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Concept of the Universe Creation

Highlights

Dynamics of the Chain Fountain

Gravity in Unitary Quantum Theory

Discovering Thoughts, Inventing Future

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The Dynamics of the Chain Fountain

By Rongqing Dai

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Keywords: chain fountain, mould effect, nonlinear, gravity, speed, tension.

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The Dynamics of the Chain Fountain

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I. The Brief Background

In 2013, science presenter Steve Mould first demonstrated in his video the phenomenon of the so-called chain fountain (Wikipedia [1], Mould 2021a[2],b[3],c[4]), during which a long chain of metal beads with rigid links would rise above the containing jar before it rapidly falls down. The higher the jar containing the chain is placed above the ground, the higher the chain will rise. Accordingly, this phenomenon is named after its discoverer as Mould Effect. Since then, this phenomenon has attracted extensive attention around the world, especially in the scientific community, and quite a few academic papers (Anghel 2020[5], Biggins and Warner 2014[6], Cambridge 2014[7], Flekkøy et al 2018[8], Gibney 2014[9], Pantaleone 2017[10]) and multimedia documents (The Royal Society 2014[11]) have been devoted to this phenomenon, unfortunately, with some fundamental mistakes.

II. The Dynamics

Although the chain fountain is counterintuitive to our common everyday experiences, people might still be tempted to assume that the dynamic cause of it is simply intuitive, as the abovementioned researchers have claimed or indicated; nevertheless, if we delve into the minute details of the motion, we might find that the dynamics of the chain fountain is difficultly simple in the sense that there is no complicated mechanisms or unknown forces involved while the real cause for the phenomenon is obscurely hard to determine, which calls for meticulous examination of all the subtleties behind the ostensible features. So we will start our discussion in the rest of this writing with the analysis of the main characteristics of the motion based on its controlling factors (forces), and then move on to the dynamic analysis.

a) Two Main Characteristics

There are two main characteristics of the chain fountain motion which are important for analyzing the dynamics of the motion, the first is the obvious and basic one, i.e. the rising "fountain" above the surface of the chain holder, and the second is not as obvious as the first one but also observable with careful observation, which (at least in the speed range of all the reported chain fountain experiments) is the acceleration of the motion that is much lower than the gravitational acceleration of a vertical dropping chain. Because of the second characteristics, the chain fountain has been assumed to move in a constant speed by the researchers (Anghel 2020 [5], Biggins and Warner 2014 [6], Cambridge 2014 [7], Flekkøy et al 2018 [8], Mould 2021c [4]).

These two characteristics are of crucial importance for analyzing the dynamics of chain fountain.

b) Controlling Factors

While in multiple cases as shown in his videos, Mould (2021b,c [3,4]) uses a spooler to drive the chain fountain, in this writing, we will not consider the mechanically aided chain fountain. Nevertheless, the primary mechanism revealed in this writing would also apply to the more general cases as Mould demonstrated which will become clear at the end of this writing.

When naturally moving in an open space, the chain fountain would be impacted by multiple factors and some of them would play the controlling roles. The foremost one would undoubtedly be the gravitational pulling power that provides all the energy input after the motion is instigated. The second controlling factor is the holding force from the unmoved part of the chain in the container (we would call it the *payload* to the moving part of the chain). The dynamically achieved balance between these two controlling factors is the primary mechanism for creating the chain fountain.

In addition to those two primary controlling factors, there is another critically important temporary controlling factor, which is also the second energy source for the chain fountain. That is the initial boost of

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manpower when the human hand pulls the head of the chain into the air below the rim of the container. This initial boost, together with gravity, is important for the chain to acquire the initial momentum. The initial momentum would enable the chain to overcome all potential resistances, including the possible resistance from the rim of the container so that the chain could be bounced up into the air to form an arch over the rim (in case the initial boost itself did not create that arch), which is the critical condition for the chain fountain to form.

i. *The influence of air*

Air plays a sensitive role to the chain fountain. A relevant parameter is the relative inertia of the chain over the inertia of air. Although the dynamic balance between gravity and the payload of chain in the container would control the chain fountain phenomenon, when the ratio of the chain inertia over the air inertia is low, the impact of air might dominate and thus the fountain might not be able to form, as evinced by the contrast between the falling chain of polymer beads (Spangler 2009[[12]], Mould 2021a [2]) and the springing chain of metal beads (e.g. Mould 2021a,b,c [2-4]). Given the resemblance of the shapes of those two different kinds of chains of beads, the contrast between their behaviors would automatically point to the ratio of the inertia of the chain over the inertia of air.

But on the other hand, once the inertia of the chain dominates over the inertia of air, the dynamically balanced effect of gravity over the payload of the unmoved part of the chain would dominate the movement of the chain that leaves the container and the fountain would form for a certain range of favored conditions.

c) *Dynamic Analysis*

In the published videos, we might see that the initiations of the fountain are in general quite complicated, depending on the initial boosting speed by the human hand as well as the layout of the chain within the container. The chain might not always move at the boosting speed of the human hand. It could experience an acceleration period after the motion starts, or even a little deceleration, or pretty much stay with a constant speed from the beginning. The pattern of the growth and dying out of the fountain also varies when the initial condition and the layout condition change.

In this analysis, we will focus on the dynamic balance between the gravitational pull and the resistance of the unmoved part of the chain in the container (the payload to the moving chain), by ignoring the air drag and assuming that the chain has already formed an arch across the rim after the motion is instigated.

To further simplify our analysis, we will ignore the impact of the irregularity in the layout of the chain in the container, and thus reasonably assume that the motion would take a regular shape as shown in Fig 1, where the length of the upward moving part of the chain is l_u, of the downward part is l_d, and of the arch is l_a; the shadowed gray area symbolizes the part of the chain that has not been pulled up, i.e. the payload that the moving part needs to pick up, and h is the height of the surface of the pile of chain above the bottom of the container; accordingly, T_p symbolizes the tension between the moving part and the payload part, T_{au} is the tension between the rising part and the arching part, and T_{ad} is the tension between the arching part and the vertically dropping part; the whole chain is pulled down to the ground by gravity G at a velocity V.

Since we assume that the arch has formed across the rim and ignore the air drag, the only forces acting on the moving part of the chain will be gravity and the tension (as denoted by T_p in the schematic) from the unmoved payload part. While gravity is relatively simple in nature, the tension T_p from the payload is most intriguing to our analysis. Although in the existing publications, same as in Fig 1, the interaction between the moving part and the unmoved part of the chain is usually conceptualized as a force acting (and counteracting) at one geometrical point, in fact, in the process of the motion, especially in the initial stage when the chain starts to move at the boost of a human hand, the transition from the moving part and the unmoved part, and accordingly the interaction between those two parts, is more complex than a single point, which would not only account for the complicated irregularities of the motion as we see in the videos but also relate to how the tension T_p would dynamically affect the formation and growth of the fountain.

Philosophically speaking, the most important thing about T_p is not how strong it is pulling the moving part back or how strong its counteracting force is pulling the unmoved part up, but instead, is how loose the pile of the unmoved part of the chain is and thus how easy it could be pulled up. The degree of the looseness accounts for the capacity to balance the increase of the pulling power, which is critical for the formation and growth of the fountain. If the unmoved pile is too loose, the gravitational pull on the falling part would be overwhelmingly dominating and the fountain would not occur; if the unmoved pile is too sticky, the dragging pull from the unmoved pile would take control and the fountain would not form either or would die out quickly after the initial boost; only when the looseness of the unmoved pile falls into a favorable range the fountain could be formed, maintained and growing. Considering that the chain speed stays almost unvaried as reported, the very bead that is picked up would experience a peculiar transition from a sudden acceleration to almost nil acceleration, which indicates that even during the period when this bead is still pulled to accelerate, the pulling back on this bead by the next one behind it would already start to increase; once this bead

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overcomes the friction from other neighboring beads as well as the pulling back of the next one behind it and picks up the upward speed V, the only forces acting on it would be gravity, the upward pulling tension, and the downward pulling tension. After the fountain is formed, as long as the tension T_p from the bead that just picks up the upward speed V upon the rest of the chain stays stable, the height of the fountain would constantly grow. Once T_p starts to drop down for whatever reasons (e.g. the motion reaches to the very last layer of the beads in the container), the height of the fountain would start to decrease as shown in the videos.

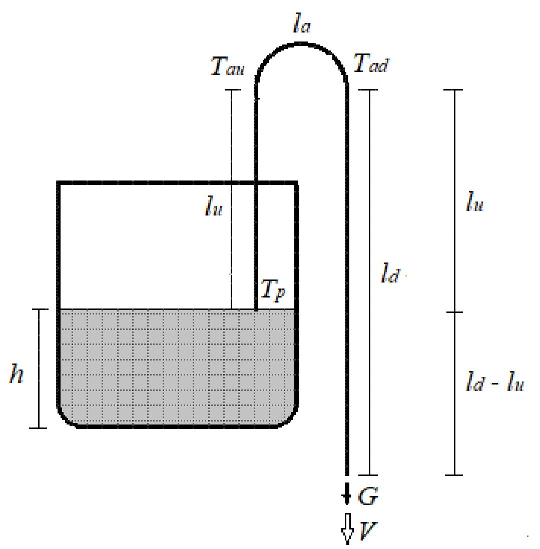

Fig. 1: Schematic of the fully developed growing fountain

i. *The mathematics behind the chain fountain*

By ignoring the irregularity of the motion and assuming a regular shape of motion as illustrated in Fig 1, and ignoring air drag, from the energy conservation and Newton's laws, we might write down a set of equations to model the dynamic relationship for the chain fountain as follows:

$$\rho(l_u+l_d+l_a)\frac{dV}{dt} + \rho(l_u-l_d)g + T_p = 0 \quad (1)$$

$$2(l_u+l_d+l_a)\frac{dV}{dt} + V\frac{d}{dt}(l_u + l_d + l_a) = 2g(l_d-l_u) \quad (2)$$

$$\frac{d}{dt}(l_d - l_u) - \frac{dh}{dt} = V \quad (3)$$

$$\frac{dh}{dt} \approx -\frac{1}{n}\frac{d}{dt}(l_u + l_d + l_a) \quad (4)$$

$$\rho l_a\frac{dV}{dt} + T_{au} - T_{ad} = 0 \quad (5)$$

$$\rho l_d\frac{dV}{dt} - \rho g l_d + T_{ad} = 0 \quad (6)$$

$$\pi\rho V^2 - \rho g l_a - \pi (T_{au} + T_{ad}) = \rho\frac{d}{dt}\left(\frac{d}{dt}l_a\right) \quad (7),$$

where g is the well-known gravitational acceleration, and $n = (\frac{R}{r})^2$, R is the radius of the container, and r is the radius of each bead.

Obviously, due to the complication of the tension between the payload and the moving chain, we might need to add one more equation by assuming the behavior of T_p. However, even if we do so, we would still face a set of highly nonlinear differential equations.

In the existing publications, researchers normally assume a so-called steady motion, i.e. omit the time dependency of certain variables, which would greatly reduce the mathematical difficulty, but in the meantime they would also miss the subtle and critical impact of those variations upon the whole dynamics as will be discussed below and thus would miss the dynamic view of how the fountain would grow.

In this writing, we use the above set of nonlinear equations only to help us to appreciate the sensitive complication of the relationship between the involved variables and assist our qualitative (metaphysical) analysis without solving the above equations.

ii. *The myth of the hidden extra kick-off force from the bottom*

Mould (2021 a,b,c [2-4]) and some other researchers (Biggins and Warner 2014 [6]; Pantaleone 2017 [10]) have a strong faith in the kick-off effect by some force from the bottom of the container that would somehow lift the chain up to form the fountain, which is obviously implausible since it is in conflict to the natural law.

As we know, when being impulsively impacted the bouncing back effect would be weaker than the impacting momentum due to the damping effect (e.g. when throwing a ball into a puddle of mud, it would not be bounced); therefore, to support a momentum of mV, with m being the mass of a bead and V being the velocity of the chain, we need a momentum greater than mV. According to the literature, the speed V would be at the order of 10m/s or even greater (as attested in the videos), which tells that we need a bead to hit the pile of chain or the container at that level of speed to acquire a bouncing back momentum to support the fountain, obviously we don't see that kind of impact in any of the videos.

Further, for the bouncing back force from the bottom to be transferred to the top of the fountain so that it could grow, we need to have collisions between the beads from the bottom all the way up to the top of the fountain, but even in the mathematical modeling of the proponent of the kick-off force mechanism (Biggins and Warner 2014 [6]), the internal force in the upward moving vertical part of the chain is treated as tensile instead of the colliding pressure between the beads.

The kick-off theory has been challenged by other researchers (Anghel 2020 [5], Flekkøy et al 2018 [8]) as well. Nevertheless, their treatment of the chain fountain as a steady (or even stationary) motion causes them to miss the real mechanism of the chain fountain as will be discussed in the next section.

iii. *The sensitive role of the time-dependent terms*

The highly nonlinear mathematical relationship has hindered the efforts from all the previous researchers to obtain a satisfactory mathematical solution to convincingly account for the dynamics of the chain fountain so far. An obvious common defect of the reported mathematical modeling (Anghel 2020 [5], Biggins and Warner 2014 [6], Flekkøy et al 2018 [8]) is their assumption of the steady (or even stationary) state of the motion, which is equivalent to assuming both $\frac{dla}{dt}$ and $\frac{dV}{dt}$ in the above set of equations to be nil. Although it seems that the variations of those physical quantities are quite mild during most part of any of the chain fountain demonstrations, the complete omission of the time dependency of those quantities could create logical conflict. The reason is as follows.

When the chain fountain is in a steady state, assume n is large, from the above set of equations we would have the following:

$$T_p = \rho g(l_d - l_u) \qquad (1')$$

$$2(\frac{d}{dt} l_d) = V + 2g(l_d - l_u)/V \qquad (2',3',4')$$

$$T_{au} = T_{ad} = \rho g l_d \qquad (5',6')$$

$$\pi \rho V^2 - \rho g l_a = \pi (T_{au} + T_{ad}) \qquad (7')$$

Here the biggest trouble is (1'). Since l_d-l_u would continue to increase all the way to the end (if the chain is infinitely long, the l_d-l_u would grow infinitely), the pulling force T_p between the upward moving part of the chain and the payload will constantly increase according to (1'). This would entail a constant increase in the momentum picked up by the bead that starts to move from rest, and this would further entail an accelerating upward movement of the chain, which would conflict with the assumption of a steady motion, although it might apparently support the kick-off theory with an constant upward propagating longitudinal wave (which would violate the natural law and thus never appeared in all the videos).

In the meantime, for a constant V, as more of the chain drops below the container, $2g(l_d$-$l_u)/V$ in (2',3',4') would continue to increase, and this would indicate an accelerated dropping of the chain (and thus an increased V), which does not seem to happen in the videos and thus it indicates that the growth of the fountain would also cancel out the accelerated increase of l_d.

Therefore, in order to correctly account for the dynamics of the chain fountain, we cannot just simply assume that the movement is in a steady state even if the acceleration might appear to be very small compared to the gravitational acceleration g for a free falling. This is because the time-dependent terms, no matter how small they might be, would play a sensitively critical role in the development of the fountain.

III. Conclusion and Final Remarks

The famous chain fountain that has baffled the public and the scientific community for nearly a decade is pictorially simple but dynamically obscure in a very sensitive way. Its apparently unchanging speed during most of the motion in all the reported experiments so far has been misleading the researchers to ignore the dependence of the fountain upon sensitive temporal variations. The logical fault in equations (1') to (7') resulting from the elimination of the time derivatives of the chain speed and the size of the arch as discussed above in fact points to a process of subtly sensitive adjustment of both the height of the fountain and the speed of the chain, through which (the tendency of) the increase of the tension T_p between the upward moving part and the unmoved payload would be soon dissolved by the minute acceleration of the upward moving part itself due to the increased pull from the increased momentum of the downward part, which ends up with some minute growth of the fountain, and as an exchange, the speed returns to pretty much the same as before since the increased height (and thus weight) of fountain would cancel the added acceleration of the upward moving part and also offset the increase in the tension T_p between the upward moving part of the chain and the unmoved payload. When the motion is near its end, i.e. the moving part of the chain touches the bottom of the container, due to the reduction in the resistance of the payload to the upward pulling force, the fountain would in fact shrink instead of intuitively supposed growing further according to (1'), due to the less effort needed for the downward moving part to bring down the height of the fountain.

In fact, the whole chain fountain phenomenon is an excellent example of how nature would automatically find the most favorable way to release its potential energy. First, without the arching across the rim of the container, the movement of the chain would dissipate more energy due to the bumpy course caused by the collision between the beads and the rim, which indeed would create more entropy with less kinetic energy transferred from the original potential energy of the beads. Accordingly, when the downward moving momentum reaches certain amount, the bumpy interaction of the beads with the rim would bounce the chain up into the air to form the arch;

Second, after the arching appears (which would cause the resistance to drop down suddenly), the chain would not fall back to the bumpy course of movement and the arch would grow, which tells that the bounce-up triggered by the bumpy collision is not the only cause to push the chain up into the air, there is more profound dynamic reason behind the formation of the arch; Third, if the chain is not initially placed in a container but rather on a smooth table, and the chain is not very long, then there would be no fountain, as shown by Mould (2021b [3]), although when the roughness of the table and the length of the chain reach certain values, another type of arching would appear as discussed by Hanna & Santangelo (2012 [[13]]). On the other hand, if the chain is nailed to the bottom of the container somewhere in its middle, then even after the arching is formed it will die out quickly once the uprising point moves close to that fixed point. Therefore, only when the resistance to the movement of the chain is mildly great would the arching stay and grow.

Fourth, as mentioned earlier, the growth of the fountain provides a mechanism to avoid an overwhelmed increase of the pulling tension between the upward moving beads and the unmoved payload. In fact, the upward pulling tension on the payload could also be alleviated by an acceleration of the chain, which would have indeed quickly happened from time to time at the very beginning and during the motion when there is still some space for the beads to relax in the neighborhood of the pile of the chain, as long as the tension in the chain has not yet reached its tolerable maximum. But those moments would be very short if the chain is solidly piled.

As a conclusion, *the chain fountain appears and grows as the consequence of the sensitive dynamic balance between the gravitational pulling power on the downward moving part of the chain (boosted by the initial human pull) and the mild resistance of the unmoved pile of the chain in the container, and thus not driven by any other kind of mythical hidden forces. If the resistance in the container is either too high or too small, the fountain would not appear or would die out quickly*; *besides*, *if the inertia of the falling chain is too small compared to the inertia of air, the fountain would not appear.*

Metaphysically, the chain fountain phenomenon manifests a profound approach of nature to manage energy and entropy to achieve certain principles. The presentations of both Mould and Hanna & Santangelo for two different types of movements of chains on a flat surface, together with the chain fountain phenomenon, reveal an important reason for the arching (and thus the fountain) to occur: *when the movement is hindered for some reason, nature could manage to make sensitive dynamic adjustment so that the conflict between the driving cause and the hindering cause might be alleviated so that the movement would continue more smoothly.*

In the case of the chain fountain as discussed in this writing, the driving cause is the difference between the lengths of the dropping part and rising part of the chain, which is counteracted by the resistance of the payload in the container; accordingly, nature raises the chain into the air to reduce the magnitude of the driving cause so that the driving cause and the hindrance would be relatively more balanced. Obviously, with the same dropping speed *V*, as the result of the struggle between the gravitational pulling force and the resistance of the payload, the formation and growth of the fountain help to maximize the amount of the chain running out of the container before the whole chain drops onto the ground, compared with the scenario when there would not have been the fountain. This mechanism could be conveniently extended to more complicated fountain cases as demonstrated by Mould (2021b,c [3,4]).

In the case of the arching on the table investigated by Hanna & Santangelo, the arching in the middle could reduce the total friction and slightly increase the speed of the chain. Even with the same total speed, the formation of that arch could speed up the reduction of the size of the original cluster a bit.

a) *A More General Law*

Further from the above-discussed arching phenomena in the natural domain, we might even find patterns similar to the chain fountain in the social domain. With different social resistances or social inertias, the social effect of a political or economic drive initiated by the influential agents upon the society might well be beyond the expectations of the initiators. Although the initiating agents might still manage to drive the (human or material) energy to their targeted destinations, it might spawn some severe or even violent side movement (similar to the chain fountain). On the other hand, sometimes, we might wish the chain-fountain-like induced side movement to occur in order to speed up the flow out of a troubled area.

Similar to the mechanism of chain fountain, the side movement in the social domain might not happen if the resistance is too strong (so that the original drive would be completely ignored) or the resistance is too weak, or there is some other colossal restrictive power in the environment (similar to the case when the air drag is overwhelming). The difference is that with the natural chain fountain, the whole chain would finally end up on the ground in general, while in the social domain, the side movement might have a big chance to turn into a game changer and replace the original movement to become the main course. Nevertheless, a good understanding of the mechanism of the chain fountain in the natural domain could assist us to better understand or predict the chain-fountain-like occurrence in the social domain.

With the realistic generality of the mechanism behind the chain-fountain-like phenomena in both the natural and social domains, we actually see a general law which could be stated as: the consequence of the struggle for a dynamic balance between the driving cause of a movement and its resistance could spawn a (violent) side movement, in case the driving cause is neither too weak nor overwhelmingly strong compared with the resistance, plus there is no other dominating environmental factors.

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The Gravity in Unitary Quantum Theory

By Leo G. Sapogin & Andrew A. Kostin
Technical University (MADI)

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Keywords: unitary quantum theory, general relativity, special relativity, maxwell equations, lorentz transformations, equation of john wheeler and bryce dewitt.

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Leo G. Sapogin [α] & Andrew A. Kostin [σ]

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It's always there where payment is higher.

A. Pechorina

I. Introduction

It seems Gravitational theory should follow from 32 nonlinear integro-differential equations of UQT and the author is expecting that it can be done in future [1-4]. Nevertheless, we will make now some conservative assertions. The current data regarding the Universe expansion can be interpreted as the change of the gravitational potential sign (gravity is replacing by repulsion) at great distances for the great masses. Probably the difference between absolute the values of electric charge of a proton and an electron, say in 15-20 signs, is responsible for his phenomena, but for us this idea is extremely unsympathetic. Gravitational interaction remains an extraordinary mysterious appearance in UQT as actually it has a very high speed of interactions distribution and approximately is in times weaker than electro-magnetic interactions. The origin of such an enormously big number remains the greatest riddle. On the other hand, if any particle is a package of partial waves of some uniform field, probably is possible a following curious phenomenon which was observed and described by us more than once earlier [4, 23]. If to put a ditch with the substance having abnormal dispersion on a way of the wave package moving in flat Euclidean space, the package after ditches can appear even if it is situated at distance of many light years from a package as formally mathematically harmonious components exist on all infinite rectilinear coordinate of package movement as ahead of it, and behind.

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Thus the package can disappear in that place where it was, and to appear at huge distances ahead of a package, or behind. Thus the package didn't move at all between points of disappearance and new appearance, and the normal idea of speed in the unitary quantum theory loses its initial meaning. Similar teleportation was observed of ten times. Probably, it is actually a long-range action, (couple longue distance) observed in gravitation. A curious though appears that the waves building a package, could be connected with gravitation and all particles consists of a gravitational field. Then this field can be a stage or a scene where all other processes with final speeds of interaction transfer are played. It will allow connecting the quantum theory and the gravitation theory which while aren't connected yet today in the future. But it is a task for the future generations. At the same time according to the processed information (Hlistunov at all [5]) from Russian Command-and-Measuring Complex for the monitoring and control of the space objects at the entire moment of collision geodesic satellites "Tope-Poseidon" and "GEO_IK" began swaying at their orbits. Normally the orbit of a geodesic satellite lies inside the tube with about 1 km diameter and the orbit can be control with the high accuracy not more than one-meter precision for the position data and centimeters per second for velocity. During the collision the sensors registered 5-8 times increase of the trajectory tube diameter. In the same article Hlistunov [5] at all on the basis of correlation analysis of the position data measurements and information obtained from earthquake-detection station it was shown that the waves of gravitational potential variation were the trigger for earthquakes. With other hand official science in Russia did not know about it [5, 6].To the author regret they do not have the similar information from NASA.

II. The Short History of Gravity

The force of gravity is one of the most mysterious phenomena in science. Despite being discovered many years before, Sir Isaac Newton first clearly demonstrated its applicability to the description of nature. In 1693, seven years after "Principia" publication, Newton expressed his view on gravitation in his letters to R. Bentley: "*You sometimes speak of gravity as essential and inherent to matter. Pray do not ascribe that notion to me, for the cause of gravity is what I do not pretend to know, and therefore would take more time to consider of it.*" It seems that in nature everything happens if particles are attracted by each other proportional to the product of their masses and inversely proportional to the square of their separation distance. Newton's Gravity Law should be considered the simplest expression of all celestial bodies' movements. In other words, Sir Isaac Newton categorically declined to consider the entire mechanism of interaction, moreover the phrase: «*I do not fabricate hypotheses*» can be ascribed to him. Newton at the end of "Principia" wrote: "*I could not to deduce the cause of gravitational properties from natural phenomena, but I don't like to fabricate hypotheses*". Despite Newton's genius, other researchers also tried either to find an explanation of the attraction mechanisms or to explain it by other phenomena.

III. A Modern View of Gravity

Albert Einstein believed that planets move in a straight line, but space itself is curved by Sun field. However, the great mystery of instant action at remains unaccounted for... Einstein didn't know this, he believed that gravity propagates at the speed of light. He said [7] "*… if the Sun were suddenly ripped out of the Solar System, the Earth would leave its orbit only 8 minutes later, the time necessary for light to reach Earth from the Sun…*". In this case, according to Laplace, a stable Solar System cannot exist at all. Moreover, serious researchers have little faith at all in gravitational wave detection, because these experiments have very different explanations [22]. The rate of propagation of gravity, if not infinite, must at least be enormous. Laplace was the first [9] who tried to elucidate this question mathematically. He proved that if the propagation rate of gravity was equal to light speed, then some significant perturbations should appear in the elliptical movement of all planets around the Sun, including the Earth. For example, longitude of periapsis of the Earth in its orbit would increase by 20` each year. In fact, within the bounds of the accuracy of modern measurement techniques, the Earth's orbit deviates no more than 2`` per century, so the rate of gravity is at least 70 million times faster than light speed.

The situation in GTR (the gravitation theory) is even more scandalous. The author does not regard themselves as the coryphées in the fields of Riemann's geometry and tensor analysis; nevertheless, they are quite confident that GTR by all means bears most profound ideas of physics that will undoubtedly retain in the future theory of gravitation. But, in fact, the conception of the dependence of space properties on the distribution and motion of masses was for the first time put forward and developed by Jacobi in ... 1848. Then this conception was further expanded in the works of a whole plead of such physicists as Lipke, Bcrwald, Frank, Eizerhard [10-13]. Nowadays we understand that the spectrum of masses and the fine structure constant [1, pages 58, 64] owe their appearance only to geometry and to the properties of space. The fact that any motion is regarded as absolute in UQT is highly positive for this theory, as was for the first time noted by Academician A. Alexandrov [13] at the All-Union Conference "Space and Time in Modern Physics" in 1959. He said that "*our issue is particularly about a mathematical theorem and, therefore, the statement that the theory is based on "the general relativity principle" (whose senselessness was admitted by Einstein as far back as in 1916) is equal to someone's allegation that "the Einstein theory relies on the general law according to which 2x2=5...Therefore, GTR rather does eliminate the relativity of motion than extends it from inertia I motions to any accelerated ones* ".

Still many leading scientists, both in Russia and abroad, definitely deny GTR at all. The President of the American Physical Society and the Nobel Prize Winner Prof. E. Wigner stated as a well-approved fact [17] that "*…such fundamental physical concepts as a coordinate and an impulse, which might be assigned any random initial values, do not bear any physical sense within the frame of GTR* ".

Vice-President of the Russian Academy of Scientists Acad. A. Logunov [15] proves that no physical sense is borne by such fundamental physical value as mass within the frame of GTR. Moreover, he wrote unambiguously that "*the energy-impulse tensor in the Einstein theory - has the same relation to physics as does the last-year snow to the mystery of the Tunguska Event*". When speaking to the UNESCO session in March 1986, Acad. A. Logunov suggested that some special international agreement should be created for expelling GTR from research as one having nothing to do with natural sciences. His article in a magazine ("Tekhnika Molodezhi", No 10, 1986) carries his opinion that "*the energy-impulse vector is always equal to zero in GTR and GTR no concept of energy can be found there*". Theory will be entirely useless if not supported by appropriate experimentation. As regards the quantum science, theory and experiment in it show coincidence with an accuracy of 6 to 9 significant figures. Unfortunately, GTR cannot boast such coincidence. We shall briefly analyze main direct experimental confirmations of the theory. Three of those are the most important. The other ones can be liable to another classical interpretation.

1. The deviation of a star beam in the Sun's gravitational field during solar eclipse. GTR predicts a 1.75" deviation of the stellar beam whereas the Newtonian theory stands for a value two times as small. The Sun has an immense plasma cloud over its surface, which also deflects the light and this deflection is tens of times larger than the predicted effect is. The plasma cloud's parameters are unknown and surely similar predictions are made to achieve needed results. The same considerations

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work when quasar radio emissions in the Sun's field are measured.

2. Expansion of the Universe according to the Hubble law. The Hubble constant has changed by orders of magnitude since the observations started but all the time it corresponds to the theoretical predictions (!).
3. The motion of the perihelion of Mercury. It has been for long known in observational astronomy that owing to other planets' gravitation Mercury's motion is not simply elliptic but the planet travels along an ellipse that rotates for 575" every hundred years. Corrections based on the Newtonian theory make it to be 532". The remaining value 43" cannot be interpreted within the frame of the Newtonian theory. Not exactly... It takes the Sun about 30 days to make a full rotation on its axis.... That is why it is a bit oblate (like the Earth) ... Then the Sun's gravitational field will rely on the angle (with no spherical symmetry), and Mercury's trajectory will certainly make a turn... We do not insist that this deviation will be 43" but it will of course exist. To solve the problem correctly, one needs to know what the Sun's polar and equatorial radius, which have never been measured and no one knows the way to measure them... Everybody keeps silent about this fact for 43" is considered to be excellently accounted for in terms of GTR...

Not long ago the situation grew absolutely scandalous... The collection of articles "Unsolved Problems in Special and General Relativity " (Chief Editor Florentin Smarandach, USA) might be referred to as a requiem for the Special and General Relativity theories. The authors are an American, a Russian, the rest are the Chinese. All of them cannot be called engaged persons. The first article of the Collection, "Einstein's Explanation of Perihelion Motion of Mercury", is by Chinese mathematician Hua Di [17, page 5]. The author pointed to a rude mistake made by Einstein when calculating the error of 43" by way of integration, and the result must have been not 43" but 71.5". We were so astonished that rushed to make sure whether it was so. Sad to say this, but we all had the same result 71.5". See last calculation [18]. The above-laid considerations reflect a completely dismal general physical picture of the world. If this picture is further accepted in the scientific community, then many countries will continue wasting their time and money in empty projects like the International Reactor for Thermonuclear Synthesis, Large Hadrons Collider and the like. The now existing army of "brother's talc-tellers" will depict for us more and more fantastic physical scenarios. Amazed people will listen to these breathtaking stories about parallel universes, worm holes, the teleportation of large objects, travelling in time, horizontal events, proof fantastic theorem about destroy information in Black Hole and any other stuff like this, and demand more and more money from their Governments for putting up new shows. Leaders of states must remember that "*the viability of any idea is determined by the quantity of people feeding on it*".

As we'll soon see, Unitary Quantum Theory - UQT generally eliminates the question of the rate of gravitational propagation. All we know leads us to the recognition that every particle demonstrates its existence in every corner of the universe, yet this phenomenon is completely beyond explanation without UQT. According UQT [4] each particle is a single wave packet (field clot, bunch) – the function *f(r-vt)* is part of equation (1) for the UQT wave function.The UQT wave function differs from standard wave function of quantum mechanics by multiplicand of running structured function:

$$\Phi(\boldsymbol{r},t) = f(\boldsymbol{r}-\boldsymbol{v}t)\exp(i\frac{Et}{\hbar}-\frac{\mathbf{Pr}}{\hbar}) \qquad (1)$$

Structured function *f(r-vt)* of wave package nulls de Broglie wave everywhere except the area of its existence, or in other words the absence of the space where de Broglie wave can spread. Thus problems in connection with the reduction of wave function immediately disappear. We would like to accentuate that de Broglie wave isn't really a wave but maximum locus of packet on the run that arrange (or "draw") a sine wave. The geometric point place of packet appears as sum of the harmonic waves, and exists in any diffraction experiment, because all propagation equations are linear. As these packets are not overlapped then everything is linear and the superposition of the partial waves creates a total diffraction pattern modulated by the de Broglie wave, although the plain de Broglie wave doesn't exist at all. It should be stressed that de Broglie wave is a packets locus of points of maximum in his motion, and it is a superposition of partial waves, that is why it appears in any diffraction and interference experiment.

If we perform a Fourier transform, then instead of this function we will get an assembly of infinite numbers of sinusoids (partial waves) that exist on the *r* axis from $+\infty$ to $-\infty$; exactly the same representation from a mathematical point of view. In other words, both exist at the same time. Let's trust math! We have developed this approach by analyzing the daring experiments of Professor Kozyrev which confirmed UQT brilliantly [3, 24, 25]. Let's briefly talk about some attraction mechanism explanations, which are based mainly on certain properties of a medium – ether. There is no ether in UQT [1 pages 81,90], and we are not going discuss it, as there are many articles dedicated to it [1]. It'll be in the manner of Newton - *to quit while you're ahead* [1, page 99].

Gravitational pulsation theories, despite their proximity to the UQT, are unlikely to be suitable in the future. Since such interaction strongly depends on the phases of the processes and great difficulties will arise with them. Among them the model of Norwegian physicist K. Bjerknes stands out. K. Bjerknes was among the first who tried to combine all fields by unified theory. Bjerknes publications (in 1870) involved an idea that behavior of particles in ether looked like behavior of synchronously pulsating bodies in an incompressible fluid between which, as we know, there is a force inversely proportional to the square of distance. English physicists Frederick Guthrie and William Mitchinson Hicks supported the Bjerknes' concept, the latter theoretically described «negative matter» in which atoms oscillated in the opposite phase and antigravity. Charles Burton further developed Bjerkenes' theory (in 1909), he attributed pulsations to electrons inside bodies. Independently, Jules Guyot in "Eléments de physique générale" (1832) explained gravitation by oscillating motion of atoms. To illustrate his ideas, he experimented with the attraction of light objects by ringing bodies (beads were drawn by a tuning fork). In a series of his memoirs entitled "Mathematical Theory of attractive forces" (1859-76), Challis presented an extensive mathematical theory of wave propagation in ether. Both, he and Bjerknes argued that a wave could attract a body to its source, which was extremely small relative to the wavelength itself. These waves are the cause of what we call gravitational forces. Under the action of these partial waves, the wave packet (particle) begins to move and as described by Newton's mechanics, and the mass of this packet is now inertial. This leads to a complete coincidence between inertial and gravitational masses.

To draw a final line in the discussion about the experimental substantiation of the General Relativity Theory (GRT), let us cite the conclusion of French Scientist L. Brillouin [21] who left to us his unambiguous estimation: "*The conclusion is that no experimental facts exist that would confirm the mathematically cumbersome theory by Einstein. Everything done after Einstein provides mathematically complicated generalizations, additions or modifications not supported by experimentation. Science fiction in the area of cosmology is, frankly speaking, a very interesting but hypothetical thing.* "

The existing general picture of the world looks extremely sad [22]. The author of UQT has written about this repeatedly. On the one hand, GRT gives a description of the world in terms of a continuous field, but, unfortunately, has very weak experimental evidence, although it is quite visual for a demanding mind. On the other hand, modern quantum theory has absolutely brilliant experimental confirmations, but is replete with paradoxes that baffle any serious mind. The standard response of a professional theoretical physicist to these paradoxes is simple - "shut up and count" can only make an unbiased researcher smile. There is no reason to doubt the correctness of the UQT, since it allowed, for the first time in the world, to calculate the value of the fine structure constant 1/137 [1, page 58] (this is the square of a dimensionless electric charge) and found an analytically accurate solution to the scalar integro-differential equation of the UQT. As a result, an accurate calculation of the mass spectrum of many elementary particles followed, including the mass of the Higgs boson 5 years before its discovery [1, page 64]. This calculation was made in 2007, and when it was published, Professor Vladimir Dubovik (JINR, Laboratory of Theoretical Physics – Dubna) told author: "They won't forgive you for this, in 2-3 months there will be nothing left of you, they will find a mistake." But 14 years have passed and it is pretended that the UQT does not exist. Note that any good student or mathematician can reproduce all these calculations [1, page 64] on a regular laptop using «Maple» or «Mathematica» programs.

But all these results required the sacrifice of the special theory of relativity: only the relativistic relationship between energy and momentum remained of it, and the reduction of rulers and the deceleration of clocks remains in the past. But, on the other hand, now the mass growth at a speed has a physically clear origin, is absolute and is simply associated with an increase in the amplitude of the wave packet - for details, see [1 page 6, 4]. The motion of a particle is absolute, but the question is, what is it about? so far, it is vague. We suspect that the movement is relative to the global vacuum potential, but this will become clear in the future. Now the UQT has acquired features that are extremely necessary for closed cosmology and there are no conservation laws for energy and momentum in it (at least in the approximate version of the equation with an oscillating charge [4]). It is the laws of conservation of energy and momentum that prohibit the emergence and development of the Universe, and they are absent in some versions of GRT, but there are also some issues that can be solved if we abandon some relativistic interpretations.

When high-energy protons collide, both new protons and a mass of mesons and other particles can arise. However, science does not answer the question of how matter with a mass from a conditional relative physical quantity depending on the reference point can appear. These difficulties arise when interpreting the multiple birth of particles, since before the UQT, the mechanism of converting kinetic energy into matter was completely incomprehensible from the standpoint of special relativity, since in it the mass has the same value in all reference frames, it is invariant regardless of how the particle moves.

In the UQT, the multiple birth of particles is explained as follows: with accelerated particle motion, its mass begins to increase, and this is due to an increase in the amplitude of the wave packet [1, page 6]. The field of such a wave packet will diffract on the complex structure of the proton, and there will be a huge number of different particles in the diffraction maxima. With multiple births, these are mainly π_+, π_-, π_0. Strange particles, new nucleons, as well as heavy particles - B-mesons, W-bosons, Z-bosons are born much less often. The main problem of studying such collisions is the huge number of particles formed. The reverse process is observed in any nuclear reactions and is widely exploited by mankind, confirming the transition of the mass defect into the kinetic energy of the products of nuclear reactions.

Unfortunately, the special theory of relativity has left its diabolically schizophrenic imprint not only on quantum theory, but also on general relativity. Imagine two particles flying towards each other from different distant places where, according to our calculations, they should meet. If the gravitational fields along the motion of the particles were different (this is the most reasonable assumption) then at the point of the intended meeting they will have different times and therefore they will never meet. The fact is that there are two points with the same spatial coordinates, but with different times, these are completely different points and in order for the particles to meet, they need to have the same time. Even if they have the same spatial coordinates, the time coordinates will always be different and no collisions will be possible. Of course, it's monstrous. What had to be sacrificed and what conclusions can be drawn from this consideration [1-4]?

1. The concept of time is misinterpreted in GRT and quantum theory.
2. The flow of time can only be uniform and independent of physical conditions. This position has always been held by Sir Isaac Newton.
3. A change in the gravitational potential does not lead to a change in the velocity of time, but to a change in the velocity of physical processes.

UQT has long come to the same requirements [3, 4]. In order to save Einstein's wonderful physical ideas about the coincidence of gravitational and inert mass, the identification of inertia and gravity (and this is all at the heart of GRT), it was necessary to get rid of time. Almost half a century ago, physicists John Wheeler and Bryce Dewitt [19, 20] were able to derive a Great Equation based on Einstein's general ideas, which the scientific community initially took with hostility, since it "violated physical laws." If we judge objectively, the Equation did not violate the laws, but it radically changed the usual picture of the world. Based on the discovery of Wheeler and Dewitt, there is no such magnitude as time. "*There has never been time, there is no time, and there never will be. It's only in our heads and the equations we use every day. In the universe, processes are not required to obey any periodicity and intervals. We are not aware of phenomena capable of describing time,*" — John Wheeler [19, 20].

And how can us not remember the words of Blessed Augustine again*: "I know what time is, as long as I'm not asked about it...*"

IV. The Gravity in UQT

And then there's the cherry on top: In 1976, at a symposium in Burakan [24,25], Professor N.A. Kozyrev reported on unusual astronomical observations he had made when scanning the celestial sphere with a reflector telescope covered by an opaque lid. He placed unusual sensors in the focal plane of telescope - a torque scale or a small thin-film resistor included in balanced bridge arm (see Fig. 1).

These results initially seemed so unbelievable that astronomers did not take them seriously, and for more than a decade, nobody tried to repeat these observations using Prof. Kozyrev's method. Later they were confirmed in Japan, Germany and America and the halo of «crazy» around Kozyrev disappeared without a trace. Now there are many scientific articles on this subject [24, 25] even including Kozyrev's assumption that «time burned in stars». But, Kozyrev initially argued that these were examples of superluminal motion.

Here we would like to offer very simple and natural explanation of these results from UQT point of view. According to UQT, any particle is a single wave packet (field slot) – function *f(r-vt)* of equation for wave function (eq.1). If somebody performs a Fourier transform over it, then instead of this function he will get a set of infinite numbers of sinusoids (partial waves) that exist on the *r* axis from till. Mathematically this is exactly the same representation. In other words, they both exist at once. The star just appeared in Point 3 (Fig.2.) and photons started their movement from it, a long time before they will finally reach the telescope, but their harmonic components would appear at point 3 IMMEDIATELY. There are many photons, the sum of their partial waves carries energy, and that results in change of the detector (4) resistance at Fig.2.

The author has been formulating UQT for more than 65 years and he has found that TRUTH is of little interest to mankind, and now money is the main goal, although in the past it was not quite so. The main difficulty in adopting a new paradigm is growing ignorance, which is linked not only to a decline in the general level of education, but also to a certain degeneracy, as evidenced by the world's diminutive political figures. The extreme complexity of the overall false picture of the world and the emergence of useless but well financed projects also challenge the adoption of a new paradigm. Who wants to lose their grant money? Nevertheless, a new picture of the world could free humanity from the daunting challenges that loom ahead [1 page 90, 23].

The general theory of relativity "explains" gravity by the curvature of space, in other words, replaces one riddle with another, without explaining the reasons for the appearance of gravitational forces. But there have been other approaches for a long time. One of them is the kinetic model of gravity. It was proposed by the Swiss mathematician Nicolas Fatio de Duillior back in 1690 and was supplemented by George-Lous Le Sage in 1756. There is even a Newton estimate for this theory: "*A unique hypothesis that can explain gravity was developed by the most brilliant geometer, Mr. N.Fatio.*"

The basic meaning of the model boils down to the fact that the universe is filled with extremely small particles moving chaotically and in different directions at a very high speed. The consequence of such chaotic movement is the pressure exerted by these particles on any material bodies encountered in their path. Since the direction of movement of the particles is random, the average flow of these particles in any direction is approximately the same.

Accordingly, the external pressure exerted by the total flow of such particles on any 3-dimensional object is balanced in all directions and is generally directed to its geometric center. But Maxwell did not agree with these ideas, and Poincare even proved that the speed of motion of gravitational particles should exceed the speed of light by several orders of magnitude, and this would lead to overheating of the planets. If gravity is caused by shielding, then the Moon at those moments when it is between the Earth and the Sun should significantly affect the force of attraction of these bodies and, accordingly, the trajectory of the Earth, but nothing like this is observed in reality. This is what put an end to the kinetic model of gravity. But all this can be revived if, instead of hypothetical particles, we consider partial waves of spectral decomposition of wave packets representing particles of matter. These waves have a very small amplitude and, therefore, all matter is completely transparent to them. They are chaotic and multidirectional.

Consider partial waves from two wave packets running strictly towards each other. Among the wide spectrum, there will necessarily be waves of the same wavelength, which will form a standing wave. It will have no momentum unlike the other waves. Therefore, waves traveling from other directions will exert pressure on these two packets with their impulses, but strictly in the direction connecting the centers of the packets, the pressure of the waves will be less, which will lead to the appearance of an attractive force between them. It is intuitively clear that such interaction will be very weak. The authors regret that they are already very many years old and they do not have the strength and energy to calculate the gravitational constant. The ideas outlined are enough to accomplish this task.

At the same time, gravity itself does not need intermediaries like gravitational waves, and such a concept as speed has no physical meaning in relation to gravity, since the entire universe is formed from existing partial waves. Therefore, Newton's classical mechanics does not use the speed of gravity when calculating the force of mutual attraction. It (the speed of gravity) there is no need as an absolutely redundant and meaningless quantity.

But many years later [26] Tom Van Flandern, an American astronomer and astrophysicist, experimentally carried out a series of measurements of the frequency of pulses emitted by double pulsars in various regions of the celestial sphere, and subsequent calculations showed that the vector of attraction of the Earth to the Sun is directed not to the position of the Sun visible from Earth, but to the center of its current true position. In other words, the situation is very similar to the results of Professor Kozyrev's experiments. From this it clearly followed that the speed of gravity propagation in the measurements carried out exceeded the speed of light by at least 10 orders of magnitude greater than the speed of light. In fact, do binary pulsars predict their future position, velocity, and acceleration faster than the light time between them allows? The book [26] poses a discouraging question:«Why do black holes have gravity, despite the fact that nothing can overcome them, because it would require a speed higher than the speed of light? Why does the total eclipse of the Sun by the Moon reach its peak before the gravitational forces of the Sun and the Moon align? »

V. Conclusion

The authors hope that they have discovered a consistent approach to gravity from the standpoint of UQT and have answered the acute experimental contradictions of modern science set out in the book [26] Tom Van Flandern.

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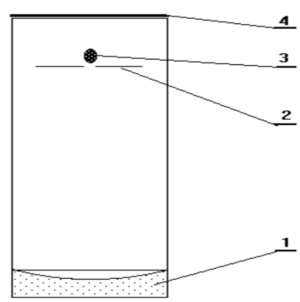

Fig. 1: Scheme of Kozyrev telescope. 1 – focusing mirror, 2 - slot, 3 - detector, 4 – light-proof lid

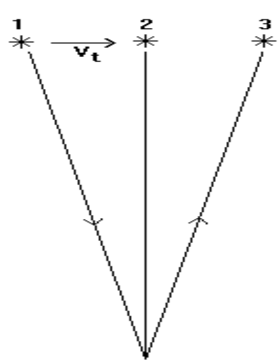

Fig. 2: The past (1), verily (2) and the future (3) positions of astronomical object. Potion of light emitted by object in position (1) reaches observer (4) many years after. During this time the object that moves perpendicular to observer with speed *v*, moves to position (2). If at the moment of record portion of light were emitted for point of observation, it would meet object in point (3)

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The Latest Discoveries of the Parker Solar Probe Confirm the Predictions of My Model of Solar Activity and My Concept of the Universe Creation

By Prof. Maria Kuman
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Abstract- The latest discoveries of the Parker Solar Probe (PSP) confirmed the predictions of my model of solar activity that the Sun is bulged at the equator during solar activity and elongated at the poles during low solar activity. The Parker Solar Probe confirmed once again that that the solar corona is much, much hotter than the surface of the Sun. This means that the energy of the active Sun comes from outside the Sun, not from the center of the Sun as we postulated without any observational evidence. My concept of the Universe creation is that the Universe must have been created from nonlinear electromagnetic field (NEMF), which does not dissipate and can imprint information. The Creator created a sphere of this non-dissipating NEMF, called Space Matrix and imprinted on it the information of the Universe to be, and the Universe was created. Thus, the Universe was not created out of nothing (vacuum) because spinning of the solar plasma in vacuum would not create energy, but spinning of the solar plasma in NEMF would create energy. Therefore, the corona of the Sun is much, much hotter because the heat energy of the corona is generated from clockwise spinning of the Sun as a vortex, which sucks energy from the Space Matrix NEMF, and this energy is released as heat of the solar corona.

Keywords: parker solar probe (PSP); PSP confirmed my predictions; confirmed predicted bulging at solar activity; confirmed predicted elongation at low activity; confirmed predicted space matrix NEMF; extreme heat of the solar corona explained.

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I. Introduction

The Parker Solar Probe (PSP) was launched on August 12, 2018 to complete 24 orbits until 2024 and to probe the solar corona going closer to the solar surface that was ever considered possible. The solar corona is many times hotter than the laying under it solar surface. Why the solar corona is so much hotter is explained in section 3 of this article. By October 24, 2022, PSP had already completed 13 out of 24 orbits [1]. What impressed me is that the author of article [1] Raouafi, who described the findings of PSP, which went to the Sun to register the solar dynamics and the created by it solar wind, does not know nonlinear physics, and it is impossible to understand and describe dynamics without nonlinear physics. His explanations of the solar dynamics are primitive because he does not know nonlinear physics. As we go farther in investigating the dynamics of the Sun and the Universe, which can be described only with nonlinear physics, it becomes more obvious that we need to teach nonlinear physics in our Universities.

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II. My Model of Solar Activity

Long-term study of the glaciers shows that Ice Ages on Earth alternate with warm periods, which means that low solar activity alternates with high solar activity. During solar activity, the number of solar spot increases, which are the openings of two chains of alternating vortices (spinning clockwise and sucking energy) and anti-vortices (spinning counterclockwise and emitting energy) running parallel to the solar equator. Since the two chains of vortices and anti-vortices spin on opposite directions in both hemispheres of the Sun, obviously the northern hemisphere and the southern hemisphere of the Sun spin in opposite directions, i.e. while the northern hemisphere of the Sun is vortex spinning clockwise, the southern hemisphere is anti-vortex spinning counterclockwise.

I created a nonlinear mathematical model [2], which explains the cycles of solar activity as a vortex on top of anti-vortex in dynamic equilibrium. According to nonlinear physics, vortices spin clockwise and suck energy. When the Sun spins clockwise as a vortex and sucks energy, the northern hemisphere of the Sun sucks energy according to the rule of the folded fingers of the right hand. Since the southern hemisphere spins in the opposite direction (counterclockwise), according to the rule of the folded fingers of right hand, the southern hemisphere will also suck energy. The energized vortex (northern hemisphere) and anti-vortex (southern hemisphere) of the Sun will attract each-other stronger, the solar equator will bulge, and the turbulent activity will increase observed as two chains of alternating vortices and anti-vortices spinning in opposite direction in both hemispheres. This continues until the vertical pressure on the solar plasma at the equator reaches the critical pressure, which the plasma can tolerate. *Thus, I*

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predicted that during solar activity the Sun is bulged at the equator.

To release the pressure, the Sun will start spinning in opposite direction (counterclockwise). According to nonlinear physics, anti-vortices spin counterclockwise and loose energy. If so, the spinning counterclockwise Sun will start losing energy. The vortex (northern hemisphere) and the antivortex (southern hemisphere) will pop out of each other and will start distancing each other. As a result, the Sun will become elongated toward the poles and its activity will drop down to zero. *Thus, I predicted that during low or no solar activity the Sun is elongated toward the poles and shrunk at the equator*. This will continue until the horizontal pressure at the equator reaches the critical value, which the solar plasma can tolerate. To release the pressure, the Sun will start spinning in opposite direction, i.e. clockwise, which will bring more energy and lead again to increased solar activity, and so on. Let us compare my predictions with what Parker Solar Probe (PSP) found. According to Raouafi [1, p. 33], PSP found that at lower activity of the Sun (when the Sun is less bright), the Sun is elongated, which perfectly fits my prediction.

III. My Concept of the Universe Creation

Raouafi writes that the fact that the corona of the Sun is much hotter than the surface of the Sun, known as "corona heating problem" "is still puzzling and controversial" – "various mechanisms had been proposed...but none can thoroughly explain the phenomenon" [1, p. 30]. This is because we refuse to accept the obvious fact that if the solar corona is the hottest, the Sun must burn what is outside of it. Obviously, the energy of the Sun comes from what is around the Sun, not from its core (as we presently chose to believe with no experimental evidence to support it). Durakiewicz writes in his article [3] that the courage to say no to scientific paradigm, to question and refuse to accept the status quo, is essential to science's ability to move forward.

It is high time to acknowledge that as more observational data pile up, we need to change the way we see things. There is no place for conservatism… we need to be ready to change the way we see things, if new observational data do not support the pre-concepted picture that the center of the Sun is the energy source of the Sun. The fact that the corona of the Sun is hotter than its surface definitely indicate that the Sun burns what is outside the Sun. What is outside the Sun? In my book "The Mystery of the Universe Creation"[4] step by step I explain why the space is not vacuum and that the Universe must have been created from nonlinear electromagnetic field (NEMF) because the nonlinear fields do not dissipate and can imprint information. The Creator created a sphere of this non-dissipating NEMF (Space Matrix), then He imprinted on it the information of the Universe to be, and the Universe was created [4].

If the Universe was created from NEMF (not from vacuum as we presently choose to believe), then the spinning solar plasma in this NEMF created the heat energy, which made the corona many times hotter than the surface of the Sun. This now makes sense, but require revision of our concept that the energy of the Sun comes from nuclear reactions at its center. If we have troubles explaining why the solar corona is so hot, it is because we have built our science as a solid building, and our science needs to be liquid - ready to flow in new directions determined by the new observations or the new experimentations… "Our science must be ready to turn the heresy of yesterday into a gospel of today, and the fundament of the future" [3]. This means that since PSP observations show (once again) that the corona of the Sun is hotter than the surface of the Sun, to explain it our science needs to embrace the fact that the space (Space Matrix) cannot be vacuum because spinning of the Sun in vacuum cannot generate energy, but spinning of the Sun in NEMF can generate energy.

IV. Conclusion

According to nonlinear physics, all vortices spin clockwise and suck energy. If so, when the Sun spins clockwise like a vortex, it will suck energy from the Space Matrix NEMF, which will make it more active. The gained energy will increase Sun's spinning, which will bulge the Sun at the equator and increase its turbulence manifested as two chains of alternating vortices and anti-vortices running along the solar equator, whose openings are observed as solar spots. This active cycle of the Sun will continue until the vertical pressure on the solar plasma reaches the critical value, which the plasma can tolerate. Then, to release the pressure on the plasma, the Sun will start spinning counterclockwise.

According to nonlinear physics, all anti-vortices spin counterclockwise and release energy. If so, the counterclockwise spinning Sun will start releasing NEMF energy to the Space Matrix NEMF. The spinning of the Sun will decrease, its activity will decrease, its vortex (northern hemisphere) and anti-vortex (southern hemisphere) will distance each other, which will make the Sun elongated toward the poles. This is what PSP found – at low solar activity the Sun is elongated toward the poles - and this is what my model of solar activity predicted. I predicted bulging at the equator of the Sun during solar activity and elongation toward the poles during low solar activity (and this is exactly what the Parker Solar Probe found).

Thus, we need to embrace the concept that the Space Matrix exists and it is NEMF (not vacuum).This is because spinning of the Sun (solar plasma) in vacuum cannot create energy and make the Sun active and spinning of the Sun (solar plasma) in NEMF can create energy and make the Sun active. Also, the only way to explain the observed fact that the corona of the Sun is much hotter than the surface of the Sun is to embrace the concept that Space Matrix exists and it is NEMF. Since vortices spin clockwise and suck energy, when the Sun spins clockwise in the NEMF of the Space Matrix, it will suck NEMF energy from the Space Matrix NEMF and become active. The sucked in energy from the Space Matrix NEMF is transformed into heat, which makes the solar corona much hotter than the surface of the Sun.

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Air Crash and Pressure

By Tian-Quan Yun
Technical University (MADI)

Abstract- This paper studies hat air crash would be caused by the difference of pressures between outside and inside of passenger's cargo. Such difference of pressures can break the window or door and thus make the plane to crash. In order to calculate the pressure outside passenger's cargo, this paper set up and solves the solution of three type equations: A "w – T eq.", B "w - P/ρeq." and C"J - P/ρeq.". The A type is the base. It states that the derivative of wind speed respect to time proportions to the derivative of temperature respect to track (space). The A's solution obtained by method of separating variables has been checked by weather forecasting, by dimensional check, and by other model check. The solutions of B and C can be obtained directly from A. Missing plane MH370 has been used as an example to show the calculation of pressure outside the passenger's cargo. This paper would be referenced to pilot, administrator, engineer, scientist, teacher and student.

Keywords: boyles law, charles' law, wind speed – temperature equation, wind speed – pressure/density equation, jet - pressure/density equation.

GJSFR-A Classification: *DDC Code: 551.630973 LCC Code: QC995*

AIRCRASHANDPRESSURE

Strictly as per the compliance and regulations of:

Air Crash and Pressure

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Keywords: boyles law, charles' law, wind speed – temperature equation, wind speed – pressure/density equation, jet - pressure/density equation.

I. Introduction

Air crash has many investigations[1]. This paper studies hat air crash would be caused by deference of pressures between outside and inside of passenger's cargo. Such deference of pressures breaks the window or door and thus the plane crashes.

In order to calculate pressure outside the passenger's cargo, we study three type equations,: A "wind – temperature equation" ("w-t eq." in short), B "wind – pressure /density equation"("w - P/ρeq." in short). C "jet – pressure /density equation" ("J - P/ρeq." in short).

In Section 2, we derive the "w – T eq.". It states that the derivative of wind speed respect to time proportions to the derivative of temperature respect to track (space).

In Section 3, the solution of "w – T eq." is obtained by method of separating variables. And it has been checked by weather forecasting, by dimensional check, and by other model check.

In Section 4, the "w - P/ρeq." is derived by the combination of Boyles law and Charles' law.

In Section 5, the solution of "w - P/ρeq." can be obtained directly from the solution of "w – T eq." in Section 3. In Section 5.1, the air density is calculated. Where the traditional method and engineering tool bar considered the air density is the functions of temperature and highness, but no connected to wind speed. Here, the air density is connected with wind speed.

In section 6, set up the "J - P/ρeq.". The absolute motion (the jet plane motion relative a referenced point P on Earth) is equal to the linking motion (wind speed motion relative P) and the relative motion (jet speed motion relative wind motion).

In Section 7, the solution of "J - P/ρeq." is directly obtained from section 3. Two cases: 1, density of jet plane is a constant; 2, the density of the jet plane is variable.

In Section 8, as an example of calculation of pressure outside the passenger's cargo, MH370 has been used. Where it had been studied in cases of non-powered flying[[6]].

In Section 10, a conclusion is made.

II. Wind-Temperature Equation of a Point in Air ("W -T eq." in Short)

The derivation of "w – T equation" follows [3].

According to combination of Boyles' law and Charles' law (B-C law, in short), we have:

$$pV = cT, \tag{2-1}$$

Where p=the air pressure, accuracy. p is a stress tensor, with the same normal stress and zero shearing stress

$$\boldsymbol{p} = \begin{bmatrix} \sigma_{xx} & 0 & 0 \\ 0 & \sigma_{yy} & 0 \\ 0 & 0 & \sigma_{zz} \end{bmatrix} = p[i \quad j \quad k]^T, \tag{2-2}$$

$\sigma_{xx} = \sigma_{yy} = \sigma_{zz} = p =$ compressive normal stress; shearing stress $\sigma_{xy} = \sigma_{yz} = \sigma_{zx} = 0$. i, j, k are unit vectors in Cartesian co-ordinates. $V = volume\ of\ a\ point = dxdydz = A_x dx = A_y dy = A_z dz$, with $dx, dy, dz \to 0$. A_x, A_y, A_z are the cross section areas of the element (point), respectively. c is a constant, T is the absolute temperature. (2-2) is the matrix form of p.

Let operator ∇ be an an inner products on both sides of (2-1), then, we have

$$\nabla \cdot (pV) = \boldsymbol{c}\nabla \cdot T, \tag{2-3}$$

Where

$$\nabla = \frac{\partial}{\partial x} i + \frac{\partial}{\partial y} j + \frac{\partial}{\partial z} k, \tag{2-4}$$

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$$pV = p[i+j+k](dxdydz) = (pA_x dx)i + (pA_y dy)j + (pA_z dz)k =$$

$$F_x dxi + F_y dyj + F_z dzk = F \cdot ds, \quad (2\text{-}5)$$

Where F=the applied force, S=the displacement

$$F = F_x i + F_y j + F_z k, \quad (2\text{-}6)$$

$$s = s_x i + s_y j + s_z k, \quad (2\text{-}7)$$

$$\nabla(pV) = \nabla.F.ds = F.(\nabla.ds) = F = c\nabla.T, \quad (2\text{-}8)$$

By Newton's second law, we have

$$F = m\dot{u} = m\left(\dot{u}_x i + \dot{u}_y j + \dot{u}_z k\right), \quad (2\text{-}9)$$

Where m is the mass, $\boldsymbol{u}$is the wind speed, $\dot{u} = \partial u/\partial t$. Substituting (2-9) into (2-8), we have

$$\dot{u} = (c/m)\nabla \cdot T, \quad (2\text{-}10)$$

(2-10) is called the "Wind –Temperature Equation of A Point (Mass) in Air", or ("W – T equation" in short). It states that $\dot{u}$ is in proportion to ∇T, i.e., the derivative of wind speed u respect to time t proportions to the derivative of temperature T respect to track (space).

III. Solution of "W – T eq." by Method of Separating Variables

(2-10) is a vector PDE. It is hard to solve. Changing (2-10) to scalar function (its component form) is an easy way to solve. By (2-2) -- (2-4), we have:

$$k\frac{\partial}{\partial x}T = kT_x' = \dot{u}_x, \quad (3\text{-}1)$$

$$k\frac{\partial}{\partial y}T = kT_y' = \dot{u}_y, \quad (3\text{-}2)$$

$$k\frac{\partial}{\partial z}T = kT_z' = \dot{u}_z, \quad (3\text{-}3)$$

Where $k = c/M.\ T_x' = \frac{\partial}{\partial x}T,\ T_y' = \frac{\partial}{\partial y}T,\ T_z' = \frac{\partial}{\partial z}T.$

Looking at (3-3):

Where $T = T(z,t),\ \dot{u}_z = \dot{u}_z(z,t),\ \dot{u} = \partial u/\partial t.$

Suppose that variables of kT_z' and $\dot{u}_z$ can be separated:

$$kT_z'(z,t) = a'(z)b(t), \quad (3\text{-}4)$$

$$\dot{u}_z(z,t) = e(z)\dot{f}(t), \quad (3\text{-}5)$$

Where $a'(z) = da(z)/dz$, $b(t)$, $e(z)$ and $\dot{f}(t) = df(t)/dt$ are unknown functions and have continuous derivatives. We need sufficient relations to determine these unknowns.

The dimensions of kT_z' and $\dot{u}_z$ are the same (see the following red part), therefore, let (3-4) = (3-5),and separating variables, we have

$$\frac{a'(z)}{e(z)} = z^0 = k = const = \frac{\dot{f}(t)}{b(t)} = t^0, \quad (3\text{-}6)$$

Where the function of the left term is z, while the function of the middle term is t, if they are equal to each other, they must be a constant--- k.
For simple, we choose two relations:

$$e(z) = a(z), \quad (3\text{-}7)$$

$$b(t) = -f(t), \quad (3\text{-}8)$$

then, integrating both sides of (3-6) for t and by (3-8), we have:

$$\int \frac{\dot{f}(t)}{b(t)}dt = ln\, f(t) = -\int Kdt + C_t = -Kt + C_t \quad (3\text{-}9)$$

Where C_t is a constant, determined by initial condition, i.e., $t=0, \ln f(0) = 1, \ln\left|1\right| = 0, \rightarrow C_t = 0$. Then, (3-9) gives:

$$b(t) = -f(t) = exp[-Kt], \quad (3\text{-}10)$$

$$f(t) = -kexp[-kt^2], \quad (3\text{-}11)$$

Substituting (3-7) into (3-6), then, integrating both sides of (3-6) for z, we have:

$$\int \frac{a'(z)}{a(z)}dz = ln[a(z)] = \int kdz + C_z = kz + C_z, \quad (3\text{-}12)$$

Where C_z is an integral constant, determined by the boundary condition, i.e., $z = 0, T_z = T_z(0) = 1(℃) \rightarrow a(0) = 1, \rightarrow C_z = 0$. Therefore,

$$a(z) = e(z) = exp[kz], \quad (3\text{-}13)$$

$$a'(z) = kexp[kz], \quad (3\text{-}14)$$

Substituting (3-14), (3-10), into (3-4), we have

$$kT_z'(z,t) = kexp[kz]\{-kexp[-kt^2]\} = exp[k(z-t^2)], \quad (3\text{-}15)$$

Substituting (3-11), (3-13), into (3-5), we have

$$\dot{u}_z(z,t) = exp[kz]exp[-kt^2] = exp[k(z-t^2)] =$$

$$kT_z'(z,t), \quad (3\text{-}16)$$

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Similar to (3-16), for (3-1), (3-2), we have:

$$\dot{u}_x(x,t) = exp[k(x-t^2)] = KT'(x,t),\ \ k=\frac{c}{m} \qquad (3\text{-}17)$$

$$\dot{u}_y(y,t) = exp[k(y-t^2)] = KT'(y,t),\ \ k=\frac{c}{m}, \qquad (3\text{-}18)$$

Expressed by vector form:

$$\dot{u}(s,t) = exp[k(\boldsymbol{s}-t^2] = k\nabla T(s,t)],\ \ k=\frac{c}{m}, \quad (3\text{-}19)$$

Dimensional check: (3-19)

Dimensional check is a tool often used to check the correctness of calculation. The dimensions of each term of an equality must be the same.

$$c=\frac{pV}{T},\ k=\frac{c}{m}=\frac{pV}{mT}.\ dim[\nabla T]=\frac{d}{ds}J=N=\frac{kg.cm}{sec^2},$$

$$dim[k]=\frac{Ncm^{-2}cm^3}{kg..N;cm}=\frac{1}{kg},$$

$$dim\,\dot{u}=\frac{cm}{sec^2}, \qquad (3\text{-}20)$$

$$dim\,k\nabla T=\frac{1}{kg}\frac{kg.cm}{sec^3}=\frac{cm}{sec^2}. \qquad (3\text{-}21)$$

$$dim\ exp[k(\boldsymbol{s}-t^2)]=\frac{cm/kg}{sec^2/kg}=\frac{\boldsymbol{cm}}{\boldsymbol{sec^2}}, \qquad (3\text{-}22)$$

The dimensional check (red part) shows that the dimensions on both sides of the equality of (3-19) are the same. The dimensions in (3-19) is correct.

a) *Checking the "w – T eq." by weather forecasting (China Weather Net), and motion equation of mushroom cloud.*

Every winter, the weather forecast(China Weather Net) alerts people be wear that cold wave *comes with strong wind companied with temperature sharp dropping.* These description on temperature sharp dropping company with strong wind confirms that the difference of temperature between positions in track causes strong wind. Which agrees with (2-10) very well.

Moreover, a motion equation of mushroom cloud[3] derived by different model based on modifying of Navier-Stock equation , with result well agreed to (2-10). Which again confirms that (2-10) is believable.

IV. The "Wind – Pressure/Density Equation"("W– p/ρ Eq."in Short)

Dividing both sides of B – C law(combination of Boyles law and Charles law) (2-1) by M (mass), we have

$$p\frac{\boldsymbol{V}}{M}=p\frac{1}{\boldsymbol{\rho_{air}}}=\frac{\boldsymbol{c}}{M}T, \qquad (4\text{-}1)$$

Where $\rho_{air}=M/V$ is the density of air. Substituting (4-1) into (2-10), we have:

$$\dot{u}=\nabla(p/\rho_{air}), \qquad (4\text{-}2)$$

(4-2) is called the "W –P/ρ equation". (4-2) shows that $\dot{u}$ is in proportion to $\nabla(p/\rho_{air})$, i.e., the derivative of wind speed u respect to time t proportions to the derivative of (p/ρ_{air}) respect to track (space).

V. Solution of "W – p/ρ Eq." (4-2)

The solution of scalar form of (4-2) can be obtained from (3-17), (3-18), and (3-16) by changing $k=c/m$ to $k=\rho_{air}^{-1}$, i.e.,

$$Kp'(s,t)=\dot{u}_x(s,t)=exp[k(x-t^2)],\ \ (k=\rho_{air}^{-1}) \quad (5\text{-}1)$$

$$Kp'(s,t)=\dot{u}_y(s,t)=exp[k(y-t^2)],\ (k=\rho_{air}^{-1}) \quad (5\text{-}2)$$

$$Kp'(s,t)=\dot{u}_z(s,t)=exp[k(z-t^2)],\ (k=\rho_{air}^{-1}) \quad (5\text{-}3)$$

The solution of vector form of (4-2) is:

$$Kp'(s,t)=\dot{u}(s,t)=exp[k(\boldsymbol{s}-t^2)],\ \ (k=\rho_{air}^{-1}) \quad (5\text{-}4)$$

The solution of vector form of (4-2) can be obtained from (3-19) by changing k = c/m to $k=\rho_{air}^{-1}$, i.e.,

$$\dot{u}(s,t)=exp[k(s-t^2)]=k\nabla p(s,t)],\ (k=\rho_{air}^{-1}), \quad (5\text{-}5)$$

a) *Calculation of ρ_{air}*

Traditionally, methods, tools for calculation of $\rho_{air}=\rho_{air}(p,z)$ as functions of p and z [4,5], based on Boyles law and Charles law for static description, i.e., they have no connection with wind speed. However, our treatment of ρ_{air} is different to that of traditional. It connects with wind speed by "w – p/ρequation". (4-2), based on Boyles law , Charles' law and together with the Newton's second law. The calculation of ρ_{air}, can be found in Appendix.

VI. Set up the "Jet – Pressure/Density Equation" ("J- p/ρ Eq." in Short)

A jet plane flies in a atmospheric environment. In which the absolute motion (the jet plane motion relative a referenced point P on Earth) is equal to the linking motion (wind speed motion relative P) and the relative motion (jet speed motion relative wind motion).

Let the relative motion of the jet plane speed, density of air and pressure be $\boldsymbol{v}, p_v$, and ρ_{air}. Then, set up the "J-p/ρ Equation" similar to (4-2), we have:

$$\dot{u}+\dot{\boldsymbol{v}}=\rho_{air}^{-1}[\nabla p]+[\nabla(p_v/\rho_{jp})], \qquad (6\text{-}1)$$

$$\dot{v}=\nabla(p_v/\rho_{jp}), \qquad (6\text{-}2)$$

Where $\rho_{jp} = \rho_{jp}(z,t) = M(t)/V_{jp}$ = Density of jet plane; $M(t)$ is the mass of the jet plane. it varies with time t (jet fuel consuming); V_{jp} is the volume of the jet plane.

(6-2) shows that $\dot{\boldsymbol{v}}$ is in proportion to $\nabla(p_v/\rho_{jp})$ i.e., the derivative of jet plane speed $\boldsymbol{v}$ respect to time t, proportions to the derivative of pressure (p_v/ρ_{jp}) respect to track (space)of the jet plane.

VII. The Solution of "J – p/ρ Equation" (6-2)

1. If ρ_{jp} = const, then, the solution of (6-2) is the same as (5-5) just by $\dot{v}$, p_v instead of $\dot{u}$, p, respectively. That is:

$$\dot{\boldsymbol{v}}(\boldsymbol{s},t) = exp[k(\boldsymbol{s}-t^2)] = k\nabla p_v(\boldsymbol{s},t)],\ k = \rho_{air}^{-1}) \quad (7\text{-}1)$$

The solutions of similar (5-1) – (5-4) are:

$$Kp'_v(\boldsymbol{s},\boldsymbol{v}) = v_x(x,t) = exp[k(x-t^2)],\ \ (k = \rho_{air}^{-1}) \quad (7\text{-}2)$$

$$Kp'_v(\boldsymbol{s},\boldsymbol{v}) = v_y(y,t) = exp[k(y-t^2)].\ \ (k = \rho_{air}^{-1}) \quad (7\text{-}3)$$

$$Kp'_v(\boldsymbol{s},\boldsymbol{v}) = v_z(s,t) = exp[k(z-t^2)],\ \ (k = \rho_{air}^{-1}) \quad (7\text{-}4)$$

$$Kp'_v(\boldsymbol{s},\boldsymbol{v}) = \boldsymbol{v}(\boldsymbol{s},t) = exp[k(\boldsymbol{s}-t^2)].\ \ (k = \rho_{air}^{-1}) \quad (7\text{-}5)$$

2. If $\rho_{jp} = \rho_{jp}(z,t) = M(t)/V_{jp}$, is a known function. Where $M(t)$ depends on flying status, e.g. flying in a constant speed, then

$$M(t) = c_1 - c_2 t.\ (c_1, c_2, = \text{known const}). \quad (7\text{-}6)$$

Where for $t = 0$, $c_1 = M(0)$ = jet plsne mass of full fuel.; for

$t = t_1, M(t_1) = C_1 - t_1 c_2$ = jet plane mass of empty fuel

The solution of (6-2) is the same as (7-1) with $\rho_{jp} = M(t)/V_{jp}$ inside ∇,i.e.,

$$\dot{\boldsymbol{v}} = exp[k(\boldsymbol{s}-t^2)] = \nabla p_v(s,t)/(M(t)/V_{jp})], \quad (7\text{-}7)$$

Where $\boldsymbol{s}$ is instead of by z.

Similar treatment can be used for the scalar form, e.g., (7-5).

$$Kp'_v(\boldsymbol{s},\boldsymbol{v}) = v(z,t) = exp[k(z-t^2)],\ (k = (M(t)/V_{jp})^{-1}) \quad (7\text{-}8)$$

VIII. Example

MH370—a missing plane [5]is used as an example to show the calculation . Suppose that the plane was crashed due to pressures difference between inside and out side of passenger's cargo. Here, we calculate the pressure out side the cargo. The Boeing 747 cruise speed $\boldsymbol{v}$ = 1000 km/hour, cruise high z = 10,000 m, The masses of jet plane of full fuel and empty fuel are $M(0)$ and $M(t_1)$, respectively.

$$\boldsymbol{v} = \int \dot{\boldsymbol{v}}dt = exp[k(10000m - t)] = 1000km/hour,$$
$$(k = (M(t)/V_{jp})^{-1}) \quad (8\text{-}1)$$

From (81), we get t.

Calculation of $\rho_{\boldsymbol{dryair}}$.

By (A-2), $\rho_{\boldsymbol{dryair}} = 31.91 \times 9.91 = 313.0371(kg/m^3)$. (8-2)

Substituting (8-2) into (5-3), we have:

$$p(z,t) = \dot{u}_z(z,t) = exp[k(z-t^2)], \quad (8\text{-}3)$$

Substituting $M(0)$, $M(t_1)$, V_{jp} and (7-6) into (7-8), we have:

$$p_v(\boldsymbol{z},t) = \dot{\boldsymbol{v}}(\boldsymbol{z},t) = exp[k(\boldsymbol{z}-t^2)],\ (k = (M(t)/V_{jp})^{-1}) \quad (8\text{-}4)$$

Substituting (6-2) and (8-4) into relative motion and linking motion, We have:

$$p(z,t) + p_v(z,t) = u_z(z,t) + v(z,t) = exp[k(z-t^2)] +$$
$$exp[k_1(z-t^2)], (k_1 = (M(t)/V_{jp})^{-1}),$$
$$(k = (313.03)^{-1}(m^3/kg) \quad (8\text{-}5)$$

If the moist air instead of the dray air, the density of moist air can be calculated by (A-3) with weight of 18 of water molecular.

Now, the pressure out side the passenger's cargo is calculated by (8-5), and the difference of pressure between inside and out side of passenger's cargo is known.

IX. Appendix

a) *Density of Dry air* ρ_{dryair}

In the atmosphere around us, 78% Nitrogen (N_2), 21% Oxygen (O_2), and 1% other gases. The N has a molecular weight of 14, so N_2 has a molecular weight of 28, Oxygen has a molecular weight of 16, so O_2 has molecular weight of 32. Given the mixture of gases of molecules weight is around 29. The total weight of 100% air of $1m^3$ is: w $= [0.78 \times 28 + 0.21 \times 32 + 0.01 \times 29] \times 1m^3 = 31.91(N)$.

$$\rho_{\boldsymbol{dryair}} = 31.91g, \quad (A\text{-}1)$$

Where $g ==$ gravity acceleration. *Assumption:* g is independent with position s, $g = 9.81(m/sec^2)$. Then, by (A-1), we have:

$$\rho_{\boldsymbol{dryair}} = 31.91 \times 9.91 = 313.0371(kg/m^3). \quad (A\text{-}2)$$

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b) Density of moist air

Water H_2O, Hydrogen H is the lightest element and has a molecular weight of 1. So a water molecular weight is $(2 \times 1 + 16 = 18)$. Which shows that the water molecular weight is much lighter than the average weight of the molecular found in air.

The density of moist air can be calculated as the sum of two gases: dry air and water vapor in proportion with their partial proportion c.

$$\rho_{moistair} = c \times \rho_{dryair} + (1 - c)\rho_{vapor} \; (c \leq 1), \quad \text{(A-3)}$$

X. Conclusion

1. The "w – T eq." is basic. The solution of "w - P/ρeq." and "J - P/ρeq.". can be obtained directly from "w – T eq.".
2. The calculation of pressure outside passenger's cargo is used by(6-1) and (6-2).

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Tips for Writing a Good Quality Science Frontier Research Paper

Techniques for writing a good quality Science Frontier Research paper:

1. Choosing the topic: In most cases, the topic is selected by the interests of the author, but it can also be suggested by the guides. You can have several topics, and then judge which you are most comfortable with. This may be done by asking several questions of yourself, like "Will I be able to carry out a search in this area? Will I find all necessary resources to accomplish the search? Will I be able to find all information in this field area?" If the answer to this type of question is "yes," then you ought to choose that topic. In most cases, you may have to conduct surveys and visit several places. Also, you might have to do a lot of work to find all the rises and falls of the various data on that subject. Sometimes, detailed information plays a vital role, instead of short information. Evaluators are human: The first thing to remember is that evaluators are also human beings. They are not only meant for rejecting a paper. They are here to evaluate your paper. So present your best aspect.

2. Think like evaluators: If you are in confusion or getting demotivated because your paper may not be accepted by the evaluators, then think, and try to evaluate your paper like an evaluator. Try to understand what an evaluator wants in your research paper, and you will automatically have your answer. Make blueprints of paper: The outline is the plan or framework that will help you to arrange your thoughts. It will make your paper logical. But remember that all points of your outline must be related to the topic you have chosen.

3. Ask your guides: If you are having any difficulty with your research, then do not hesitate to share your difficulty with your guide (if you have one). They will surely help you out and resolve your doubts. If you can't clarify what exactly you require for your work, then ask your supervisor to help you with an alternative. He or she might also provide you with a list of essential readings.

4. Use of computer is recommended: As you are doing research in the field of science frontier then this point is quite obvious. Use right software: Always use good quality software packages. If you are not capable of judging good software, then you can lose the quality of your paper unknowingly. There are various programs available to help you which you can get through the internet.

5. Use the internet for help: An excellent start for your paper is using Google. It is a wondrous search engine, where you can have your doubts resolved. You may also read some answers for the frequent question of how to write your research paper or find a model research paper. You can download books from the internet. If you have all the required books, place importance on reading, selecting, and analyzing the specified information. Then sketch out your research paper. Use big pictures: You may use encyclopedias like Wikipedia to get pictures with the best resolution. At Global Journals, you should strictly follow here.

6. Bookmarks are useful: When you read any book or magazine, you generally use bookmarks, right? It is a good habit which helps to not lose your continuity. You should always use bookmarks while searching on the internet also, which will make your search easier.

7. Revise what you wrote: When you write anything, always read it, summarize it, and then finalize it.

8. Make every effort: Make every effort to mention what you are going to write in your paper. That means always have a good start. Try to mention everything in the introduction—what is the need for a particular research paper. Polish your work with good writing skills and always give an evaluator what he wants. Make backups: When you are going to do any important thing like making a research paper, you should always have backup copies of it either on your computer or on paper. This protects you from losing any portion of your important data.

9. Produce good diagrams of your own: Always try to include good charts or diagrams in your paper to improve quality. Using several unnecessary diagrams will degrade the quality of your paper by creating a hodgepodge. So always try to include diagrams which were made by you to improve the readability of your paper. Use of direct quotes: When you do research relevant to literature, history, or current affairs, then use of quotes becomes essential, but if the study is relevant to science, use of quotes is not preferable.

10. Use proper verb tense: Use proper verb tenses in your paper. Use past tense to present those events that have happened. Use present tense to indicate events that are going on. Use future tense to indicate events that will happen in the future. Use of wrong tenses will confuse the evaluator. Avoid sentences that are incomplete.

11. Pick a good study spot: Always try to pick a spot for your research which is quiet. Not every spot is good for studying.

12. Know what you know: Always try to know what you know by making objectives, otherwise you will be confused and unable to achieve your target.

13. Use good grammar: Always use good grammar and words that will have a positive impact on the evaluator; use of good vocabulary does not mean using tough words which the evaluator has to find in a dictionary. Do not fragment sentences. Eliminate one-word sentences. Do not ever use a big word when a smaller one would suffice.

Verbs have to be in agreement with their subjects. In a research paper, do not start sentences with conjunctions or finish them with prepositions. When writing formally, it is advisable to never split an infinitive because someone will (wrongly) complain. Avoid clichés like a disease. Always shun irritating alliteration. Use language which is simple and straightforward. Put together a neat summary.

14. Arrangement of information: Each section of the main body should start with an opening sentence, and there should be a changeover at the end of the section. Give only valid and powerful arguments for your topic. You may also maintain your arguments with records.

15. Never start at the last minute: Always allow enough time for research work. Leaving everything to the last minute will degrade your paper and spoil your work.

16. Multitasking in research is not good: Doing several things at the same time is a bad habit in the case of research activity. Research is an area where everything has a particular time slot. Divide your research work into parts, and do a particular part in a particular time slot.

17. Never copy others' work: Never copy others' work and give it your name because if the evaluator has seen it anywhere, you will be in trouble. Take proper rest and food: No matter how many hours you spend on your research activity, if you are not taking care of your health, then all your efforts will have been in vain. For quality research, take proper rest and food.

18. Go to seminars: Attend seminars if the topic is relevant to your research area. Utilize all your resources.

19. Refresh your mind after intervals: Try to give your mind a rest by listening to soft music or sleeping in intervals. This will also improve your memory. Acquire colleagues: Always try to acquire colleagues. No matter how sharp you are, if you acquire colleagues, they can give you ideas which will be helpful to your research.

20. *Think technically:* Always think technically. If anything happens, search for its reasons, benefits, and demerits. Think and then print: When you go to print your paper, check that tables are not split, headings are not detached from their descriptions, and page sequence is maintained.

21. Adding unnecessary information: Do not add unnecessary information like "I have used MS Excel to draw graphs." Irrelevant and inappropriate material is superfluous. Foreign terminology and phrases are not apropos. One should never take a broad view. Analogy is like feathers on a snake. Use words properly, regardless of how others use them. Remove quotations. Puns are for kids, not grunt readers. Never oversimplify: When adding material to your research paper, never go for oversimplification; this will definitely irritate the evaluator. Be specific. Never use rhythmic redundancies. Contractions shouldn't be used in a research paper. Comparisons are as terrible as clichés. Give up ampersands, abbreviations, and so on. Remove commas that are not necessary. Parenthetical words should be between brackets or commas. Understatement is always the best way to put forward earth-shaking thoughts. Give a detailed literary review.

22. Report concluded results: Use concluded results. From raw data, filter the results, and then conclude your studies based on measurements and observations taken. An appropriate number of decimal places should be used. Parenthetical remarks are prohibited here. Proofread carefully at the final stage. At the end, give an outline to your arguments. Spot perspectives of further study of the subject. Justify your conclusion at the bottom sufficiently, which will probably include examples.

23. Upon conclusion: Once you have concluded your research, the next most important step is to present your findings. Presentation is extremely important as it is the definite medium though which your research is going to be in print for the rest of the crowd. Care should be taken to categorize your thoughts well and present them in a logical and neat manner. A good quality research paper format is essential because it serves to highlight your research paper and bring to light all necessary aspects of your research.

Informal Guidelines of Research Paper Writing

Key points to remember:

- Submit all work in its final form.
- Write your paper in the form which is presented in the guidelines using the template.
- Please note the criteria peer reviewers will use for grading the final paper.

Final points:

One purpose of organizing a research paper is to let people interpret your efforts selectively. The journal requires the following sections, submitted in the order listed, with each section starting on a new page:

The introduction: This will be compiled from reference matter and reflect the design processes or outline of basis that directed you to make a study. As you carry out the process of study, the method and process section will be constructed like that. The results segment will show related statistics in nearly sequential order and direct reviewers to similar intellectual paths throughout the data that you gathered to carry out your study.

The discussion section:

This will provide understanding of the data and projections as to the implications of the results. The use of good quality references throughout the paper will give the effort trustworthiness by representing an alertness to prior workings.

Writing a research paper is not an easy job, no matter how trouble-free the actual research or concept. Practice, excellent preparation, and controlled record-keeping are the only means to make straightforward progression.

General style:

Specific editorial column necessities for compliance of a manuscript will always take over from directions in these general guidelines.

To make a paper clear: Adhere to recommended page limits.

Mistakes to avoid:

- Insertion of a title at the foot of a page with subsequent text on the next page.
- Separating a table, chart, or figure—confine each to a single page.
- Submitting a manuscript with pages out of sequence.
- In every section of your document, use standard writing style, including articles ("a" and "the").
- Keep paying attention to the topic of the paper.
- Use paragraphs to split each significant point (excluding the abstract).
- Align the primary line of each section.
- Present your points in sound order.
- Use present tense to report well-accepted matters.
- Use past tense to describe specific results.
- Do not use familiar wording; don't address the reviewer directly. Don't use slang or superlatives.
- Avoid use of extra pictures—include only those figures essential to presenting results.

Title page:

Choose a revealing title. It should be short and include the name(s) and address(es) of all authors. It should not have acronyms or abbreviations or exceed two printed lines.

Abstract: This summary should be two hundred words or less. It should clearly and briefly explain the key findings reported in the manuscript and must have precise statistics. It should not have acronyms or abbreviations. It should be logical in itself. Do not cite references at this point.

An abstract is a brief, distinct paragraph summary of finished work or work in development. In a minute or less, a reviewer can be taught the foundation behind the study, common approaches to the problem, relevant results, and significant conclusions or new questions.

Write your summary when your paper is completed because how can you write the summary of anything which is not yet written? Wealth of terminology is very essential in abstract. Use comprehensive sentences, and do not sacrifice readability for brevity; you can maintain it succinctly by phrasing sentences so that they provide more than a lone rationale. The author can at this moment go straight to shortening the outcome. Sum up the study with the subsequent elements in any summary. Try to limit the initial two items to no more than one line each.

Reason for writing the article—theory, overall issue, purpose.

- Fundamental goal.
- To-the-point depiction of the research.
- Consequences, including definite statistics—if the consequences are quantitative in nature, account for this; results of any numerical analysis should be reported. Significant conclusions or questions that emerge from the research.

Approach:

- o Single section and succinct.
- o An outline of the job done is always written in past tense.
- o Concentrate on shortening results—limit background information to a verdict or two.
- o Exact spelling, clarity of sentences and phrases, and appropriate reporting of quantities (proper units, important statistics) are just as significant in an abstract as they are anywhere else.

Introduction:

The introduction should "introduce" the manuscript. The reviewer should be presented with sufficient background information to be capable of comprehending and calculating the purpose of your study without having to refer to other works. The basis for the study should be offered. Give the most important references, but avoid making a comprehensive appraisal of the topic. Describe the problem visibly. If the problem is not acknowledged in a logical, reasonable way, the reviewer will give no attention to your results. Speak in common terms about techniques used to explain the problem, if needed, but do not present any particulars about the protocols here.

The following approach can create a valuable beginning:

- Explain the value (significance) of the study.
- Defend the model—why did you employ this particular system or method? What is its compensation? Remark upon its appropriateness from an abstract point of view as well as pointing out sensible reasons for using it.
- Present a justification. State your particular theory(-ies) or aim(s), and describe the logic that led you to choose them.
- Briefly explain the study's tentative purpose and how it meets the declared objectives.

Approach:

Use past tense except for when referring to recognized facts. After all, the manuscript will be submitted after the entire job is done. Sort out your thoughts; manufacture one key point for every section. If you make the four points listed above, you will need at least four paragraphs. Present surrounding information only when it is necessary to support a situation. The reviewer does not desire to read everything you know about a topic. Shape the theory specifically—do not take a broad view.

As always, give awareness to spelling, simplicity, and correctness of sentences and phrases.

Procedures (methods and materials):

This part is supposed to be the easiest to carve if you have good skills. A soundly written procedures segment allows a capable scientist to replicate your results. Present precise information about your supplies. The suppliers and clarity of reagents can be helpful bits of information. Present methods in sequential order, but linked methodologies can be grouped as a segment. Be concise when relating the protocols. Attempt to give the least amount of information that would permit another capable scientist to replicate your outcome, but be cautious that vital information is integrated. The use of subheadings is suggested and ought to be synchronized with the results section.

When a technique is used that has been well-described in another section, mention the specific item describing the way, but draw the basic principle while stating the situation. The purpose is to show all particular resources and broad procedures so that another person may use some or all of the methods in one more study or referee the scientific value of your work. It is not to be a step-by-step report of the whole thing you did, nor is a methods section a set of orders.

Materials:

Materials may be reported in part of a section or else they may be recognized along with your measures.

Methods:

- Report the method and not the particulars of each process that engaged the same methodology.
- Describe the method entirely.
- To be succinct, present methods under headings dedicated to specific dealings or groups of measures.
- Simplify—detail how procedures were completed, not how they were performed on a particular day.
- If well-known procedures were used, account for the procedure by name, possibly with a reference, and that's all.

Approach:

It is embarrassing to use vigorous voice when documenting methods without using first person, which would focus the reviewer's interest on the researcher rather than the job. As a result, when writing up the methods, most authors use third person passive voice.

Use standard style in this and every other part of the paper—avoid familiar lists, and use full sentences.

What to keep away from:

- Resources and methods are not a set of information.
- Skip all descriptive information and surroundings—save it for the argument.
- Leave out information that is immaterial to a third party.

Results:

The principle of a results segment is to present and demonstrate your conclusion. Create this part as entirely objective details of the outcome, and save all understanding for the discussion.

The page length of this segment is set by the sum and types of data to be reported. Use statistics and tables, if suitable, to present consequences most efficiently.

You must clearly differentiate material which would usually be incorporated in a study editorial from any unprocessed data or additional appendix matter that would not be available. In fact, such matters should not be submitted at all except if requested by the instructor.

Content:

- Sum up your conclusions in text and demonstrate them, if suitable, with figures and tables.
- In the manuscript, explain each of your consequences, and point the reader to remarks that are most appropriate.
- Present a background, such as by describing the question that was addressed by creation of an exacting study.
- Explain results of control experiments and give remarks that are not accessible in a prescribed figure or table, if appropriate.
- Examine your data, then prepare the analyzed (transformed) data in the form of a figure (graph), table, or manuscript.

What to stay away from:

- Do not discuss or infer your outcome, report surrounding information, or try to explain anything.
- Do not include raw data or intermediate calculations in a research manuscript.
- Do not present similar data more than once.
- A manuscript should complement any figures or tables, not duplicate information.
- Never confuse figures with tables—there is a difference.

Approach:

As always, use past tense when you submit your results, and put the whole thing in a reasonable order.

Put figures and tables, appropriately numbered, in order at the end of the report.

If you desire, you may place your figures and tables properly within the text of your results section.

Figures and tables:

If you put figures and tables at the end of some details, make certain that they are visibly distinguished from any attached appendix materials, such as raw facts. Whatever the position, each table must be titled, numbered one after the other, and include a heading. All figures and tables must be divided from the text.

Discussion:

The discussion is expected to be the trickiest segment to write. A lot of papers submitted to the journal are discarded based on problems with the discussion. There is no rule for how long an argument should be.

Position your understanding of the outcome visibly to lead the reviewer through your conclusions, and then finish the paper with a summing up of the implications of the study. The purpose here is to offer an understanding of your results and support all of your conclusions, using facts from your research and generally accepted information, if suitable. The implication of results should be fully described.

Infer your data in the conversation in suitable depth. This means that when you clarify an observable fact, you must explain mechanisms that may account for the observation. If your results vary from your prospect, make clear why that may have happened. If your results agree, then explain the theory that the proof supported. It is never suitable to just state that the data approved the prospect, and let it drop at that. Make a decision as to whether each premise is supported or discarded or if you cannot make a conclusion with assurance. Do not just dismiss a study or part of a study as "uncertain."

Research papers are not acknowledged if the work is imperfect. Draw what conclusions you can based upon the results that you have, and take care of the study as a finished work.

- o You may propose future guidelines, such as how an experiment might be personalized to accomplish a new idea.
- o Give details of all of your remarks as much as possible, focusing on mechanisms.
- o Make a decision as to whether the tentative design sufficiently addressed the theory and whether or not it was correctly restricted. Try to present substitute explanations if they are sensible alternatives.
- o One piece of research will not counter an overall question, so maintain the large picture in mind. Where do you go next? The best studies unlock new avenues of study. What questions remain?
- o Recommendations for detailed papers will offer supplementary suggestions.

Approach:

When you refer to information, differentiate data generated by your own studies from other available information. Present work done by specific persons (including you) in past tense.

Describe generally acknowledged facts and main beliefs in present tense.

The Administration Rules

Administration Rules to Be Strictly Followed before Submitting Your Research Paper to Global Journals Inc.

Please read the following rules and regulations carefully before submitting your research paper to Global Journals Inc. to avoid rejection.

Segment draft and final research paper: You have to strictly follow the template of a research paper, failing which your paper may get rejected. You are expected to write each part of the paper wholly on your own. The peer reviewers need to identify your own perspective of the concepts in your own terms. Please do not extract straight from any other source, and do not rephrase someone else's analysis. Do not allow anyone else to proofread your manuscript.

Written material: You may discuss this with your guides and key sources. Do not copy anyone else's paper, even if this is only imitation, otherwise it will be rejected on the grounds of plagiarism, which is illegal. Various methods to avoid plagiarism are strictly applied by us to every paper, and, if found guilty, you may be blacklisted, which could affect your career adversely. To guard yourself and others from possible illegal use, please do not permit anyone to use or even read your paper and file.

Criterion for Grading a Research Paper (Compilation)
by Global Journals

Please note that following table is only a Grading of "Paper Compilation" and not on "Performed/Stated Research" whose grading solely depends on Individual Assigned Peer Reviewer and Editorial Board Member. These can be available only on request and after decision of Paper. This report will be the property of Global Journals.

Topics	Grades		
	A-B	**C-D**	**E-F**
Abstract	Clear and concise with appropriate content, Correct format. 200 words or below	Unclear summary and no specific data, Incorrect form Above 200 words	No specific data with ambiguous information Above 250 words
Introduction	Containing all background details with clear goal and appropriate details, flow specification, no grammar and spelling mistake, well organized sentence and paragraph, reference cited	Unclear and confusing data, appropriate format, grammar and spelling errors with unorganized matter	Out of place depth and content, hazy format
Methods and Procedures	Clear and to the point with well arranged paragraph, precision and accuracy of facts and figures, well organized subheads	Difficult to comprehend with embarrassed text, too much explanation but completed	Incorrect and unorganized structure with hazy meaning
Result	Well organized, Clear and specific, Correct units with precision, correct data, well structuring of paragraph, no grammar and spelling mistake	Complete and embarrassed text, difficult to comprehend	Irregular format with wrong facts and figures
Discussion	Well organized, meaningful specification, sound conclusion, logical and concise explanation, highly structured paragraph reference cited	Wordy, unclear conclusion, spurious	Conclusion is not cited, unorganized, difficult to comprehend
References	Complete and correct format, well organized	Beside the point, Incomplete	Wrong format and structuring

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save our planet

Global Journal of Science Frontier Research

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