

Flowing aether: A concept

Duncan W. Shaw^{a)}

1517 Angus Drive, Vancouver, British Columbia V6J 4H2, Canada

(Received 11 December 2012; accepted 5 September 2013; published online 30 December 2013)

Abstract: The author's article, *The Cause of Gravity: A Concept* [Phys. Essays **25**, 66 (2012)], proposes a physical cause-of-gravity concept. An important element of the concept is that a subatomic substance—aether—flows into and is expelled from cosmic bodies. The present article further develops this aspect of the gravity concept as follows: It describes inflowing aether and expelled aether as two distinct states of aether—thanks to two-state aether proposals of Karim Khaidarov and Héctor Múnera; It uses K. P. Atkins's "trout stream" analog to help visualize aether flowing into cosmic bodies; It considers evidence which indicates that aether flows into cosmic bodies; It explains why inflowing aether exerts more pushing force on atomic matter than expelled aether. This accounts for gravity being a one-way force; It demonstrates how inflowing aether accelerates and does so in conformity with the inverse square rule; It offers evidence of the speeds of inflowing aether; It explains why the planets do not slow down and spiral into the Sun as a result of encountering aether in their orbital paths; It explains the illusion of gravity between the Earth and the Sun appearing to be instantaneous action-at-a-distance. © 2013 Physics Essays Publication. [<http://dx.doi.org/10.4006/0836-1398-26.4.523>]

Résumé: L'article qui s'intitule *The Cause of Gravity: A concept*, [Phys. Essays **25**, 66 (2012)], propose un concept de la gravité qui est tout à fait physique. Un élément important du concept est qu'une substance sous-atomique - l'éther - coule vers les astres et est expulsée des astres. Le présent article développe davantage cet aspect-ci du concept, dans les termes suivants: - Il décrit que l'éther existe en deux états distincts: celui qu'il prend lorsqu'il coule vers les astres, et celui lorsqu'il en sort - inspiré des propositions de Karim Khaidarov et de Héctor Múnera; - Il utilise comme analogie un "ruisseau de truites" (exemple de K. P. Atkins), pour illustrer l'éther qui coule vers les astres; - Il considère des preuves que l'éther coule vers les astres; - Il explique pourquoi l'éther qui pénètre les astres pousse la matière atomique plus que l'éther qui est expulsé dans l'espace; ce qui explique pourquoi la gravité est une force qui opère dans une seule direction; - Il démontre que l'éther qui coule vers les astres s'accorde bien avec la loi du "carré inverse" de la gravité; - Il offre des preuves des vitesses de l'éther qui coule; - Il explique pourquoi la terre en orbite autour du soleil rencontre de l'éther sans ralentir sa vitesse et sans tomber dans le soleil; - Il explique l'illusion de l'apparence de la gravité entre la terre et le soleil comme action-à-distance instantanée.

Key words: Cause-of-Gravity; Aether; Flowing Aether; Inverse Square Rule; Aberration.

I. INTRODUCTION

The physical cause-of-gravity is a long-standing mystery. There is not as yet a theory of the physical cause-of-gravity that is generally accepted by the scientific community.¹ If such a theory is to be found, it needs to start with a fundamental concept.

That author's article entitled *The Cause of Gravity: A Concept*² (the "Cause of Gravity article") proposes a concept of the physical cause-of-gravity. It suggests that a subatomic substance called aether flows into cosmic bodies and is expelled from them, and that gravity is caused by the pushing action on atomic matter by incoming aether less the pushing action on atomic matter by expelled aether. The present article further develops the cause-of-gravity concept, with particular regard to the flowing aether aspect of the concept.

II. THE GRAVITY CONCEPT

The gravity concept as proposed in the *Cause of Gravity* article and in the present article is briefly as follows:

Aether flows in bulk—like a wind. It comes from space and flows into cosmic bodies. As aether approaches cosmic bodies, it converges and accelerates. The aether collides with cosmic bodies and the transfer of linear momentum from the aether to cosmic bodies is the dominant cause-of-gravity.

The energy of the impacting bulk aether is dissipated into cosmic bodies. The energy is converted into heat and the heat causes cosmic bodies to expel individual aether cells into space. The expulsion of aether cells lowers the pressure of aether in cosmic bodies below the pressure of aether in space. The result is that higher pressure aether in space flows into lower pressure aether in cosmic bodies. This flow is like that of a gas that flows from where its pressure is greater to where its pressure is lower.

^{a)}duncanshaw@shaw.ca

The energy that propels the inflow of aether is its own internal energy consisting of vibrations of aether cells and their mutual collisions and rebounding. This energy causes aether to push itself into areas of lesser pressure. The energy is constantly replenished by the energy of the aether cells that are expelled into space from cosmic bodies.

A household vacuum cleaner is an example of expulsion causing inflow. A vacuum cleaner expels air and this creates a partial vacuum inside the vacuum cleaner. As a result, there is a pressure imbalance between the air inside the vacuum cleaner and the air outside the vacuum cleaner. The higher pressure outside air pushes itself into the vacuum cleaner because a vacuum pump causes a pressure differential. In the case of aether, the immense reservoir of high pressure aether in the universe causes its penetration into cosmic bodies where lower pressure exists.

The vacuum cleaner example also explains the phenomenon of gravitational acceleration. Incoming air converges as it flows toward the vacuum cleaner. The convergence causes the inflowing air to accelerate. This is the Venturi effect. The Venturi effect accounts for the acceleration of aether that flows into cosmic bodies.

There are two separate and distinct states of aether. One is aether that flows into cosmic bodies from space. It is a collective form of aether composed of aether cells that tend to hold together, like the molecules of a liquid. The other state of aether is the individual cells that are expelled from cosmic bodies. The expelled cells are separate from each other, like individual molecules of a gas. The collective form of aether is regenerated in space by a form of condensation of expelled aether cells.

Inflowing aether exerts greater pushing force on atomic matter than expelled aether cells. Expelled aether cells are extremely small compared with the collective state of inflowing aether. Because of their tiny size, expelled aether cells tend to pass through atomic matter and incoming aether and therefore exert only minimal collisional force on them.

Gravity is the transfer of linear momentum from inflowing aether to cosmic bodies, less the transfer of linear momentum to atomic matter exerted by expelled aether.

III. THE LE SAGE THEORY

The origin of the idea of gravity being caused by a pushing action goes back to theories developed by Fatio in the 17th century and Le Sage in the 18th century. Collectively, the work of Fatio and Le Sage has come to be known as the Le Sage theory.

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 gravific 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.³

The Le Sage theory has not been accepted by mainstream science. There is, however, a body of present-day scientists who support the Le Sage theory or variations

thereof.⁴ Apart from the proposition that gravity is a pushing force, the present author does not agree with the Le Sage theory.⁵ The gravity concept proposed by the *Cause of Gravity* article and by the present article is fundamentally different from the Le Sage theory. Differences of substance include the following:

- Le Sage corpuscles criss-cross space in all directions at random, whereas in the proposed gravity concept, aether flows in bulk toward cosmic bodies.
- In the proposed gravity concept, gravitational acceleration is caused by the Venturi effect on converging aether. In the Le Sage theory, gravitational acceleration is caused by shadowing.
- The proposed gravity concept is premised upon the density of aether in space being higher than the density of aether in cosmic bodies. This density differential triggers the flow of spatial aether into cosmic bodies. There is no comparable mechanism in the Le Sage theory.
- In the Le Sage theory, corpuscles are not expelled by cosmic bodies; rather, they proceed right on through cosmic bodies and out the other side. In the proposed concept, the expulsion of aether cells from cosmic bodies is caused by the inbound flow of bulk aether.
- Under the proposed gravity concept, aether has two distinct states, collective cells and separated cells. This is not in the Le Sage theory. Note, however, Múnera proposes the idea of “free sagions” and “condensed sagions” as a modification to the Le Sage theory.⁶
- In the proposed gravity concept, incoming aether accelerates toward cosmic bodies, whereas Le Sage corpuscles do not accelerate. They travel at a constant velocity.
- In the Le Sage theory, the speed of corpuscles is many orders of magnitude higher than the speed of light. In the proposed gravity concept, the speed of inflowing aether is relatively slow, generally well under the speed of light.
- In the proposed gravity concept, individual aether cells are expelled from cosmic bodies and join up in space with spatial aether, thereby regenerating the supply of spatial aether. The Le Sage theory has no comparable process.
- In the proposed concept, the ram pressure of incoming aether on atomic matter is far greater than the ram pressure of expelled aether on atomic matter. This is because of the size difference between the collective state of incoming aether and the separated cells of expelled aether. This explanation for gravity operating as an inward force is not part of the Le Sage theory.
- In the proposed aether concept, expelled aether takes away heat caused by the impacts of incoming aether. The Le Sage theory does not offer the same solution to the heat problem.

The above list is not exhaustive, but it illustrates the point that the proposed cause-of-gravity concept is fundamentally different from the Le Sage theory.

IV. THE FIELD CONCEPT

Scientists consider gravity as a “field,” with mathematical vectors within the field indicating the direction and

intensity of the gravity force at any given point. There is no doubt that the field concept of gravity is extremely useful. The fact that we use gravity vectors to plot our way to the Moon, to Mars, and to other planets and bodies in the solar system bears this out. However, mathematical vectors do not explain the underlying physics of gravity. The pushing force of inflowing aether less the pushing force of expelled aether is offered as a physical description of gravitational fields.

Fields as we know them are made up of distinct things. The “things” may be blades of grass or stalks of corn. The proposed cause-of-gravity concept is based upon aether cells, in both their collective and separated states, as being the things that constitute gravitational fields.

V. AETHER

Aether is posited as a subatomic substance that permeates space and cosmic bodies. It has tangible physical existence and can exert momentum on any substance it encounters. It consists of cells that are flexible and compressible and possesses thermodynamic properties of temperature, pressure, and density.

Aether exists in two separate states: (1) a collective state where its cells adhere to each other—much like a fluid; and (2) a separated state where the individual cells are separated from each other—much like the individual molecules of a gas. In its collective state, aether can flow in bulk like a fluid and exert linear momentum on any atomic matter that it encounters. In its separated state, it essentially passes on through atomic matter.

The concept of aether existing in two distinct states differs from the approach taken in the *Cause of Gravity* article. In the *Cause of Gravity* article, inflowing aether and expelled aether are distinguished from each other, with inflowing aether being said to consist of individual aether cells, and expelled aether to consist of the constituent parts of aether cells.

While preparing the present article, the author became aware of the idea of two different states of aether in a paper written by Khaidarov.⁷ Khaidarov calls one state “phase aether” and says that it is made up of separate individual cells called “amers.” He calls the other “corpuscular aether” and says that it consists of groups and domains of large numbers of amers. He employs the phenomena of “evaporation” and “condensation” to describe aether changing back and forth between the two states.

In addition, the author’s attention has recently been brought to a paper by Héctor Múnera entitled, *A Le Sagian Atomic-Type Model for Propagation and Generation of Gravity* (2011).⁸ In that paper, Múnera proposes separate states of aether (he uses the word “sagions”) that he describes as “free sagions” and “condensed sagions.”

The present paper adopts the idea of separate states of aether principally because separate states of atomic matter (gas, liquid, and solid) are known scientific phenomena. A second reason is that the collective state of aether is consistent with aether acting as a medium through which electromagnetic radiation is transmitted, a medium sufficiently

complex to accommodate the phenomena of wave lengths, amplitude, polarization, wave packets, and group velocity.⁹

VI. SPACE

In this article, the word “space” is used to denote the volume of the universe that lies between cosmic bodies. In this sense, space is seen as a combination of absolute void and whatever substances that exist in the void—mainly aether. The void is simply nothing, and therefore has no structure. To the extent that space has structure, it is provided by the substances that occupy the void—again, mainly aether.

VII. FLOWING AETHER

This section focuses upon the inflow aspect of the gravity process. In order to understand the concept of inflowing aether, it helps to visualize the flow of water in an ordinary stream. Consider the diagram of a “trout stream” (Fig. 1) by Atkins.¹⁰

Atkins explains his trout stream diagram:¹¹

“Imagine a rapidly flowing trout stream containing several whirlpools that dimple its surface. A complete description of the flow could be obtained by giving the velocities of the water at each point in the stream. The velocity of a small sample of water located at P could be given as three vectors in a Cartesian coordinate system: V_x , V_y , and V_z . The resulting description of the flow might be referred to as a velocity field.”

Atkins suggests that the trout stream illustrates what is taking place throughout the universe. He suggests that the behavior of the stream is similar to that of a gravitational field. He notes the convergence of the stream’s flow as it approaches the opening of a narrow tunnel under the dam.

Visualize a vessel floating in the trout stream. The vessel goes where the stream goes. When the stream twists and turns, the vessel does too. When the stream converges into a narrow channel and therefore accelerates, the vessel accelerates with the stream.

Picture yourself standing in the trout stream. You feel the pressure of the flowing stream against your legs. You feel that pressure as long as you stand your ground. It is like the pressure we feel from our own weight caused by the force of inflowing aether. Imagine losing your footing in the stream and being swept away downstream. In effect, you are now in a state of free-fall as you are being carried by the flow of the stream. You no longer feel the pressure that you felt when you were standing your ground against the flow of the stream. The stream’s path has become your path.

With the trout stream in mind, picture aether flowing in bulk into the Earth and into the Sun. Figure 2 illustrates these flows.

Then go one step further: Visualize aether flowing into cosmic bodies throughout the universe. See this happening with moons, planets, stars, galaxies, accretion discs, black holes, clusters of galaxies, and all the other material things that exist in space. Think of countless individual flows of

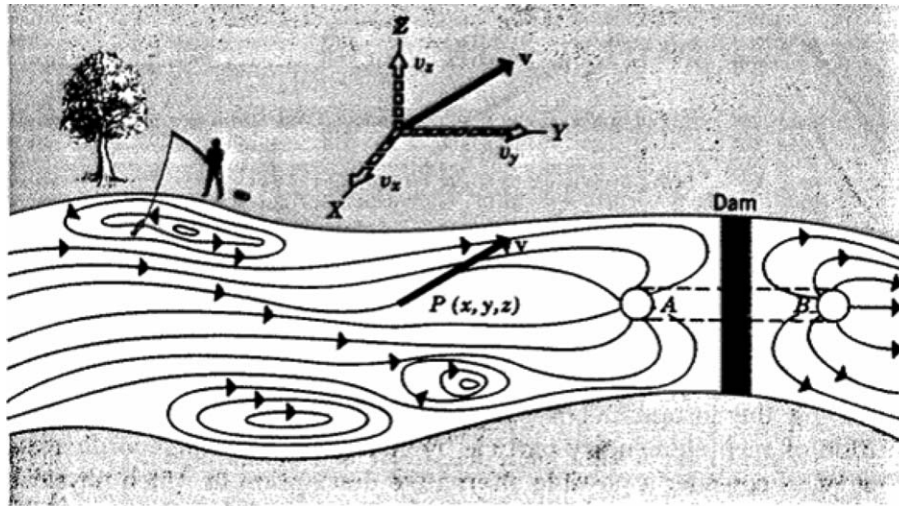


FIG. 1. Atkins's trout stream diagram. From K. R. Atkins, *Physics*, 3rd Edition. Copyright © 1976 by K. R. Atkins.

aether in constant motion, flows that tie cosmic bodies to each other and provide each body with gravitational force.

VIII. EVIDENCE OF INFLOW

A baseball that is tossed upwards and falls back to the ground is compelling evidence of inflow. Something of substance must be pushing the baseball toward the Earth. That "something" must have substance in order to effect the push and it must be moving in the general direction of the push. It is suggested that inflowing aether fulfils this description.

There is considerable evidence derived from experiments that supports the propositions that aether flows into all sides of the Earth and that the Earth encounters aether on

its orbital path. These propositions are drawn from test results and interpretations of data amassed by numerous scientists, including Michelson and Morely,¹² Sagnac,¹³ Miller,¹⁴ Allais,¹⁵ Galaev,^{16,17} DeMeo,¹⁸ De Witte,¹⁹ Cahill,²⁰ Múnera *et al.*,^{21,22} Pound and Rebka,^{23,24} Pound and Snider,²⁵ Vessot *et al.*,²⁶ Atsukovsky,²⁷ Nikitin,²⁸ and Khaidarov.²⁹

The experiments include interferometry tests by Mickelson, Morley, Sagnac, Miller, Galaev, and Múnera, coaxial cable tests by De Witte and Cahill, red shift tests by Pound, Rebka, Snider, and Vessot *et al.*, light deflection tests by Nitikin, and flyby doppler shift observations of spacecraft by Cahill.

The tests have generally been performed for the purpose of determining whether aether exists. Numerous scientists

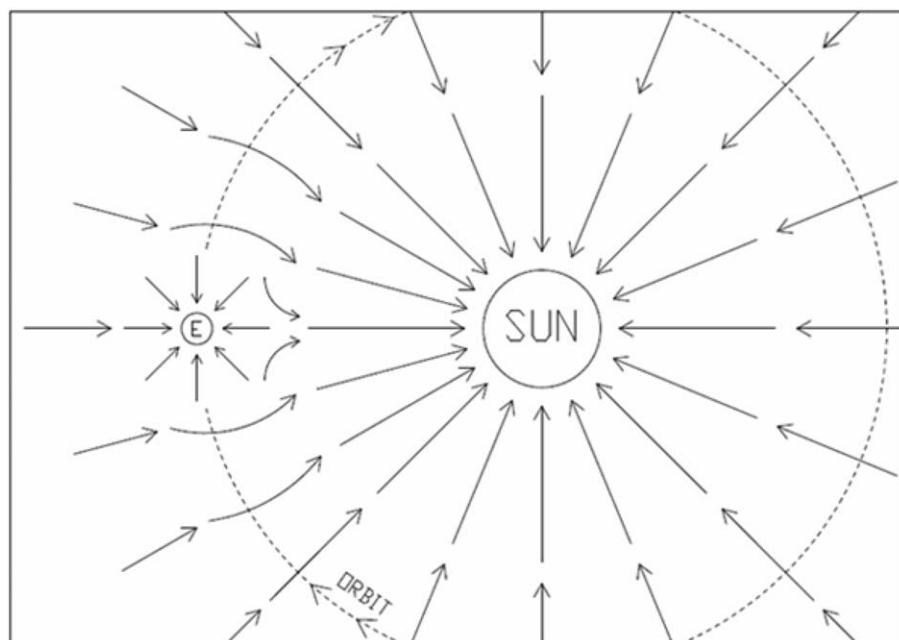


FIG. 2. Inflowing aether.

interpret the test results as establishing that aether does, in fact, exist. The tests are said to have established aether drift—the encountering of aether by the Earth on its orbital path around the Sun.

There is also evidence that aether flows into all sides of the Earth. The two above-cited papers by Galaev indicate both horizontal and vertical vectors to incoming aether. These vectors are consistent with the Earth encountering aether in its orbital path and aether flowing into all sides of the Earth. Cahill has conducted experiments and he has also analyzed the experimental work of Miller and De Witte and others. He concludes that quantum foam (a form of aether) flows into matter. Atsukovsky, Khaidarov, Múnera, and DeMeo are also in accord that aether, in one form or another, enters cosmic bodies from space. Nikitin's observations of light deflection toward the Earth are consistent with the proposition of inflowing aether.

Allais carefully examined the data compiled by Miller and concluded that it supports the proposition of aether drift. Allais also observed in Miller's data a drift component that is perpendicular to the Earth's orbit. From this, he reasoned that the space that surrounds the Earth must be "anisotrope," that is, its actions and characteristics are not the same in all directions. While this is not direct evidence of aether flowing into all sides of the Earth, it is consistent with that proposition.

The experiments of Pound, Rebka, Snider and Vessot and his collaborators are of particular interest. Their experiments were carried out for the purpose of testing the predictions of relativity, and their results are said to have confirmed the predictions. **In fact, the recorded data reveal that the frequency of radiation waves coming into the Earth is higher than the frequency of the same radiation leaving the Earth. While these results may be consistent with the predictions of relativity, there is another conclusion that may be drawn from the data. That conclusion is that radiation travels faster into the Earth than away from the Earth. If one assumes that aether is the medium through which electromagnetic radiation is transmitted, the higher speed of incoming radiation may be viewed as evidence that the medium itself is flowing into the Earth.**

It must be said, however, that a cloud of controversy lies over whether aether even exists. There is a body of opinion that the Michelson–Morley experiment in 1887 and other interferometry tests establish that there is no such thing as aether. This proposition is generally accepted by present-day mainstream science. The present author does not share this view. Experiments carried out by Miller¹⁴ produced data that he contended confirmed the existence of aether drift. This work was subsequently discredited by a team led by Shankland *et al.*³⁰ Since then, the Shankland analysis itself has been convincingly attacked.³¹ The issue remains a continuing source of controversy.

Another concern relates to the observation of gravitational anomalies associated with solar eclipses. The anomalies are generally known as the "Allais Effect." Several articles that deal with gravitational anomalies are published in the book entitled *Should the Laws of Gravitation be Reconsidered? The Scientific Legacy of Maurice Allais.*³²

The articles suggest various and conflicting explanations. The present paper does not attempt to resolve the problem of gravitational anomalies.

In summary, it is clear that there is a substantial body of evidence that supports the propositions that aether flows into the Earth and that the Earth encounters aether on its orbital path. While these propositions remain a source of controversy, it is suggested that they are rational and reasonable, and more likely than not correct.

IX. EXPULSION OF AETHER

The expulsion of aether from cosmic bodies is an essential element of the gravity concept. Reasons why expulsion is essential include:³³

1. Expulsion plays a role in regard to the direction of inflow being toward cosmic bodies. Expulsion creates a continuous partial vacuum of aether in cosmic bodies and it is toward and into the partial vacuum that spatial aether flows.
2. The heat generated by the impacts of inflowing aether, would, if not dispersed be sufficient to incinerate cosmic bodies. The expulsion of aether provides the means to disburse heat into space.
3. Without the compensating factor of expulsion, the constant influx of aether would quickly cause cosmic bodies to balloon in size.
4. Regeneration of spatial aether (aether in its collective state) is essential for the long-term operation of gravity. Expulsion of aether cells provides the continuous supply of cells necessary for regeneration of spatial aether.

X. NET PUSHING FORCE

An essential element of the gravity concept is the proposition that incoming aether exerts greater pushing force on atomic matter than expelled aether. This differential accounts for gravity being an inward force toward cosmic bodies.

As posited, inflowing aether and expelled aether are two separate and distinct forms of aether. Inflowing aether consists of aether cells that tend to hold together and act in concert. Expelled aether consists of individual aether cells that are separate from each other. Aether cells are extremely small and when in their separated state, they tend to pass on through matter—much like neutrinos that rarely collide with atomic matter.

The present article contends that the "collision cross-section" of inflowing aether is far greater than that of expelled aether cells. The concept of collision cross-section dates back to the work of Rutherford in 1911 in his development of the nuclear theory of atoms. Experiments by Rutherford and others were carried out by bombarding atoms with alpha particles. The results showed that atoms had "nuclear cross-sections."³⁴ More recently (1961–1963), the concept has been described by Feynman:³⁵

"The effective "size" of a target in a collision we usually describe by a "collision cross section," the same idea that is used in nuclear physics, or in light-scattering problems."

The present paper contends that the collision cross-section concept may fairly be applied to aether, both in its collective state and in its separated cells state.

It is suggested that the collision cross-section of an individual aether cell must be so small compared with that of billions upon billions of aether cells in their collective state, it is a fair inference that the pushing force of inflowing aether on atomic matter must dominate over that of expelled aether cells.

This inequality of pushing force on atomic matter raises the question of whether the equality of momentum principle is being violated. In fact it is not. It is a matter of where the momentum comes into play. While incoming aether imparts far more momentum on atomic matter than expelled aether, the individual aether cells that travel into space maintain their momentum until they eventually collide and coalesce with spatial aether. It is in space that expelled aether cells mainly exert their momentum.

XI. CONVERGENCE AND THE INVERSE SQUARE RULE

One of the hallmarks of gravity is the inverse square rule. The force of gravity is proportional to the inverse square of the radius from the centre of a cosmic body.

Does the cause-of-gravity concept accord with the inverse square rule? Yes, it does, for the following reasons:

Consider inflowing aether as essentially a perfect fluid. As aether flows in bulk from space toward a cosmic body, the flow is subjected to convergence. This is because the flow is from the broad expanse of space into the relatively narrow destination of a cosmic body. Picture what happens in a river that flows into a narrow canyon. As the flow converges, its velocity increases. The same thing happens in the nozzle of a garden hose. The narrowing flow path causes convergence and convergence accelerates the velocity of the water. This is the Venturi effect. The inflow of aether to a cosmic body is likewise narrowed because all pathways converge as they move towards the body.

In the case of flow into all sides of a globe, the inverse square rule is applicable. This is confirmed mathematically by Cahill in his article *Dynamical Three-Space: Emergent Gravity*.³⁶

In regard to expelled aether, the velocity of its cells is set at the instant of expulsion, and the cells spread out into space just like radiated light. It is accepted physics that the intensity of light diminishes with the inverse square of the distance from the source. In like manner, so does the intensity of expelled aether cells.

In conclusion, after considering both inflow and expulsion, it is evident that the proposed cause-of-gravity concept accords with the inverse square rule.

XII. VELOCITIES OF INFLOWING AETHER

Assuming that aether flows and accelerates into cosmic bodies, can its velocities be calculated? The present article argues that the speeds of free-falling spacecraft returning to the Earth from the moon are evidence of the velocities of

aether flowing toward the Earth. Once the space vehicles cross the line from the moon's gravitation into the Earth's gravitation, no further power is applied to propel them toward the Earth. They travel in a state of free-fall until they reach the Earth's atmosphere. Assuming that inflowing aether is the dominant cause-of-gravity and that the spacecraft are being carried in that flow, the speed of the spacecraft at any given point should be approximately the same as the speed of inflowing aether. Some adjustment is required to account for the force exerted in the opposite direction by the expelled aether cells, but because those cells generally pass on through atomic matter and collective aether, the adjustment is likely negligible.

The velocities of spacecraft returning from the moon have been calculated by Braeunig.³⁷ The calculations are based upon no acceleration power being applied to the spacecraft after they enter the Earth's gravitational area until they reach the Earth's atmosphere. Thus, the spacecraft is in free-fall. The calculated speeds of the vehicles in relation to the Earth vary from about 0.8 km per second at the point where they enter into the Earth's area of gravitation, and rise to about 11.0 km per second where they start to encounter the braking effect of the Earth's atmosphere.

Assuming that the spacecraft are being carried by aether that is flowing toward the Earth, much like a vessel that is carried in Atkins's trout stream, it follows that the speeds of the spacecraft en route to the Earth should be essentially the same as the velocities of the inflowing aether. Thus, for example, the velocity of the aether at the point where the vehicles reach the Earth's atmosphere must be about 11 km per second.

One may therefore conclude that the speeds of aether flowing toward and into the Earth are no more than tiny fractions of the speed of light. The speeds must be higher as aether approaches the Sun, but still very slow compared with the speed of light. One can speculate, however, that inflow speeds at or near a black hole might be at or beyond the speed of light.

XIII. ORBITING THROUGH AETHER

In addition to being pushed by aether toward the Sun, it is assumed that the planets encounter aether as they proceed in their orbital paths around the Sun. In effect, there are two distinct pressures exerted by aether on the planets. The first is that of aether pushing the planets toward the Sun. The second is lateral pressure on the planets from the aether they encounter in their orbits.

If the planets are encountering aether in their orbital paths, then why does the aether not slow them down and cause them to spiral into the Sun?

The answer lies in the proposition that the aether that is pushing planets toward the Sun causes a side-force on the planets in the direction of their orbital travel. The side-force phenomenon is described by Batchelor,³⁸ in regard to bodies that move through a flowing fluid. The side-force is caused by the linear momentum of the aether flowing toward the Sun. The side-force on the Earth is at 90° of the direction of the flowing aether and thus in the direction of the Earth's

orbital path. The side-force off-sets the friction exerted on the planets by their orbital movement through the aether. The relevant passage and diagram from Batchelor's text are set out below (Fig. 3):³⁹

“The remarkable side-force or ‘lift’ on the body, which is the foundation of the theory of the lifting action of aeroplane wings, arises from the combined effect of the motion of the body and the circulation round it, and is independent of the size, shape and orientation of the body.”

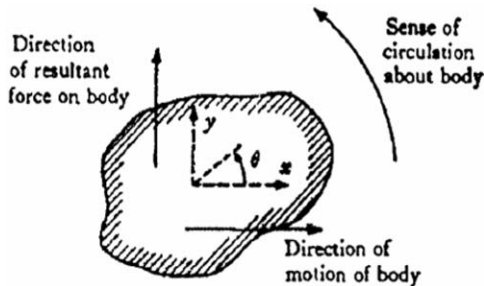


FIG. 3. Batchelor's side-force diagram. From G. K. Batchelor, *An Introduction To Fluid Dynamics* (2010).

There are many factors that are relevant to the calculation of side-force. Amongst others, they include: the effects of acceleration of the aether; the shape of the Earth; convergence of stream lines; the direction of the movement of the Earth vis-à-vis the flowing aether; the rotation of the Earth; the momentum of the Earth; the momentum of the flowing aether; boundary layer separation; vorticity; turbulence; and drag.⁴⁰

Analyzes of these factors and calculations of the side-force are beyond the scope of this article.

XIV. THE ACTION-AT-A-DISTANCE ISSUE

The direction of the force of gravity as between the Sun and the Earth is directly toward the Sun. There appears to be no time delay for the gravitational force to travel from the Sun to the Earth. In contrast, sunlight is subject to significant time delay. It takes 8.3 min for sunlight to travel from the Sun to the Earth. Consequently, when we look at the Sun, we see it where it was 8.3 min ago. The absence of time delay in regard to gravity gives the impression of instantaneous “action-at-a-distance” as between the Sun and the Earth, as if gravitational force is travelling from the Sun to the Earth, with the force being exerted on the Earth at the instant it is sent.

The flowing aether concept provides an explanation for the appearance of instantaneous action-at-a-distance. Visualize aether flowing from outer space toward the Sun. When the flow reaches the solar system and encounters the Earth, the direction of the flow is straight at the Sun. This is illustrated by Fig. 2. Accordingly, when the flow pushes the Earth, it does so directly at the Sun. It is at that instant that the direction of the force of gravity is set. The appearance of

instantaneous action-at-a-distance is simply an illusion. Whatever happens to the flowing aether on the rest of its journey to the Sun, including how long it takes to reach the Sun, has no relevance because the gravitational push has already taken place.

The fact there is no apparent gravitational time delay between the Sun and the Earth is evidence that supports the flowing aether concept of gravity. Why so? Because the concept provides a logical explanation for the apparent anomaly of the instantaneous effect of the Sun's gravity on the Earth.

XV. COCOONING

Refer back to Fig. 2. Note that at the location of the Earth, the diagram illustrates aether flowing into the Earth. That aether is tied to the Earth in the sense that its flow is essentially caused by the Earth.

Figure 2 also depicts aether that is flowing into the Sun. Note that the flow toward the Sun encounters the aether that surrounds and is flowing into the Earth. It is arguable that part of the pushing force of the aether that is travelling toward the Sun is absorbed by the aether that surrounds the Earth. If so, the aether that surrounds the Earth probably cocoons the Earth from part of the pushing pressure exerted by the aether that is flowing toward the Sun.

It is also arguable that the Earth is similarly cocooned from part of the collisional force of the aether that the Earth encounters in its orbital path around the Sun. In other words, the aether that surrounds the Earth may be absorbing part of the force exerted by the aether through which the Earth travels in its orbital path.

Further, it is arguable that the cocooned aether is subject to turbulence,⁴¹ likely from the action of convergence, the interaction of aether that is flowing into the Earth with aether that is flowing toward the Sun, and the usual turbulence associated with a fluid flowing by an object, in this case, the Earth.

In the discussion about the trout stream analogy, an example is posed of a vessel riding in the stream. When the stream changes course, so does the vessel. In large part, the water takes the pressure of the directional changes. One could say that the vessel is cocooned by the water that surrounds it, and that the water is likely turbulent.

Cocooning offers a rational explanation for the measurements of various interferometry tests, starting with Michelson–Morley (1887), being significantly lower than what one would expect if the Earth itself was absorbing the full force of the encountered aether. Because all interferometry tests have been carried out on the Earth's surface, well inside the cocooning aether that surrounds the Earth, it seems likely that this would skew the measurements.

XVI. CONCLUSIONS

The cause-of-gravity article proposes a physical gravity concept that is based upon flowing aether. The present article further develops the concept. It provides visualization of flowing aether by reference to Atkins's trout stream analogy;⁴² it proposes separate states of aether, with thanks

to Khaidarov⁴³ and Múnera;⁴⁴ it considers evidence that indicates that aether flows into cosmic bodies; it explains why inflowing aether exerts more pressure on atomic matter than expelled aether; it rationalizes the pushing force differential of incoming and expelled aether with the principle of equality of momentum; it demonstrates that the concept of aether flowing into cosmic bodies is consistent with the inverse square rule; it explains why the planets do not slow down and spiral into the Sun as a result of encountering aether in their orbital paths; it argues that spacecraft returning to the Earth from the moon provide evidence of the velocities of inflowing aether; and it provides a logical explanation for the anomaly of the Sun's gravity appearing to act instantaneously on the Earth (i.e., action-at-a-distance).

The points dealt with in this article and in the *Cause of Gravity* article collectively support the concept of flowing aether as the physical cause-of-gravity.

¹R. Feynman, *The Feynman Lectures on Physics. The Definitive Edition* (Addison Wesley, Reading, MA, 2006), Vol. 1, pp. 7–9.

²D. Shaw, *Phys. Essays* 25, 66 (2012).

³Ref. 2, p. 74.

⁴*Pushing Gravity: New Perspectives on Le Sage's Theory of Gravitation*, edited by M. R. Edwards (C. Roy Keys, Montreal, 2002).

⁵Ref. 3.

⁶H. Múnera, *Should the Laws of Gravitation be Revisited? The Scientific Legacy of Maurice Allais*, edited by H. A. Múnera (C. Roy Keys, Inc., Apeiron, Montreal, 2011), pp. 385–422.

⁷K. Khaidarov, *Aethereal Mechanics*, 2004, bourabai.narod.ru/mechanics-e.htm.

⁸Ref. 6.

⁹D. J. Griffiths, *Introduction to Electrodynamics*, 3rd ed. (Prentice-Hall, Inc., Upper Saddle River, NJ, 1999), pp. 364–384.

¹⁰K. R. Atkins, *Physics*, 3rd ed. (John Wiley & Sons, Inc., New York, 1976), p. 266. See also: S. Rado, *Aethro-Kinematics* (Aethron Publishing Company, Los Angeles, CA, 1994), p. 126.

¹¹Ref. 10.

¹²A. A. Michelson and E. W. Morley, *Am. J. Sci.* 34, 333 (1887).

¹³M. G. Sagnac, *C. R. Acad. Sci. (Paris)* 157, 710 (1913); *C. Rend. Acad. Sci. (Paris)* 157, 1410 (1913).

¹⁴D. C. Miller, *Rev. Mod. Phys.* 5, 203 (1933).

¹⁵M. Allais, *L'Anisotropie de L'Espace* (Clement Juglar, Paris, 1997).

¹⁶Y. U. Galaev, *Spacetime Subst.* 2, 211 (2001).

¹⁷Y. U. Galaev, *Spacetime Subst.* 3, 207 (2002).

¹⁸J. DeMeo, *Should the Laws of Gravitation be Revisited? The Scientific Legacy of Maurice Allais*, edited by H. A. Múnera (C. Roy Keys, Inc., Apeiron, Montreal, 2012), pp. 285–316.

¹⁹R. Cahill, *Prog. Phys.* 3, 60 (2006).

²⁰R. Cahill, *Should the Laws of Gravitation be Revisited? The Scientific Legacy of Maurice Allais*, edited by H. A. Múnera (C. Roy Keys, Inc.,

Apeiron, Montreal, 2012), pp. 359–372; *Process Physics* (Nova Science Publishers, Inc., New York, 2005), Chaps. 7 and 11.

²¹H. A. Múnera, D. Hernández-Deckers, G. Arenas, and E. Alfonso, "Observation of a significant influence of earth's motion on the velocity of photons in our terrestrial laboratory," *Proc. SPIE* 6664, 66640K (2007).

²²H. A. Múnera, D. Hernández-Deckers, G. Arenas, E. Alfonso, and I. López, "Observation of a non-conventional influence of Earth's motion on the velocity of photons, and calculation of the velocity of our galaxy," in *Progress in Electromagnetic Research Symposium PIERS-2009, March 23–27, Beijing, China* (The Electromagnetics Academy, Cambridge, MA, 2009), pp. 113–119, www.piers.org.

²³R. V. Pound and G. A. Rebka, Jr., *Phys. Rev. Lett.* 4, 337 (1960).

²⁴Ref. 23.

²⁵R. V. Pound and J. L. Snider, *Phys. Rev. Lett.* 13, 539 (1964).

²⁶R. F. C. Vessot, M. W. Levine, E. M. Mattison, E. L. Blomberg, T. E. Hoffman, G. U. Nystrom, B. I. Farrel, D. Decher, P. B. Eby, C. R. Baugher, J. W. Watts, D. L. Teuber, and F. D. Wills, *Phys. Rev. Lett.* 45, 2081 (1980).

²⁷V. A. Atsukovsky, *General Ether-Dynamics* (Energoatomizdat, Moscow, 1990), Chapter 7, English summary at <http://rusnauka.narod.ru/lib/phisic/acukov/3/about.html>.

²⁸G. Nikitin, *Measurements of Variations in the Direction of Light Beam* (2004), translation from Russian by H. Holushko, <http://vixra.org/pdf/1205.0045v2.pdf>, Russian version at <http://www.bourabai.kz/nikitin/measure.htm>.

²⁹K. Khaidarov, *Gravitating aether*, 2004, <http://bourabai.kz/kechanics.e.htm>.

³⁰R. S. Shankland, S. W. McCuskey, F. C. Leone, and G. Kuerti, *Rev. Mod. Phys.* 27, 167 (1955).

³¹Refs. 15 and 18.

³²*Should the Laws of Gravitation be Revisited? The Scientific Legacy of Maurice Allais*, edited by H. A. Múnera (C. Roy Keys, Inc., Apeiron, Montreal, 2012).

³³D. Shaw, *Phys. Essays* 25, 69 (2012).

³⁴H. Semat and J. R. Albright, *Introduction to Atomic and Nuclear Physics*, 5th ed. (Holt, Rinehart and Winston, New York, 1972), pp. 57–65.

³⁵R. Feynman, *The Feynman Lectures on Physics. The Definitive Edition*, Vol. 1 (Addison Wesley, Reading, MA, 2006), p. 43-3.

³⁶R. T. Cahill, *Dynamical Three-Space: Emergent Gravity*, Ref. 32, pp. 359–372, at p. 367.

³⁷R. A. Braeunig, *Circumlunar free return trajectory* (2008), www.braeunig.us/apollo/free-return.htm; *Hybrid Lunar Profile with LOI and TEI* (2008), www.braeunig.us/apollo/hybrid-profile.htm.

³⁸G. K. Batchelor, *An Introduction to Fluid Dynamics* (Cambridge University Press, New York, 2010), pp. 402–427.

³⁹G. K. Batchelor, *An Introduction to Fluid Dynamics* (Cambridge University Press, New York, 2010), p. 406.

⁴⁰G. K. Batchelor, *An Introduction to Fluid Dynamics* (Cambridge University Press, New York, 2010), pp. 398–427 and throughout the text.

⁴¹R. T. Cahill, *Process Physics: From Information Theory to Quantum Space and Matter* (Nova Science Publishers, Inc., New York, 2005), pp. 152–155.

⁴²Ref. 10.

⁴³Ref. 7.

⁴⁴Ref. 6.