Experimental support for the flowing aether concept of gravity

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Abstract: The article of Apffel *et al.* [Nature **585**, 48 (2020)] reported on an experiment that produced the sight of two miniature sailboats floating upside down to each other on the two sides of a layer of glycerol that was levitated by high frequency vibrations. The vessel on the underside of the glycerol is a remarkable display of the results of simulated gravity caused by vibrations. The present article considers this and other experiments on simulated gravity and finds that they provide support for the flowing aether concept of the cause of gravity. © *2021 Physics Essays Publication*. [http://dx.doi.org/10.4006/0836-1398-34.4.538]

Résumé: L'article [Apffel *et al.*, Nature **585**, 48 (2020)] rapporte sur une expérimentation qui a produit la vue de deux voiliers miniatures flottant l'un vers l'autre sur les deux côtés d'une couche de glycérol qui a été en lévitation par des vibrations à haute fréquence. Le vaisseau sur le dessous du glycérol est un affichage remarquable des résultats de la gravité simulée causée par des vibrations. Le présent article examine cette expérimentation et d'autres sur la gravité simulée et trouve qu'elles fournissent du support pour le concept de l'éther courant de la cause de la gravité.

Key words: Cause of Gravity; Simulated Gravity; Aether; Ether; Flowing Force; Pushing Force.

I. INTRODUCTION

In a series of four articles published from 2012 to 2018, the present author proposed a flowing aether concept of the cause of gravity.[1–4] The concept is based upon the proposition that aether, a substance that is considerably smaller than atoms, permeates space and the bodies that occupy space. Like atomic matter, the posited aether exists in gaseous and in liquid states, much like water vapor and droplets. The cause-of-gravity concept posits a cyclic process whereby gaseous-state aether evaporates from cosmic bodies, moves by diffusion into space, condenses into droplets of liquid-state aether, and flows back into cosmic bodies. The inflowing liquid-state aether exerts a pushing force on the atomic matter of cosmic bodies. That pushing force is posited as the force of gravity.

In 2020, a paper entitled *Floating Under a Levitating Liquid* was published in *Nature*[5] (the Levitation paper). The paper relates to experiments performed in a laboratory in Paris, France. The experiments produced what may be described as simulated gravity. A vibrator applied high frequency vibrations to a layer of glycerol in a container. The vibrator was situated beneath the container, and the vibrations were directed upwards. They caused the layer of glycerol to rise, that is, to levitate in the container. Two miniature sailboats were inserted into the levitated layer of glycerol, one placed on the top side of the layer and the other placed on the bottom side. The result was remarkable. The upper vessel floated upright on the topside of the glycerol, and the lower vessel floated upside down on the underside of the glycerol, see Fig. 1. This seemingly bizarre result raises the question of whether the process used to produce simulated gravity on the bottom side of the layer might shed some light on the cause of real gravity. Might the process lend support to the flowing aether concept of the cause of gravity?

Prompted by the Levitation paper, the present author found a series of papers on experiments that deal with simulated gravity. On reviewing these papers and experiments, it became evident they address many essential elements of the flowing aether concept.

The present article will consider the experiments reported in the Levitation paper and a selection of papers that relate to simulated gravity. Their findings will be compared with essential aspects of the flowing aether concept of gravity. The object will be to see whether the cited papers and experiments support the flowing aether concept.

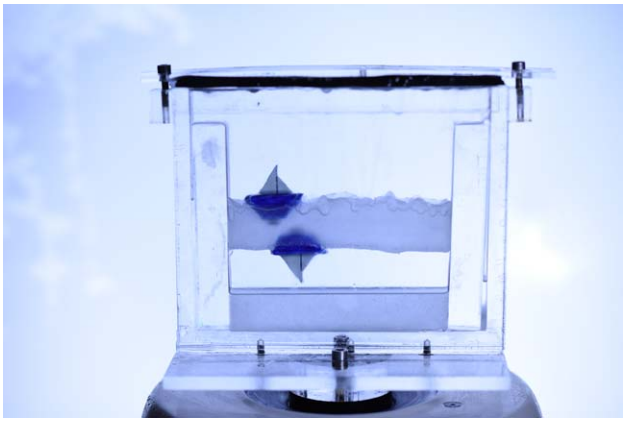

FIG. 1. (Color online) Photograph of the experiment provided by the authors of the Levitation paper [Apffel *et al.*, Nature **585**, 48 (2020)].

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The first step will be to provide a summary of the flowing aether concept of gravity. Next will be an analysis of the cited papers and experiments that address elements that are relevant to the flowing aether concept. This will be followed by an analysis of how the cited papers and experiments support the flowing aether concept; then, a section on the element of aether; and finally, a section on conclusions.

II. SUMMARY OF THE FLOWING AETHER CONCEPT OF GRAVITY

The following summary of the flowing aether concept of the cause of gravity is drawn from author's above-cited articles.[1–4] The concept is based upon the proposition that a subatomic substance called aether permeates space and cosmic bodies. The posited aether is essentially the "ether" that was theorized by James Clerk Maxwell as the physical underpinning of the electromagnetic equations he developed in 1865 in his seminal work, *A Dynamical Theory of the Electromagnetic Field*.[6] Maxwell said:[7]

> We have therefore some reason to believe, from the phenomena of light and heat, that there is an ethereal medium filling space and permeating bodies, capable of being set in motion and of transmitting that motion from one part to another, and of communicating that motion to gross matter so as to heat it and affect in in various ways.

And[8]

> We may therefore receive, as a datum derived from a branch of science independent of that with which we have to deal, the existence of a pervading medium, of small but real density, capable of being set in motion, and of transmitting motion from one part to another with great, but not infinite, velocity.

The flowing aether concept posits that aether, like ordinary atomic matter, exists in separate states or phases, including a gaseous state and a liquid state. The gaseous phase consists of individual aether cells that are separate from each other. The liquid state consists of droplets that are groups of cells that adhere to each other. The droplets are tiny compared to the size of atoms, but they are orders of magnitude larger than the individual cells of gaseous aether.

Aether in its liquid state flows from space into cosmic bodies. The flowing aether collides with the atomic matter of cosmic bodies. The collisions exert a pushing force that is the direct cause of gravity.

The collisions provide heat that causes liquid state aether to volatilize, that is, to change from liquid-state aether into gaseous-state aether.

When inflowing aether collides with a cosmic body, this sets off a series of collisions between the body's atomic matter and its aether cells, proceeding throughout the body and every part thereof. This transfers momentum from the incoming aether to the whole of the cosmic body. The process is called scattering.

Gaseous-state aether flows from cosmic bodies into space by diffusion and convection. In space, gaseous-state aether condenses into droplets of liquid-state aether. The liquid-state aether flows from space into cosmic bodies.

The inflow is caused by the concentration of inflowing aether droplets being reduced at and near cosmic bodies. The imbalance of concentration is caused by elimination of droplets of incoming aether that are volatilized into gaseous aether.

The outward flow of gaseous-state aether into space is caused by an imbalance of concentration of gaseous-state aether in space as a result of the elimination of gaseous-state aether cells by condensation into liquid-state aether.

The directions of the flows (inflow of droplets and outflow of cells) are set by imbalances of concentration of each state or phase.

The system of inflowing liquid state aether and outflowing gaseous state aether is cyclic and essentially permanent. Both states of aether are in continuous states of disequilibrium of concentration. Each state seeks but never reaches equilibrium. Thus, the cyclic nature of gravity.

The energy that drives the flows is derived from continuous random Brownian movements (collisions and rebounding) of the aether cells and the aether droplets within the aether medium.

The directions of the inflow of droplet aether toward cosmic bodies and the outflow of gaseous aether into space are set by the imbalances of concentration of each of the stages or phases of the aether.

How can the two states of aether flow through each other? The phenomenon of fluids moving through each other in opposite directions is described and explained in G. K. Batchelor's textbook, *An Introduction to Fluid Mechanics*,[9] as follows:

> Transfer of matter of a specific kind occurs in a fluid mixture of which the composition varies with position. We may suppose that the molecules belonging to one constituent of the mixture are marked in some manner. All molecules are in continual motion of a random kind, and as a consequence have a tendency to migrate away from any initial position. Then if at any instant the proportion of marked molecules immediately on one side of an element of surface drawn in the fluid is larger than that on the other side, random migration of marked molecules in both directions across the surface element will lead in general to a non-zero flux of marked molecules across the element, of such a sign as to tend to make the proportion of marked molecules more nearly equal on the two sides. This non-zero flux of a constituent of the fluid due to migration constitutes *diffusion of matter*.

The same process is also described in Landau and Lifshitz, *Fluid Mechanics*, 2nd ed.[10]

Gaseous-state aether cells and liquid-state droplets are separate constituents of the medium of aether, such that they are capable of flowing through each other. Visualize them as being as different as gaseous-state H_2O molecules that

diffuse into the atmosphere and droplets of liquid-state H_2O that return to the Earth as rain.

The flowing aether concept provides rational explanations for various fundamental aspects of gravity. Some examples are provided in the following paragraphs.

Why is gravity a one-way force? Atoms are porous structures that occupy far larger volumes of space than the individual particles that form the structures. Droplets of liquid-state aether that flow into cosmic bodies are orders-of-magnitude larger than the individual cells of gaseous-state aether that flow out of cosmic bodies. Thus, incoming aether droplets are much more likely than outgoing aether cells to collide with the structures of atomic matter. This permits incoming droplets to transmit far greater momentum to atomic structures than outflowing gaseous aether. Thus, porosity in combination with inflow being a different state of aether than outflow permits gravity to be a one-way force. An analog is a fish net that permits minnows to easily pass on through but impedes the passage of large fish.

Why is gravity an accelerating force? The inflow is from the vast expanse of space toward the relatively tiny target of a cosmic body. Thus, the volume of space available for inflow narrows (converges) as the inflow travels toward a cosmic body. It is fundamental fluid mechanics that the velocity of a flowing fluid accelerates as the volume of space available for the passage of the flow converges.

Why does gravity apply equally to all objects, large and small, light and heavy. The classic experiments at the leaning tower of Pisa proved this characteristic a long time ago. The key is the flowing element of aether. Visualize a flowing river that carries various objects such as big ships and little rafts. The river carries them all at the velocity of the river's flow.

Why does gravity between the Sun and each of the planets appear to be instantaneous, without the time delay that one would expect for the travel times from the Sun to the planets of the waves or particles or force that would be necessary for the Sun to transmit to the planets to cause attraction? This is one of the most puzzling anomalies of gravitation. The answer lies in gravity being a flowing and pushing force. Visualize liquid state aether flowing from outer space toward the Sun as the predominant body in the Solar system. As the flow reaches each of the planets that orbit the Sun, the flow collides with them and exerts a pushing force toward the Sun. The imposition of this pushing force is instantaneous, exerted precisely when the collisions occur, without the need of travel time between the Sun and the planets. Note that this explanation is inconsistent with the generally held belief that gravity is a force of attraction.

How does the flowing aether concept explain the characteristic of gravity that weight is proportional to mass? The answer is that the atoms of heavier objects are more closely concentrated and thus less porous than the atoms of lighter objects and therefore more likely to be struck by inflowing aether droplets.

A. Related matters

1. The Le Sage theory

There is another pushing theory of gravity that has some adherents. It is called the Le Sage theory. It was developed by Fatio in the 17th century and Le Sage in the 18th century. The Le Sage theory posits high-speed gravific corpuscles that criss-cross the universe in all directions. Their speed is many orders faster than the speed of light. Most of the corpuscles pass right on through cosmic bodies, but some collide with cosmic bodies and exert a pushing force upon them. Cosmic bodies partially shadow each other from gravific corpuscles. The result of the shadowing is that gravific corpuscles push cosmic bodies toward each other. The subject of the Le Sage theory is addressed in the author's articles.[1–3]

The Le Sage theory is fundamentally different from the flowing aether concept. The essential differences are set out in the author's article, *Flowing Aether: A Concept* (Ref. 2, p. 524). The Le Sage theory is not accepted by mainstream science—nor by the present author.

2. Heat

One of the concerns raised about the Le Sage theory is that, according to Maxwell, Kelvin, and Poincare, the heat generated by the collisions of the incoming gravific corpuscles would incinerate the Earth in a matter of seconds. The flowing aether concept provides an answer to this concern. Vaporization and evaporation of incoming liquid aether into gaseous aether cause gaseous aether to absorb heat caused by the collisions, and the outflow of aether disperses the heat into space. This subject is addressed in *Outflowing Aether* (Ref. 3, p. 487).

3. Aether friction

Do the planets while orbiting the Sun encounter viscous drag from the aether that occupies the space the planets are traversing? If so, would the drag destabilize the orbits of the planets and cause them to spiral into the Sun? Briefly, the answers are (1) yes, there must be some drag on the planets as they proceed in their orbits, and (2) no, the planets' orbits are not destabilized and the planets will not spiral into the Sun. Rather, their orbits are constantly adjusted and stabilized by equilibrium of the all the forces that cause the orbits. These questions are dealt with in detail in the article, *Outflowing Aether* (Ref. 3, pp. 488 and 489).

III. SIMULATED GRAVITY EXPERIMENTS

The advent of human access to space has led to experiments exploring the characteristics of fluids in space, particularly in regard to the physical needs of astronauts and the operation of space vehicles. Experiments on fluids have been carried out in orbiting space stations, shuttles to access the space stations, rockets in the state of free-fall, aircraft simulating zero gravity, and at ground level in simulated settings of zero gravity. Experiments have tested various substances, including water, alcohol, air, CO_2, H_2, SF_6, and glycerol. The experiments have tested these substances in their gaseous and liquid states or phases and have applied vibrations emanating from mechanical vibrators. The tests have produced results that simulate characteristics of gravity.

The following selection of papers deals with elements of simulated gravity that are the same as those posited in the

articles on the flowing aether concept of gravity. The papers also deal with matters that are not addressed in the articles, but are relevant to their validity.

Note: The Levitation paper and the other cited papers on simulated gravity do not raise or deal with the possibility that aether might play a part in the gravity and simulated gravity processes. The aether question will be addressed in Sec. V.

Pendulum With A Vibrating Suspension by Kapitza[11]

This is a much-cited paper that reports on what appears to be an example of simulated gravity in the sense of high frequency vibrations causing a pendulum to operate upside down as if it were subject to upside down gravity. Vibrations were applied to the suspension portion of the pendulum, causing it to oscillate and provide upside down stability to the whole of the pendulum apparatus. The provision of stability by means of vibrations has come to be known as the Kapitza effect.[12]

High-Frequency Driven Capillary Flows Speed Up the Gas-Liquid Phase Transition in Zero-Gravity Conditions by D. Beysens, D. Chatlin, P. Evesque and Y. Garrabos (2005).[13]

This paper involves experiments that emit high frequency vibrations into liquid and vapor phases of hydrogen (H_2). The experiments were performed at ground level in weightless conditions provided by magnetic force compensating for the force of gravity. The paper reports:[14]

> In this letter, we report on how high-frequency vibrations under weightlessness can modify and speed up phase transition, thus reproducing some features of gravity effects.

The observations in the experiments include flows of liquid H_2 and vapor H_2 in opposite directions, velocity differences between them, density differences between them, coalescence of droplets in the liquid H_2 flows, boundary layers between the flows, Brownian motions, buoyancy, inertial effects of the flows, and flows changing direction from linear to perpendicular to the original vibration's direction.

The paper's concluding remarks read in part:[15]

> Our investigation shows that the phase transition of a gas and a liquid in space under weightlessness conditions can be significantly accelerated by high-frequency vibrations. The vibrations initiate velocity differences between the gas–liquid growing domains, whereby the domain size grows larger than the viscous boundary layer. Across the domains, shear flow and Bernoulli pressure difference participate to enhance domain coalescence and speed up growth. Domains eventually become anisotropic and order in periodic planes perpendicular to the vibration direction.

Vibrations in Space as an Artificial Gravity? by Beysens[16]

This paper is based upon the experiments considered in the 2005 paper discussed above. It raises the question of whether vibrations in space can cause artificial gravity. The application of high frequency, low amplitude vibrations produced bubbles of gaseous H_2, and droplets of liquid H_2 that flowed in opposite directions. Elements at play in the artificial gravity process were observed. They included the flows and transitions of the liquid and vapor phases of H_2, concentration differences, Brownian movements, evaporation and condensation, collisions of gaseous state flows with liquid-state flows, heat application, buoyancy, horizontal phenomena, and stabilization.

The paper concludes that high-frequency, low-amplitude vibrations can cause artificial gravity:[17]

> Returning to the initial question: can high frequency, low amplitude vibrations be used in space as an artificial gravity? The answer is "yes … but" since it depends on the very phenomenon involved. When one deals with 'thermal convection, interface localization and even – as mostly reported here – phase separation, vibration can indeed induce mean flows that closely resemble buoyancy. In this sense vibration can really serve as an artificial gravity.

Thermoconvectional Phenomena Induced by Vibrations in Supercritical SF_6 Under Weightlessness by Y. Garrabos, D. Beysens, C. Lecoutre, A. Dejoan, V. Polezhaev, and V. Emelianov (2007).[18]

This paper reports on experiments carried on in weightless conditions in the orbiting MIR space station. The experiments applied heat to flows generated by vibrations. The fluid used in the experiments was sulfur hexafluoride (SF_6). The authors observe in the Introduction that vibrations are used in industry to control solid–solid, liquid–solid, and liquid–liquid dispersions. They say:[19]

> Such vibrations, however, can generate average flows that show some similarities with earth gravity driven convections. In this sense, vibrations might appear as a way to control and operate fluids in space by creating effects similar to those triggered by earth gravity.

The experiments produced evidence that the application of vibrations and heat to a medium can cause the medium to flow in the direction of the vibrations and, at the same time, cause instability that is evidenced by some of the flow spreading out horizontally to the direction of the initial flow and producing horizontal phenomena. The abstract reads in part:[20]

> The HBL [hot boundary layer] is initially convected as symmetrical plumes over a distance that only depends on the vibration velocity and which corresponds to a Rayleigh–Bénard-like instability where the vibration acceleration acts as the earth gravity. Then the extremities of the plumes are convected perpendicularly to the direction of oscillation as two 'pancakes,' a process encountered in the vibrational Rayleigh–Bénard instability.

It was observed in the experiments that elements at play included concentration differences, phase transitions, Brownian movements, evaporation and condensation, buoyancy, vertical and horizontal flows of H_2, buoyancy, stability, instability, and the application of heat.

"Anomalous" Phenomena in Fluid under the Action of Vibration by I. I. Blekhman, L. I. Blekhman, L. A. Vaisberg, V. B. Vasil'kov and K. S. Yakimova (2008).[21]

This is an example of upside-down phenomena caused by high frequency vibrations. The experiments were carried out at ground level in a laboratory at the Mekhanobr Institute in St. Petersburg, Russia. The tests were performed in a cylindrical vessel 60 mm in diameter filled with water. The emission of high frequency vibrations produced bubbles of air that travelled downward in the vessel and caused heavier-than-air pieces of rubber to rise to the surface of the water. The paper concluded:[22]

> The submersion of bubbles and floating of "heavy" particles can be considered as an effect of vibrational displacement stimulated by the gradient-type asymmetry.

Phase Transition Under Forced Vibrations in Critical CO_2 by D. Beysens, Y. Garrabos, D. Chatain and P. Evesque (2009).[23]

This paper reports on experiments carried out in free-fall in the sounding rocket, MAXUS 7. The purpose of the experiments was to investigate build-ups of liquid and vapor domains of carbon dioxide (CO_2) caused by vibrations.

The experiments produced evidence that with the application of high frequency vibrations, liquid and vapor domains grew horizontally to the initial direction of the vibrations. The experiments also produced evidence of flows beyond the point of commencement of the horizontal flows that were parallel to the original direction of the vibrations.

One may draw from the evidence that collisions in the interface zone between flows of gaseous and liquid CO_2 partially blocked the passage of the liquid state CO_2 and caused it to spread out horizontally to its original direction of flow. One may also draw from the evidence that the remaining portion of the CO_2 passed through the blockage and continued to flow in its original direction.

The paper reports on various elements at play in the artificial gravity process including concentration differences, Brownian movements, evaporation and condensation, the flows and transitions of the liquid and vapor phases of H_2, collisions of gaseous state flows with liquid-state flows, the application of heat, buoyancy, horizontal phenomena, and stabilization.

Faraday Waves on Band Pattern Under Zero Gravity Conditions by T. Lyubimova, A. Ivansov, Y. Garrabos, C. Lecoutre and D. Beysens.[24]

This paper examines the results of experiments carried out in containers carried onboard sounding rockets. The experiments used CO_2 in its gaseous and liquid states or phases.

It was observed that after the interface zone of flows between the liquid and gaseous phases of CO_2 and with the application of high frequency vibrations, a portion of CO_2 flowed in the same direction as the original flow and vibrations. The paper states:[25]

> Concerning fluids near a critical point, the same phenomenon as noted above in Sec. II C occurs: As the wavelength of the instability decreases [frequency increases] when approaching the critical point, enhanced dissipation induces a transition from square pattern to line pattern.

The expression "line pattern" means in line with the direction of the original flow and vibrations—the line of simulated gravity. It was observed that the production of the horizontal bands and flows occurred at the interfaces of liquid and gaseous phases of the CO_2.

It may be inferred from the experiments that the interface areas between the liquid and vapor phases of the CO_2 blocked a portion of the original flow and caused it to flow horizontally to the direction of the original flow, while the rest of the original flow passed on through the blockage and continued to flow in line with the original direction of flow. This may be seen as bifurcation of the flows.

Floating Under a Levitating Liquid by B. Apffel, F. Novkoski, A. Eddi and E. Fort (2020). (the Levitation paper)[26]

As noted, the experiments that underlie the Levitation paper were carried out in a container in a laboratory in Paris. High frequency vibrations were emitted from a mechanical shaker situated underneath the container. The experiments resulted in the remarkable sight of miniature sailboats floating upside down to each other on the top and bottom sides of a levitated layer of glycerol.

The Levitation experiments provide evidence that high-frequency vibrations are an essential element in the process of simulated gravity (called effective gravity in this paper). The vibrations caused the layer of glycerol to levitate and pushed the lower vessel upward into the underside of the glycerol, causing it to float there, upside down, exhibiting an upward buoyancy force equal to the weight of the glycerol that it displaced. Waves in the glycerol surround the vessel.

The experiments demonstrate a causal relationship between the emission of high frequency vibrations and stability and instability of flows within the layer of glycerol. The abstract says:

> Stabilization is the result of the dynamical averaging effect of the oscillating effective gravity. Vibrations of liquids also induce other paradoxical phenomena such as the sinking of air bubbles or the stabilization of heavy objects in columns of fluid at unexpected heights.

And

> Moreover, we predict theoretically and show experimentally that vertical shaking also creates stable buoyancy positions on the lower interface of the liquid, which behave as though the gravitational force were inverted.

The levitation paper attributes the stability of the lower part of the layer of glycerol to the Kapitza effect:[27]

> As mentioned, the vertical vibrations have a stabilizing effect on the lower fluid interface. This can be interpreted as a Kapitza effect, which is the dynamical stabilization of an inverted pendulum by vertical shaking.

The paper attributes the sinking of air bubbles to the Bjerknes force.[28]

> Air bubbles are observed to sink when placed below a critical depth. This behavior, which defies standard buoyance, can be explained by a simple model that takes into account the kinetic force—also called the Bjerknes force—that is exerted on the bubble in the oscillating bath.

Note: What has come to be called the Bjerknes force is set out in the treatise, Fields of Force, by Vilhelm Bjerknes published in 1905.[29]

The miniature sailboat on the upper side of the glycerol is evidently being subjected to the real force of gravity. It is floating, partially submerged, and is being subjected to the force of buoyancy. Waves in the glycerol surround the vessel. The similarities in the situations of the two vessels suggest that the real force of gravity is a pushing force that is energized by high frequency vibrations.

On Dispersion Relation for Faraday Waves in a Near-critical Fluid Under Weightlessness by T. Lyubimova, A. Ivantsov and D. Beysens (2021).[30]

This paper analyzes data from two earlier experiments, one involving CO_2 carried in the sounding rocket (Maxus 7) and the other involving H_2 tested at the Earth's surface.

The paper observes that applied high-frequency vibrations can cause part of the flows of CO_2 and H_2 to change their directions of flow to horizontal to their original directions and cause part of the flows to continue in their original directions. It was observed that these phenomena occurred with the temperatures of the flows being close to their critical points of transition between their vapor and liquid states.

The paper reports:[31]

> Marked deviations from the dispersion relation were, however, observed for temperatures very close to the critical point, where the transition from square patterns to line patterns occurs, similar to what was observed under 1-g conditions.

The expression "line patterns" means in the same line as the original vibrations and flows, the line necessary for the production of artificial gravity.

IV. APPLICATION OF THE CITED EXPERIMENTS TO THE FLOWING AETHER CONCEPT

The Levitation experiment brings into play an inference of similar causes based upon the similar situations of the two miniature sailboats.

In addition, the cited experiments, including the Levitation experiment, show a remarkable consistency between elements observed in the experiments and the elements posited in the flowing aether concept.

The similar situations inference

Observe the images of the two miniature sailboats in the Levitation paper. The lower vessel appears to be pushed into its position as a result of high frequency vibrations emanating from the vibrator. The vessel is floating upside down on the undersurface of the glycerol. Waves in the glycerol surround the vessel. It is partially submerged and appears to be subjected to buoyancy.

The upper vessel is floating on the upper side of the glycerol with waves surrounding it. It too is partially immersed in the glycerol, and therefore subjected to buoyancy. It is clear that the real force of gravity is engaged on the upper vessel and the portion of the glycerol in which it is floating.

The comparison is so striking that one may rationally infer that similar mechanics are at play with each of the two vessels. Thus, the Levitation experiment supports the proposition that gravity is a pushing force that is energized by high-frequency vibrations.

Gravity as a pushing force

The cited experiments provide evidence that simulated gravity is a pushing force. This is consistent with the flowing aether concept that posits that the flow of incoming liquid aether exerts a pushing force on the atomic matter of cosmic bodies.

Brownian collisions

Cited experiments indicate that Brownian collisions are at play in the movements of the fluids used in the experiments. The flowing aether concept posits Brownian collisions as the mechanism that drives both the inflows and the outflows of gaseous and liquid state aether.

High-frequency vibrations

Cited experiments are based upon high-frequency vibrations emanating from vibrators. The vibrations provide the energy that drives the force of artificial gravity. The flowing aether concept is also based upon vibrations. The vibrations are Brownian collisions of aether cells and droplets that flow into and out of cosmic bodies. Brownian collisions are posited as the driving force of the flows of incoming liquid-state aether that cause gravity and outgoing gaseous-state aether that replenishes the aether supply in space. The tiny sizes of aether cells and droplets and their pervasiveness throughout space and bodies are consistent with their Brownian interactions producing short wavelengths (high frequencies) in the gravity process.

Flows of gaseous and liquid state fluids

The experiments that produce simulated gravity or the effects of gravity involve flows of atoms in their gaseous and liquid states. The flowing aether concept posits inflow of liquid state aether and outflow of gaseous state aether as fundamental elements of the gravity process.

Transitions between liquid and gaseous state fluids

The experiments that produce simulated gravity or the effects of gravity involve the process of transition of atomic

matter from gaseous state to liquid state and vice versa. The flowing aether concept posits the same transitions—volatilization and condensation—as essential elements of the gravity process.

Differences in concentration

Experiments observe differences in concentration as the cause of the flows of the gaseous and liquid phases of the tested substances. The flowing aether concept posits imbalances of concentration through volatilization and condensation as the cause of inflow and outflow and the directions of the flows towards cosmic bodies and away from cosmic bodies into space.

Porosity of atomic matter

Cited experiments indicate that portions of the fluids used in the experiments flow linearly through interface areas while other portions are stopped and caused to flow horizontally. The linear flow aspect through the interface areas is consistent with it being permitted by porosity. The flowing aether concept posits that atoms are porous structures that occupy more empty space than the materials from which they are constructed. This porosity is an essential element of gravity being a one-way force.

Gravity as a one-way force

Experiments reported in the cited papers involve substances in their separate states as gaseous and liquid substances flowing through each other. The flowing aether concept posits that cells of gaseous aether and droplets of liquid aether flow through each other. These flows, combined with aether droplets being orders-of-magnitude larger than aether cells, explain why gravity is a one-way force.

Gravity as a cyclic force

The experiments demonstrate that substances in their gaseous and liquid states flow through each other and are caused to do so by differences in their concentrations. The flowing aether concept posits that gravity is a cyclic process based upon liquid state aether and gaseous state aether flowing through each other.

Buoyancy

Cited experiments produce buoyancy effects that are related to flows in opposite directions, up and down. The flowing aether concept posits flows of aether (gaseous and liquid) in opposite directions, up and down. These flows are consistent with the phenomenon of buoyancy.

Horizontal phenomena

Cited experiments produce flows, bands, deposits, vibrations, and Faraday waves that spread out in directions generally horizontal to the initial direction of the flows and vibrations. The articles on the flowing aether concept do not consider horizontal phenomena. However, the evidence of horizontal phenomena is logically consistent with the flowing aether concept. Visualize horizontal phenomena as resulting from blockage or partial blockage of a flowing substance. The substance can be any of those used in the experiments, or it can be aether. To the extent that the flow is blocked, it makes sense that it will be forced to spread out to the sides of its initial direction of travel. It also makes sense that if the flow is only partially blocked, the portion that is not blocked will carry on flowing generally in the same direction as the original flow. This is consistent with the experiments that demonstrate that horizontal phenomena and continuing linear flows occur together.

Try pouring some tap water through an ordinary kitchen sieve. With the right flow and the right sieve, a portion of the water will spread out horizontally on the surface of the sieve and make waves while doing so. The rest will pass through the sieve and continue to flow in its original direction: Newton's second law of motion in operation.

Stabilization

The cited experiments provide evidence of stabilization in the sense of flows carrying on in the direction of the originating vibrations despite partial blockages evidenced by the horizontal phenomena. Stabilization was not considered in the articles that developed the flowing gravity concept. However, the evidence of stabilization is consistent with the concept. Picture liquid-state aether flowing into cosmic bodies and encountering blockages by flowing droplets colliding with atomic matter, thus exerting the force of gravity. The remaining portion that proceeds on through encountered atomic matter remains available to continue to exert gravitational force when or if it ultimately collides with atomic matter.

Stabilization of the direction of flow may be seen as the result of flowing aether droplets being forced to stay in line by the adjacency of the flowing droplets that are collectively moving in the same direction. In effect, stabilization may be viewed as a form of polarization. It may also be viewed as the Kapitza effect based upon the reciprocal movements of vibrating matter and Newton's second law requiring the matter to maintain the same line of movement except where physically caused to change direction.

V. THE AETHER QUESTION

The most fundamental premise of the flowing aether concept is that a subatomic substance called aether in fact exists. This is a disputed premise. Some say that it does exist and others say it does not. The flowing aether concept is essentially based upon the form of aether theorized by Maxwell in 1865 in his treatise, *A Dynamical Theory of the Electromagnetic Field*,[32] that is, a real substance of small but real density that fills space and permeates bodies and is capable of motion and of communicating motion to "gross matter." It is significant that the electromagnetic field equations developed by Maxwell based upon his theory of aether are still in use to today.

Maxwell's theory of aether fell out of use essentially because of the Michelson–Morley experiment in 1887 and papers authored by Einstein in the early 1900s. Although Einstein later recanted his dismissal of aether, experiments and the considered views of numerous leading physicists support the existence of aether. It is fair to say that there remains to this day a majority of the scientific community

that rejects the existence of aether. But it is also fair to say that in the present-day scientific community a significant minority accept the existence of aether.

The experiments reviewed in this article are all based upon tests of atomic substances. None of the cited articles mention that aether might exist and none suggest that aether might play a part in the processes of gravity or simulated gravity.

In the present article, observations made in the cited experiments relating to simulated gravity are compared with essential elements of the flowing aether concept. The rationale for making such comparisons is that, given the propositions posited by the flowing aether concept, namely, that aether a real substance that exists in vapor and liquid states or phases, both of which are fluids, it is rational to assume that the states or phases of aether are subject to the same laws of fluid mechanics as atomic fluids in similar states or phases.

This assumption is contingent upon the premise that there is rational evidence that aether in fact exists.

Is there such evidence? Numerous experiments and analyses provide evidence of the existence of aether and indicate that the "aether-does-not-exist" interpretation of the results of the Michelson–Morley and related experiments is wrong. Experiments provide evidence that (1) aether flows into all sides of the Earth and (2) that the Earth encounters aether in its orbital path around the Sun. These experiments include interferometry tests by A. A. Michelson and E. W. Morley,[33] M. G. Sagnac,[34] D. C. Miller,[35] Y. U. Galaev,[36,37] and Y. U. Munera,[38,39] coaxial cable tests by R. De Witte[40] and R. Cahill,[41] red shift tests by R. V. Pound, G. A. Rebka, J. L. Snider and R. F. C. Vessot et al.,[42,44] and light deflection tests by G. Nitikin.[45]

In addition, various analyses and resulting views of leading 20th and 21st century physicists indicate that aether in some form or other must exist. These scientists include Dirac,[46] Ives,[47] Allais,[48] Wolfram[49] ("nodes" or "cells"), Laughlin[50] ("stuff" and "relativistic ether"), Cornille,[51] Cahill[52] (quantum foam), Wilczek[53] ("ether" and "grid"), and Hooft[54] (cellular automatons).

The cited experiments and certain elements of the flowing aether concept itself provide powerful evidence of the existence of aether. It is helpful to consider these points in the context of space where there is essentially no atomic matter. Consider the following:

- The experiments demonstrate a causal relationship between the emission of high frequency vibrations and stability and instability of flows. Flows require a substance to do the flowing. What is this substance in space where there is essentially no atomic matter? The most likely candidate is aether.
- The experiments demonstrate that the cause and the directions of flows are set by differences of concentration of the flowing substances. How can this be in space without a substance that is capable of flowing and capable of differences of concentration?
- Acceleration is a dominant characteristic of gravity. It is based upon the known phenomenon that when the pathway of a flowing fluid converges, the flow accelerates. The pathways available for the flow of a fluid from space to a cosmic body are constantly reduced from the wide area of space to the limited area of a cosmic body. A flowing fluid requires a substance to flow.
- This simple explanation of gravity being a one-way force is based upon separate states or phases of aether that flow in and out of cosmic bodies. This explanation is consistent with the simulated gravity experiments that evidence flows of gaseous and liquid states of atomic substances. What might that substance be in space where there is essentially no atomic matter?
- The cited experiments tested a broad array of atomic substances, but only one type of wave frequency appears to be common to the production of gravitational effects, that being high frequency waves. This suggests that there must be a common substance that is producing vibrations. A rational candidate is aether.
- Recall the example of a small raft and a large ship being transported at equal velocities in a flowing river. This simple example is consistent with the proposition than in space there is a substance such as aether that is doing the flowing.
- The explanation of how the flowing aether concept provides for the apparent instantaneous gravity between the Sun and the planets depends upon there being a substance that flows toward the Sun and collides with the planets. The logic of the explanation is consistent with the flow being of a real tangible substance such as aether.
- The horizontal phenomena observed in the simulated gravity experiments are consistent with the horizontal phenomena that are observed in association with real gravity. The simple explanation of physical blockage of a flowing substance being the cause of horizontal phenomena is dependent upon there being a flow of a real substance. What might such a substance be in space? Answer: Aether.
- The Kapitza effect. If one seeks a mechanical explanation for the stabilization provided by the Kapitza effect, the explanation can be provided by vibrations that traverse the medium of aether that surrounds and permeates the pendulum or other objects that are stabilized.
- The Bjerknes force. If one seeks a mechanical explanation for the Bjerknes force that causes gaseous bubbles to flow in the opposite direction from normal buoyancy, the explanation can be provided by vibrations that traverse the medium of aether that surrounds and permeates the bubbles.

The consistencies between the evidence provided by the cited experiments and the essential elements of the flowing aether concept are like the pieces of a jigsaw puzzle that fit together and form a picture. The picture they form is of a flowing substance that permeates space.

VI. CONCLUSIONS

In conclusion, it is suggested that the observations and findings in the cited experiments and papers provide considerable support to the flowing aether concept. They do so in

regard to essential elements of the flowing aether concept that are borne out by the experiments, as listed below:

- Simulated gravity involves vibrations as the source of energy. So does the flowing aether concept.
- Simulated gravity involves flowing substances. The flowing aether concept involves flowing substances.
- In simulated gravity, Brownian collisions provide the mechanics of flow. So does the flowing aether concept.
- In simulated gravity experiments, disequilibrium of density sets the directions of flow. So does the flowing aether concept.
- Simulated gravity is a pushing force. The flowing aether concept posits gravity as a pushing force.
- Simulated gravity involves flows of gaseous and liquid substances. The flowing aether concept does too.
- Simulated gravity uses evaporation and condensation for phase changes. The flowing aether concept posits volatilization and condensation for phase changes.

The cited papers and experiments also provide evidence on points that are not in the articles that propose the flowing aether concept, but which support the concept. These points include:

- High frequency waves are an essential element of the simulated gravity process. This is logically consistent with the Brownian collisions within the flows of aether droplets and cells in the flowing aether concept.
- The observed horizontal phenomena (flows, bands, and waves) are logically consistent with gravity being a flowing force.
- The observed continuation of flows in the same line as the original flow after the occurrence of horizontal phenomena is logically consistent with gravity being a flowing force.

Further, the flowing aether concept provides points that are not addressed in the cited papers. These include the four elements listed below:

- a logical mechanical explanation of the acceleration aspect of gravity,
- a logical mechanical explanation of the one-way force aspect of gravity,
- a logical mechanical explanation of the apparent anomaly of instantaneous gravity between the Sun and the planets, and
- a logical mechanical explanation of why gravity acts equally on all objects big and small, light and heavy.

In summary, the cited experiments relating to simulated gravity and the elements of the flowing aether concept support each other in such detail and to such extent that collectively they add substantial weight to the flowing aether concept.

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