Outflowing aether

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Abstract: Two articles by the present author propose and expand upon a model of the physical cause of gravity: [D. W. Shaw, Phys. Essays **25**, 66 (2012); *ibid*. **26**, 523 (2013)]. The model is based upon the proposition that a subatomic substance called aether permeates space and cosmic bodies. The posited aether has two separate and distinct states—as a gas and as a liquid. Aether in its liquid state flows from space into cosmic bodies where it exerts ram pressure on atomic matter. The ram pressure of inflowing aether is posited as the physical cause of gravity. The outflow of aether from cosmic bodies back into space is an essential part of the gravity model. Outflow is needed to replenish the supply of inflowing aether. The present article focuses upon outflowing aether. It argues that: (1) heat derived from the ram pressure of inflowing aether causes it to vaporize or evaporate into gaseous aether; and (2) gaseous aether flows into space mainly by way of convection propelled by the force of buoyancy, and partially by way of diffusion. [http://dx.doi.org/10.4006/0836-1398-29.4.485]

Résumé: Deux articles écrits par le présent auteur proposent et élargissent un modèle de la cause physique de la gravité: [D. W. Shaw, Phys. Essays **25**, 66 (2012); *ibid*. **26**, 523 (2013)]. Le modèle est basé sur la proposition qu'une substance subatomique appelée éther se répand dans l'espace et les astres. L'éther proposé dans l'article a deux états distincts –liquides et gazeux. L'éther dans l'état liquide coule de l'espace vers les astres, où il exerce de la pression dynamique sur la matière atomique. Cette pression dynamique est proposée comme la cause physique de la gravité. Le transport de l'éther vers l'espace est une partie essentielle au modèle de la gravité. Ce transport est nécessaire pour compléter le niveau de l'approvisionnement en éther affluant. Cet article vise l'éther qui coule des astres vers l'espace. L'article soutient que: (1) la chaleur produite par la pression de l'éther qui coule vers les astres cause la vaporisation ou l'évaporation de l'éther en état gazeux; et (2) l'éther gazeux qui coule vers l'espace est transporté en grande partie par la convection propulsée par la flottabilité, et partiellement par la diffusion.

Key words: Cause-of-Gravity; Aether; Outflowing Aether; Vaporization; Gaseous Aether; Convection; Buoyancy; Diffusion.

I. INTRODUCTION

The two articles[1,2] cited above in the abstract propose that flowing aether is the physical cause of gravity. The process is cyclic. Cosmic bodies eject gaseous aether, and it proceeds into space where it condenses into groups or droplets of aether cells (liquid aether). Liquid aether flows back into cosmic bodies, exerting ram pressure on all atomic matter it encounters. The gravity model is strictly mechanical. It rejects the idea of "attraction" as a force, except where it is based upon underlying mechanics of physical cause and effect.

The energy source for inflow is the vibrational, collisional, and rebounding energy of the cells and droplets that comprise aether. For the outflow, the energy source is heat produced by the collisions of inflowing aether droplets with the atomic matter of cosmic bodies.

The gravity model explains why gravity is a one-way force. Outgoing individual aether cells are tiny compared to the groups of cells (droplets) of incoming aether. Because of their greater size, aether "droplets" have a greater tendency than individual aether cells to collide with atomic matter. Think of a fish-net through which minnows can easily pass, but in which bigger fish get caught.

The expression "liquid aether" needs some explanation. Liquid is not meant in the sense of a cohesive substance like water in a glass or in a lake. Rather, it is used in the sense of water droplets in a cloud that acts substantially as a gas. While the aether droplets are substantially larger than the individual aether cells from which they are formed, the droplets are still so small that we are not yet so technically advanced that we can definitively detect the droplets—apart of course from the inference that if gravity is a pushing force, there must be something that is doing the pushing.

The model is similar to the water cycle that produces rain. Water molecules in their gaseous state evaporate and rise into the atmosphere where they condense into droplets—the liquid state of water—and return to the Earth as rain. The force of the rain is felt, whereas the evaporation is almost imperceptible.

The concept provides for angular momentum that keeps the planets accelerating toward the Sun in their orbital paths.

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The angular momentum is caused by ram force exerted by the liquid aether that constantly flows from space toward the Sun. As the aether passes through the areas occupied by the planets, it collides with the atomic matter in and by the planets and pushes them toward the Sun.

The flowing gravity concept explains why gravity is an accelerating force. As inflowing aether proceeds from the vast expanse of space to the relatively small target of a cosmic body, the space available for flow constantly narrows. This causes the aether flow to accelerate, much like the acceleration one sees when a wide river flows into a narrow canyon.

Another example of a substance flowing from a wide area into a narrow area is air flowing into an ordinary household vacuum cleaner. The air accelerates as it moves toward the vacuum cleaner's intake. Put your hand close to the intake and you can feel the acceleration.

The two articles contend that inflow is caused by the concentration and therefore the pressure of aether in space being higher than the concentration and pressure of aether in cosmic bodies. Visualize the weather patterns in our atmosphere: air flows from high-pressure areas toward low-pressure areas.

The cause of the pressure difference of aether in space and aether in cosmic bodies is that cosmic bodies continuously vaporize aether and eject it into space. The vacuum cleaner analog is that the continuous forced expulsion of air from a vacuum cleaner lowers the air pressure in the vacuum cleaner and thereby creates the pressure differential that enables the higher-pressure ambient air to flow toward and into the machine.

While the two articles deal extensively with inflow, they provide little detail of the mechanisms of the outflow. The first of the above-cited articles says, at p. 69:

> "The precise mechanism of outflow is difficult to pinpoint. However, there are a number of means known to science that may be applicable. They include radiation, convection, diffusion, evaporation, super fluidity and rebounding. The scope of this article does not extend to analyses of each of these possible outflow mechanisms."

The present article makes qualitative proposals of the mechanics of the outflow of aether.

II. FUNDAMENTAL CONSIDERATIONS

It is important that the proposals take into account the following fundamental considerations:

1. Collisions of incoming aether with the atomic matter of cosmic bodies produce heat. It has been calculated by Maxwell,[3] Kelvin,[4] and Poincaré[5] that heat produced by the energy associated with a pushing theory of gravity would incinerate the Earth in a matter of seconds if the heat were not dispersed into space. Thus, the process of expulsion of aether must enable the dissipation of heat.
2. To enable inflow to occur, the concentration and therefore the pressure of aether must be lower in cosmic bodies than in space.
3. Without aether flowing back into space and replenishing the supply of aether in space, inflowing aether would diminish and disappear, and bring the gravity process to an end.
4. Without a mechanism for dissipating the bulk of inflowing aether, cosmic bodies would quickly balloon in size.
5. To enable gravity to be a one-way force, outgoing aether must exert less ram pressure on atomic matter than incoming aether.

The proposed outflow mechanics set out below are drawn from the science of fluid mechanics, principally the phenomena of vaporization, evaporation, convection, diffusion, and buoyancy.

III. THE CONVECTION PROPOSAL

The first proposed method of outflow of gaseous aether is expulsion by vaporization or evaporation and transport into space byway of convection that is propelled by the force of buoyancy.

When incoming aether exerts ram pressure on the atomic matter of cosmic bodies, the collisions transmit energy by way of heat to cosmic bodies. This heat and any other heat the cosmic bodies may possess cause liquid aether to vaporize, that is, to change its state from liquid to gaseous. In this process, the vaporizing aether cells absorb heat.

Gaseous aether is less dense than fluid aether. The density difference engages the phenomenon of buoyancy. Buoyancy causes gaseous aether to rise through liquid aether and flow into space. It is proposed that outflow is by way of convection.

An example of a form of convection that is propelled by buoyancy is water vapor that is transported by convection currents from the Earth's surface into the atmosphere.

The gaseous aether that proceeds into space gradually interacts with liquid aether. The interaction involves the latent energy of the gaseous aether in combination with the relative cold and the relatively higher pressure of the liquid aether. This results in the gaseous aether condensing into droplets of liquid aether.

The above steps are based upon phenomena known to science in the field of fluid mechanics. The applicable phenomena are described in passages, referenced below, in *Principles of Heat and Mass Transfer,* seventh edition, by Incropera *et al*.:[6]

- Bulk transport by way of convection (p. 6).
- Convection caused by buoyancy force (pp. 6–7).
- Heat exchange between liquid and gaseous states of fluids; heat transfer by convection (p. 7).
- Energy changes associated with changes of state (p. 15).
- Buoyancy related to density and temperature differences (p. 594).
- Combination of vaporization, buoyancy force and condensation (p. 654).
- Boiling, vapor production and condensation (p. 655).
- Mechanisms of condensation (pp. 673–674).

The proposition that small things (in this case, aether cells) are less likely to strike objects than large things (in this case, aether droplets) is really a matter of common sense. The applicable scientific expression is "collision cross section." In the words of Feynman:[7]

> "The average distance a molecule goes before colliding with another molecule – the mean free path I – will depend on how many molecules there are around and on the "size" of the molecules, i.e., how big a target they represent. 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."

Does the convection proposal accord with the fundamental considerations listed above? Yes it does. Vaporization and evaporation of incoming liquid aether into gaseous aether and the expulsion of gaseous aether reduce the density of aether in and near cosmic bodies below the density of fluid aether in space. Vaporization and evaporation energize aether cells and the outflow of aether cells disperses heat into space. The supply of aether in space is replenished by outflowing aether and by condensation. The tiny separated cells of out flowing gaseous aether have a lesser tendency to collide with atomic matter than droplets of incoming aether. And, outflowing aether solves the problem that cosmic bodies would balloon in size if there was no outflow.

IV. THE DIFFUSION PROPOSAL

The second proposal is expulsion by evaporation and transport into space by diffusion.

The second proposal is similar to the first proposal in the sense that vaporization and evaporation are changes of state from liquid aether to gaseous aether. Where the two proposals differ is in regard to the process of transport of aether into space. The second method posits transport by diffusion, as distinct from convection.

Diffusion consists of migration of sets of molecules that differ in size and concentration. Individual cells of gaseous aether and droplets of liquid aether are considered as analogous to molecules of different sizes and concentration. The proposal is that the cells of gaseous aether migrate into space by diffusion through the droplets of incoming liquid aether.

This proposal is analogous to one of the methods by which water molecules rise into the atmosphere and form clouds. Water molecules evaporate from the Earth's surface and are carried into the atmosphere by way of diffusion.

Reference is made to the following passages from *Principles of Heat and Mass Transfer:*

- Diffusion is a means of mass transfer (p. 935).
- Diffusion is caused by density and concentration differences (p. 935).
- Diffusivity is related to weight and concentration differences (p. 937).
- The direction of diffusion of a gas through a liquid is upwards (p. 942).

Does the diffusion method of outflow accord with the listed requirements? Yes it does. Whether the outflow is initiated by vaporization or by evaporation, both have the effect of reducing the density and pressure of aether at and in the vicinity of cosmic bodies. In the evaporation process, aether cells absorb heat, and in the diffusion process, the aether cells transport heat into space. Outflow replenishes the aether supply in space. As with the convection proposal, diffusion physically transports aether cells into space and thereby counteracts the risk of cosmic bodies ballooning in size. And, the relatively tiny individual outflowing cells flow through atomic matter more easily than the droplets of inflowing aether.

V. DO BOTH PROPOSALS APPLY?

It is likely that both proposals (convection and diffusion) play roles in the outflow process. Both engage the change-of-state of aether from liquid to gas. In each case, a lighter and less concentrated substance (gaseous aether) rises through a heavier and more concentrated substance (liquid aether). Both have counterparts in the water cycle on Earth. Convection occurs when air rises from heating of the Earth's surface and where air is caused to rise by winds flowing up hills and mountainsides. Diffusion occurs when water molecules migrate into the atmosphere.

Assuming that both processes of outflow are at play, what might be the respective contributions of each of them? While it is not possible to determine their precise contributions without the development of sufficiently sophisticated technology that provides data on the detection and operation of aether, it is suggested that the convection process is likely predominant. This suggestion is consistent with the bulk flow idea upon which the inflow of aether is based. Where the velocity of inflowing aether is quite high, as is likely the case with massive cosmic bodies such as stars, the diffusion process may not be sufficiently fast moving to be as effective as convection as a means of transporting gaseous aether into space.

Feynman addressed the essential difference between conduction and diffusion. He said:[8]

> "We turn now to a different kind of problem, and a different kind of analysis: the theory of diffusion. Suppose that we have a container of gas in thermal equilibrium, and that we introduce a small amount of a different kind of gas at some place in the container. We shall call the original gas the "background" gas and the new one the "special" gas. The special gas will start to spread out through the whole container, but it will spread slowly because of the presence of the background gas. This slow spreading-out process is called *diffusion*. The diffusion is controlled mainly by the molecules of the special gas getting knocked about by the molecules of the background gas. After a large number of collisions, the special molecules end up spread out more or less evenly throughout the whole volume. We must be careful *not* to confuse diffusion of a gas with the gross transport that

> may occur due to convection currents. Most commonly, the mixing of two gases occurs by a combination of convection and diffusion. We are interested now only in the case that there are *no "wind" currents*. The gas is spreading only by molecular motions, by diffusion." [Underlining added]

It is suggested that the role of diffusion is probably mostly applicable in the areas at and near cosmic bodies where aether changes its state from liquid to gaseous, and at the condensation stage in space where gaseous aether interacts with liquid aether.

VI. OBSERVATIONS

A unique property of gravity is that it is a one-way force. An important feature of the gaseous aether and liquid aether distinction is that it provides a logical explanation for gravity being a one-way force. It does so in a way that is completely mechanical. One can easily understand that it is easier for minnows than large fish to swim through a fishnet.

The water cycle analog is also significant. As noted earlier, a problem that an inflow (pushing) theory of gravity has to overcome is that the heat generated by the inflow is so great that, without a means to dissipate the heat, the Earth would incinerate within seconds: Maxwell, Kelvin, and Poincaré. The change of the state of aether from liquid to gas and its flow into space provide a rational answer to this problem.

Do the proposed outflow mechanics apply to all cosmic bodies, whether they be stars, planets, asteroids, or other entities? In particular, while it would seem that hot bodies such as stars produce more than enough heat to ensure that liquid aether vaporizes into gaseous aether, would the vaporization process operate on cold cosmic bodies, ones whose temperatures are at or below 2.7 K, the approximate temperature of space? Given the premise that gaseous aether condenses into liquid aether in the cold setting of space, it is suggested that whatever heat is transmitted to cosmic bodies by ram pressure of incoming aether should be sufficient to cause liquid aether to vaporize into gaseous aether, no matter how cold the cosmic bodies may be.

The author has been asked whether the different levels of momentum exerted on atomic matter by incoming and outgoing aether violate the principle of equality of momentum. The answer is no. While it is fair to suggest that the momentum of incoming aether and the momentum of outgoing aether must be about the same, it is not fair to suggest that the incoming momentum and outgoing momentum must be exercised at one and the same place. While the momentum that incoming aether exerts on atomic matter is substantially more than the momentum exerted by outgoing aether on atomic matter, the momentum of the outgoing aether is generally exercised in space where it gradually comes into contact with, and condenses into, liquid aether. There is no law of physics that says that incoming momentum and outgoing momentum have to be exercised in the same place and at the same time.

Do the planets while orbiting around the Sun encounter viscous drag from the aether that is flowing into the Sun? If so, would the drag destabilize the orbits of the planets and cause the planets to spiral into the Sun?

The answer to the first question is yes, there must be some measure of viscous drag exerted on the planets as they orbit through the aether.

The answer to the second question is that the orbital paths of the planets are in part affected, but not destabilized, by aether drag, and that as long as there are sufficient forces at play to cause the planets to form stable orbital paths, the presence of aether drag will not cause the planets to spiral into the Sun. The rationale for this answer lies in the proposition that the shapes and velocities of orbital paths are products of equilibrium of various forces and factors. These forces and factors include the masses of the planets and the Sun, their kinetic energies, the kinetic energy of the flowing aether the planets encounter, the level of encountered drag, and, importantly, the side-force on each of the planets resulting from their encounters with the flowing aether. This list is not necessarily complete. But, it is important to note that the force of drag is simply one force in a broad array of forces that are applicable to the equilibrium process. If all the forces in combination are sufficient to provide equilibrium of the orbital paths of the planets, it follows that the planets will remain in orbit. If any of the factors change, as they have in the past with the evolution of the masses of the Sun and the planets, the paths and the velocities of the orbits will change in accordance with the prevailing state of equilibrium. This reasoning is as applicable to the force of drag as it is to all the other forces that are engaged in the equilibrium process. Put simply, the seeking out and finding of equilibrium is a self-correcting process. So far, with the passage of billions of years of the existence of the solar system, the orbits of the planets have no doubt changed, but they have always remained in equilibrium.

The phenomenon of side-force plays a significant role in regard to the force of drag. These forces tend to counteract each other. Side-force occurs where an object travels through a flowing fluid. Circulation of the fluid around the object creates vortices that provide a measure of thrust to the object along its path of movement and a measure of lift to the object in the direction of the fluid's circulation.

This article contends that aether that is flowing toward the sun exerts side-force on the planets, providing thrust in the direction of their orbital paths and lift in the direction away from the sun.

The thrust aspect of side-force is considered by Batchelor in his textbook, *An Introduction to Fluid Dynamics*.[9] He says, at pp. 433–434:

> "Thus the combination of the translational motion of the body and the circulation leads to a side-force, normal to the body velocity (U,V), as already established; and if the net flux of volume m across the body surface were non-zero and positive, this flux in combination with the translational motion would lead to a thrust, or negative drag, parallel to (U,V)."

Note that in the above passage, Batchelor equates the side-force element of thrust with what he calls "negative drag."

Batchelor also considers the lift element of side-force. He says, at p. 406:

> "This 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 forward motion of the body and the circulation round it, and is independent of the size, shape and orientation of the body."

Examples of side force are the tacking of sailboats into the wind, and lift provided by the wings of an aircraft. While these examples might suggest that side-force should be limited to objects shaped like wings or sails, it should be noted that Batchelor gives as examples for the two above-quoted passages, a cylinder (for the first quote) and a partially round misshapen object (for the second quote).

Where does side-force get its energy? It is suggested that its principal source is the kinetic energy of the aether that is flowing into the Sun, that"side-force" is a stress vector of the momentum of the flowing aether.

Feynman, in his *The Feynman Lectures on Physics,* made an argument against pushing theories of the cause of gravity. His argument was that friction would slow down the Earth and cause its orbit to stop. He said, at pp. 7–10 of Vol. I:

> "This particular idea has the following trouble: the earth, in moving around the sun, would impinge on more particles which are coming from its forward side than from its hind side (when you run in the rain, the rain in your face is stronger than on the back of your head!). Therefore, there would be more impulse given the earth from the front, and the earth would feel a *resistance to motion* and would be slowing up in its orbit. One can calculate how long it would take for the earth to stop as a result of this resistance and, it would not take long enough for the earth to still be in its orbit, so this mechanism does not work."

With respect, Feynman did not take into account the element of side-force, nor did he do so in the context of Nature seeking and finding equilibrium. While his argument is initially attractive, it is incomplete. While the person who is running in the rain may be slowed down by the rain, he will none-the-less continue to run at the slower speed. He will only be stopped if he runs out of energy. In the case of the Earth, the flow of inflowing aether—that causes side-force—does not stop. It is continuous.

Note that Feynman's argument is answered in the present author's first-cited article, at p. 74, and the side-force point is set out in the second-cited article at pp. 528–529.

In conclusion, the choice is whether drag should cause the planets to spiral into the Sun, or whether equilibrium will prevail. Based upon the proposition that side-force provides thrust in the direction of the orbital paths of the planets and lift that is away from the Sun, it appears likely that side-force counters drag on the planets and tips the scales in favor of Nature's tendency to seek and find equilibrium.

VII. CONCLUSIONS

The mechanics proposed by this article for outflowing aether are based upon the proposition that aether exists in gaseous and liquid states, and that the science of fluid mechanics may be applied to aether. Given these premises, this article and the gravity model upon which this article is based offer an array of rational explanations associated with the cause of gravity. The explanations include:

- Why gravity is a one-way force.
- Why gravity is an acceleration force.
- How heat from inflow is dispersed from cosmic bodies.
- How the substance of aether is dispersed from cosmic bodies.
- How aether in space is replenished.
- How side-force counteracts drag.
- What causes inflow.
- What causes outflow.

The rationality of each of these explanations does not of course prove that the gravity model is necessarily correct. But, the explanations logically fit together like pieces of a jigsaw puzzle. A coherent picture emerges, of a cyclic and mechanical model of gravity. Considered together, the explanations lend credibility to the outflow mechanisms proposed in this article and to the overall cause-of-gravity concept proposed in the two cited articles.

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