millimeters; when rotating in reverse, the motion direction was symmetrical. The dandelion fluff flew out along the tangential direction at the moment of starting and fell rapidly under the action of gravity.

3.4.2 Verification of Universality for Multiple Materials

The couplings made of materials such as iron (84.36g), wood (9.6g), sponge (0.228g), copper (25.46g), stainless steel (16.14g), rubber (15.5g), and plastic (5.62g) were sequentially replaced. It was found that the test pieces with different densities (ranging from 0.032g/cm³ to 7.85g/cm³) and different masses (ranging from 0.228g to 84.36g) could all drive the fluff on the feather to produce directional displacement, proving that the experimental phenomenon was independent of the material. However, the differences in the displacement amounts caused by different materials still need to be precisely measured.

3.4.3 Flow Field Occlusion Verification Experiment

A transparent acrylic hollow tube with an outer diameter of 32mm and a wall thickness of 2mm (with a height matching that of the coupling, 30mm) was sleeved outside the test piece to form a physical isolation barrier. After starting the forward rotation at 3000rpm, both the feather and the dandelion fluff remained stationary, showing a significant difference from the unoccluded working condition (with a displacement amount between 0 and 5mm).

4 Experimental video link and phenomenon record

`https://www.youtube.com/watch?v=uKoJ8UKz6Z0`

In the initial state of a vacuum without airflow, both the down on the feather and the dandelion down remained stationary, serving as a baseline control for subsequent experiments. When air was blown at a speed of 16 m/s using a hair dryer, the down still remained stationary, verifying that in a vacuum without airflow, the down is not affected by air currents. This ensures that any movement of the down in the following experiments is solely caused by the rotation of the coupling.The experiment involved observing the rotation-driven behavior using couplings of different materials and rotation speeds. When an aluminum alloy coupling rotated clockwise at 3000 rpm, the down on the feather converged in a clockwise spiral and unfurled in an orderly manner, while the dandelion down flew out tangentially in the clockwise direction and quickly fell to the ground due to gravity. When an iron coupling rotated counterclockwise at 2500 rpm, the down converged counterclockwise in a spiral, and the dandelion down flew out tangentially in the counterclockwise direction before hitting the ground. When wooden and sponge couplings rotated clockwise at 400 rpm and 500 rpm respectively, the down on the feather also exhibited clockwise spiral convergence and orderly unfurling. Notably, in all experimental conditions, when the area around the coupling was blocked, the down returned to a stationary state.

5 Physical Parameters of the Couplings of Different Materials

- Aluminum alloy coupling: height 30mm, diameter 25mm, aperture 8mm, mass 36.45g
- Iron coupling: height 30mm, diameter 25mm, aperture 8mm, mass 84.36g
- Wooden coupling: height 30mm, diameter 25mm, aperture 8mm, mass 9.6g
- Sponge coupling: height 30mm, diameter 25mm, aperture 8mm, mass 0.228g
- Copper coupling: height 22mm, diameter 14mm, aperture 8mm, mass 25.46g
- Stainless steel coupling: height 22mm, diameter 14mm, aperture 8mm, mass 16.14g
- Rubber coupling: height 25mm, diameter 25mm, aperture 8mm, mass 15.5g
- Plastic coupling: height 23mm, diameter 19mm, aperture 8mm, mass 5.62g.

6 Discussion and Prospect of the Experimental Conclusion

In this experiment, by controlling the material variables of the couplings (covering metals, non-metals, and lightweight materials) and conducting rotation experiments with couplings of different densities and masses, a directional action field was successfully induced in all cases. Through observing and analyzing the motion states of feathers on the sides and above the couplings, it is hypothesized that the action field exhibits the characteristics of a fluid vortex. Additionally, the experiment revealed that this action can be blocked by physical barriers.

Based on the results of this experiment, it is reasonable to infer that there may be a combination of one or more substances in a vacuum. For the convenience of research and discussion, they are collectively referred to as "ether[4]". Judging from the experimental phenomena and theoretical derivations, "ether" is likely to possess physical properties similar to those of a fluid, and the entire cosmic space can be regarded as a huge "ocean" filled with "ether". In this hypothetical model, when the Earth rotates, it will drive the surrounding "ether" to form a swirling flow structure. Within this swirling system, the velocity distribution of the "ether" fluid exhibits obvious gradient characteristics, that is, the closer to the Earth, the faster the velocity of the "ether", and the velocity of the inner layer is greater than that of the outer layer. According to Bernoulli's principle[5], this difference in velocity will lead to the generation of a pressure difference, which in turn forms a pressure pointing towards the center of the Earth. This pressure is speculated to be the essential source of gravity, and the intensity of the gravitational effect follows the inverse square law of distance.

When studying the directional action field induced by the rotation of the coupling, it is observed that it can be blocked by physical occlusion. This phenomenon significantly differs from the penetration characteristics of the Earth's gravity. Theoretically, this difference may be attributed to the different fluctuation characteristics of the two, that is, there are significant differences in the wavelength and amplitude parameters between the gravitational wave and the ether wave generated by the coupling. The gravitational wave associated with the Earth's gravity has a long wavelength and carries a huge amount of energy. In contrast, the ether wave generated by the coupling is at a lower magnitude in terms of wavelength and energy. Analogous to the propagation characteristics of radio waves, long-wave radio waves can effectively penetrate obstacles such as buildings due to their characteristics, while short-wave radio waves with lower energy have extremely limited penetration ability in the face of physical occlusion. The penetration difference between the directional action field of the coupling and the Earth's gravity may follow a similar wave propagation mechanism.

Upon further in-depth consideration, within the framework of this "ether" hypothesis, there are many scientific issues worthy of exploration. For example, will the mechanical motion of macroscopic objects cause fluctuations in "ether"? If such fluctuations exist and their recovery process is extremely rapid, how can we use existing scientific and technological means to design precise and effective experimental methods to capture and measure them? In addition, as a process of high-energy release, violent explosion events will inevitably have a strong impact on the surrounding environment. During this process, will "ether" experience violent fluctuations in a short period? If "ether" experiences violent fluctuations due to an explosion, will the light at the edge of the explosion show bending or refraction of its propagation path due to the drastic changes in the state of "ether" during the propagation process? These issues are not only closely related to the physical properties of "ether", but may also open up new directions for basic physics research such as the nature of gravity and the mechanism of light propagation, and require more in-depth theoretical research and experimental verification in the future.

Within the framework of the "aether" hypothesis, the frontier issues derived not only point out new directions for fundamental physics research but also form a profound echo with the historical controversies of classical physics experiments. Looking back at the history of physics, the Cavendish experiment was limited by the technical level of the 18th century, failing to effectively control disturbances such as the Earth's rotation, environmental vibrations, unknown magnetic field interferences, and as-yet-undiscovered electromagnetic induction phenomena. Using a single metal ball as the experimental object further cast doubt on the universality of its conclusions. The Michelson-Morley experiment[6], based on the premise of "absolute rest of the aether," failed to detect the expected "aether wind" but accidentally contributed to the birth of special relativity. The existence of absolute rest remains controversial, and in the context of modern science, the Fizeau experiment remains a classic case for exploring the interaction between light and media. By measuring the propagation speed of light in flowing liquids, this experiment confirmed that fluid motion indeed affects the speed of light. Historically, this result was regarded as key evidence for Fresnel's "hypothesis of partial aether dragging[7]" but with the establishment of relativity, it replaced the traditional aether hypothesis.

These historical controversies form a fascinating academic resonance with contemporary research: Although the bending of light observed in the Eddington solar eclipse experiment[8] has been classically explained by the theory of spacetime curvature in general relativity, a hydrodynamic model based on "aether vortices" also provides an inspiring explanatory perspective, which urgently needs verification through precise hydrodynamic experiments. Of particular note is the high similarity in dynamic mechanisms between the Doppler effect of light and that of mechanical waves, which not only confirms the wave nature of light but also provides experimental evidence for the hypothesis that "there exists a mechanical wave-like medium for light propagation."

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