Modeling of gravitational waves by creating a system of paired cross vortices. Some properties , conclusions   and applications.

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Summary: *This article uses and develops the effects and results of the New axioms and Laws described in the previous articles. New axioms and relevant Laws are necessary to extend the theory of Electromagnetic Field to a new field including and the Gravitational Field . The main difference between the Electromagnetic and the Gravitational fields is that the Electromagnetic Field is an even (equal in measure) movement , but the Gravitational Field is uneven (not equal in measure)i.e. it is an accelerating or decelerating movement. The New axioms have a new approach - substitution of closed, even(uniform) vortices from the Electromagnetic Field with open and uneven vortices of the Gravitational Field. As a result, the following properties and relationships are obtained in 2D: electric charge is a result of the direction and size of empty ring and deceleration; the structure of vacuum is a result of the feedback of primary cross vortices; the essence of the masses is a result of the number and density of cross-winds; the shape of accelerating cross vortex elements as a dense sphere is a result of direction of acceleration and shape of the decelerating cross vortex elements as an empty ring is a result of direction of deceleration; the decelerating element rotates around the accelerating element as a result of the difference of eccentricity of the accelerating and decelerating vortices and others .
For 3D is obtained :the transformation of longitudinal vortex into a cross vortex and a cross vortex into a longitudinal vortex as a cause of 3D connection in this system .*
Key words: *Electromagnetic Field, Maxwell's laws, Gravitational Field, Transformation from 2D to 3D.*

I.   Introduction

The popular axiom guaranteeing Maxwell's laws claims   that the even motion of vector E leads to movement in a closed loop {div(rot E) = 0} [1]. The author replace this axiom with a new one, which   claims that the uneven movement of vector E results in an open loop{div(rot E) ≠ 0} [2] . The first   article describes three axioms and four laws [3]. In the next article , the main axiom is developed to an open vortex {div(Vor E) ≠ 0} and in this article are described   three axioms and ten laws [4]. They lead to the following results: the even movement is replaced by an uneven (decelerating or accelerating) and   from a movement in 2D a movement in 3D is obtained; pairs of objects are constructed as transformations of uneven vortices (an accelerating a into a decelerating and vice versa) and a movement in two resultant, mutually perpendicular closed loops in 3D is obtained [4].

In this current article the descriptive approach of the essence of the phenomena is preferred , instead of using ready terms. This choice aims now to avoid the need for parallel and complicated explanations. **As well explained the former axiom {div(rot E) = 0} describes   only the Electromagnetic field [5]. In this current article, it is proven that the new axiom { div(rot E}≠ 0 or div (Vor E) ≠ 0 } describes a more extended field, including the Gravity field.**
Definition : Gravity structures represent a design of elements and links between them founded on the axiom : **div(Vor E) ≠ 0** .

Let's look at the main Gravity vortex pair: an accelerating transverse vortex (2) generated by a decelerating longitudinal vortex (8); longitudinal vortex connection (3);and a decelerating transverse vortex (1) generatin an accelerating longitudinal vortex (7) (Figure 1) [3]. The reverse pair is not examined for now .

II.   Properties and characteristics of the pair of vortex structures [2; p. 289-293] .
2.1.   Charge of the two structures of transverse vortices.
Definition: The pair of transverse vortices (1) and (2) connected with longitudinal vortex (3) represent a sustainable system which we will call a sustainable pair (Figure 1).
Let's mark the two objects as an accelerating object (2), ($a_2 > 0$) and a decelerating object (1), ($a_1 < 0$) . Let's break the transverse link (3) between the two objects (1) and (2) , for example, in point 3 (p.3) . For instance let's put the accelerating object (2) in an electric field with two poles. Then the acceleration component (2), ($a_2 >$

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0) of Figure1 , ***will be attracted by the negative pole*** (1), (a_1 <0). The cause is that the accelerating element(2) strives to form a sustainable pair with one of the excessive decelerating elements (1) and it looks as if it has a positive charge. If we put the decelerating vortex element (1) of Figure1 in the electric field, it will move to the pole, which contains an excess of accelerating elements (2), (a_2>0) , i.e. **to the positive pole**. The cause is that the decelerating element (1) ***strives to form a sustainable pair*** with one of the excessive accelerating elements (2) and it looks as if it has a negative charge.
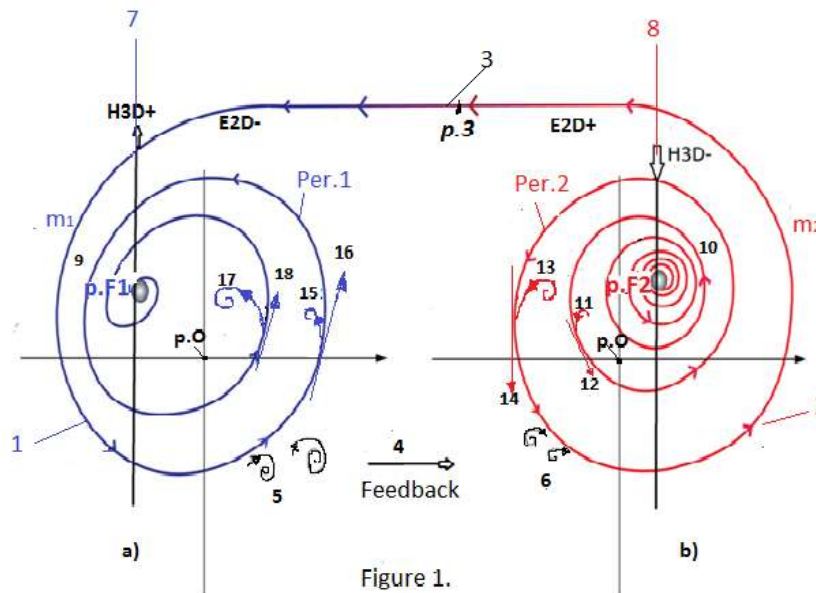

Figure 1.

Conclusion : The charge of the open vortices is a dynamic feature of the cross vortex and is proportional to the acceleration, which is the same, respectively at the output (p. 3 ;E2D+) of the accelerating (2) and the input (p. 3 ;E2D-) of the decelerating (1) vortex {Figure 1).

The charge is an essential expression of the structure, rather than its shape. This is an internal dynamic manifestation of the vortex structure, ***not just the external addition(or lack)*** of electrostatic load to the surface of close or open vortices.

2.2. The space(vacuum) between the two main cross vortex elements is full of primary cross vortices .
The main transverse link (3) is between the accelerating (2) and the decelerating (1) open vortex . The main decelerating vortex (a_1 <0) of the decelerating element (1) emits elementary vortices (5) in the space around this object (1), and the main accelerating vortex (a_2> 0) of the accelerating element (2) sucks these elementary vortices (6)[3] . Thus a reverse movement appears (4) *(feedback)* from the decelerating (1) to the accelerating (2) element in the empty space between the two elements[4].
The direction (4) is opposite to the main transmission (3) on the main connection of the accelerating (2) to the decelerating (1) element(Figure 1).
The sign of the feedback (4) is positive, because the more powerful is the main transmission (3), the more powerful is the counter transmission (4) to the full saturation (Figure 1)[8].
Conclusion : *The primary decelerating transverse vortices (5) are emitted (outside) by the main decelerating vortex(1) and the primary accelerating transverse vortices (6) are sucked by the main accelerating transverse vortex (2) by means of the positive feedback (4) .*
The primary transverse vortices (5,6) are similar to the secondary or main transverse vortices (1, 2), but are in another - smaller measuring scale . Thus, the secondary- main (1, 2) and the primary -elementary (5.6) transverse vortices form a sort of fractal structures in 2D (Figure 1)[3].

2.3. Difference in the reflection of the light of two vortex objects and the link between them.
2.3.1. Two objects are visible.
As we know light is distributed evenly in space in the form of cross electromagnetic wave [4]. Both vortex objects (1) and (2) are also created by transverse waves but uneven transverse waves. One of the objects is generated by a cross accelerating (2) and the other is created by a cross decelerating wave (1). Therefore the two vortex objects and the light are similar and homogeneous and that is why these objects will reflect the electromagnetic light wave in an adequate manner and **they are be visible** (Figure 1).

Conclusion : Both cross vortex objects (1) and (2) will be visible as they are: the accelerating object (2) will be more visible ,as a large and dense sphere and the decelerating object (1) will be less visible , as an empty and light ringlet(Figure 1).

2.3.2.The link is invisible.
The link (3)between the two vortex objects (1,2) is not cross vortex , but it is a longitudinal vortex[2,3].
If the dimension of section of this longitudinal vortex is commensurable with the length of the electromagnetic wave of light, and when the transverse electromagnetic wave (called light) meets this longitudinal thread of link (3), then the wave **will diffract** around the longitudinal thread i.e. it will wind round and will continue to move in the original direction ,with the
initial speed and intensity. So the longitudinal vortex (3) will conduct energy from (2) to (1) but **it is invisible** (Figure 1) .
Conclusion : The light will not be reflected, refracted or bent by the longitudinal vortex (3) and we, as external observers, will not see anything.

2.3.3. The feedback is invisible.
 The reverse link (4) between the two vortex objects (1) and (2) is neither transverse nor longitudinal, and is realized by the movement of one ring primary open cross vortices (5) and (6) (Figure 1).

        If the dimensions of the elementary one ring primary open cross vortices (5,6) are commensurable with the length of the electromagnetic wave, *and when* the electromagnetic wave meets these one ring open primary vortices, then it **will diffract** around them i.e. it will wind round them and will continue to move in the initial direction, speed and intensity. The external primary vortices (5) and (6), forming the reverse link (4) are **also invisible,** but conduct matter(not energy) (Figure 1).
Conclusion : The external one ring primary vortices (5) and (6), filling the space between the two vortex objects (1) and (2) and generating the reverse link as a feedback (4) between them, are also invisible to the external observer.
Therefore, we as external observers, will see the accelerating object (2), the decelerating object (1) , but we will not see any of the links between them: neither the direct link (3), nor the reverse link (4) connection (Figure 1).Even more we will see accelerating object (2) as a thick and heavy sphere and the decelerating object (1) -as a light and empty ringlet [4].

2.4.Pulsing (breathing) of the whole system in time.
The accelerating (2) and the decelerating (1) objects pulse in time by shortening and stretching, both in terms of a longitudinal component (7,8) and a transverse component (9,10). The reason for pulsing modulation comes outside. It forces the generating longitudinal vortex (8) of the accelerating object (2) to pulse.
Thus, when the generating longitudinal vortex (8) gets an impulse from outside ,it *extends.* The accelerating transverse vortex (2) *expands* ,the longitudinal vortex link (3) *extends,* the decelerating transverse vortex (1) *shrinks* and the resulting   longitudinal vortex (7) *extends.*
The accelerating element (2) at this condition look as if it has a large and inflate body.The decelerating element(1) at this condition look as if it has a small and shrink body(Figure1) .
Conclusion : The accelerating (2) and the decelerating (1) element as well as the connection (3) between them pulsate (breathe) in time. The generating longitudinal vortex (8) shortens or extends and causes contraction or expansion of the transverse vortex (2) and thus shortening or extending of the longitudinal link (3), which causes contraction or expansion of the transverse vortex (1) and the shortening or extension of the resulting longitudinal vortex (7) .

III. The decelerating element revolves around the accelerating one   [6; p.65-75]
3.1 The open decelerating element is   eccentric, but not concentric.
In the decelerating element (1) the linear speed (16) at the periphery(Per.1) is greater than the linear speed(18) to the center(p.F_1) towards the more internal turn (Figure 1a).Moreover the speed V_1 in point 1(1) is greater than the speed V_2, at its opposing point 2 (2) . So $V_1 > V_2$, and the speed V_3 in point 3 (3) is greater than the speed V_4 in the opposite point 4(4) i.e.: $V_3 > V_4$ (Figure 2a). In the perpendicular direction V_5 in point 5(5) is greater than V_6 in point 6(6) i.e.: $V_5 > V_6$ and etc. (Figure 2a) .This dynamics has shown that the transverse turns will be drawn to the higher speed i.e. to V_1 (upwards) and V5 (left)(when observer is against the body) .The geometric center (p. O)   will   shift   to   the   new   place   or   to   the   gravity center(p.F_1).
The   distance   between   the   two   centers   (p.   O   –   p. F_1)   will   be   (F_L -).
So the   decelerating vortex (1) will thicken generally to the point 7 and point 8 of periphery and will be

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diluted to point 9 and point 10 of periphery. So the center will shift from geometric center O (p.O) upwards and left to the gravity center F (p.F$_1$). The power of eccentricity (F$_L$-) will be proportional to the distance (D) from geometric center (p. O) to the gravity center (p.F$_1$))i.e. :(p.O—p.F1) (Figure 2a; Figure 3a).Therefore:

$$(F_L\text{-}) \quad \sim \quad D\,(p.O\text{—}p.F_1)$$

3.2. The open accelerating element is eccentric too ,but not concentric .
By the same logic the center of the accelerating vortex (2) will be drawn to the higher speed: up and right (when observer is against the sketch) (Figure 3b).

Conclusion: Drawing to the center of the accelerating vortex (2) up and right (FL+) (Figure3b) is opposite to the shift of the center of the decelerating vortex (1), which is pulled up and left (FL-)(when observer is against the sketch) (Figure3a).

3.3. Mutual disposition of the accelerating and the decelerating eccentric vortex objects.
3.3.1. Eccentricity (FL) .
The accelerating element (2) is much denser to the center, than the decelerating (1) is much denser to periphery.
The accelerating element (2) has a lack of space in center (Figure 1a). So the shift of the center of the accelerating element (FL+) is much less(Figure3b) than a shift of the center of the decelerating element (FL-)(Figure3a) . The shift (FL-) from the center of the decelerating vortex from point O(p.0) up and left to point F1 (p .F1) (Figure 3a) will be much greater than the shift (FL+) from the center of the accelerating vortex from point O (p.O) up and right to point F2 (p.F2) (Figure 3b). Therefore:

$$(\text{ FL- })\ \square\ (\text{FL+})\ .$$

This means that when (FL-) and (FL+) decompose horizontally and vertically: the horizontal (F1-) and vertical vector (F2-) of the shift (FL-) for the decelerating element(1) will also be larger than the horizontal (F1+) and vertical vector (F2+) of the shift (FL+) for the accelerating element (2), i.e. (Figure 3).Therefore:

$$(\text{F1-}) > (\text{F1+})\ ;\quad (\text{F2-}) > (\text{F2+})\ .$$

Conclusion 1: The decelerating element (1) has a greater shifted center , greater eccentricity and greater force of eccentricity (F $_L$-). This force (F$_L$-) is directed from the gravity point (p. F$_1$) to the point of the geometric center (p. O) and is decompose into two perpendicular to each other components: the first one (F$_1$-) is aimed to the accelerating element (2) and the second one (F$_2$ -) is perpendicular (in a plan of view from the top downwards) and it is situated on the <u>right</u> of the first (Figure 3a).
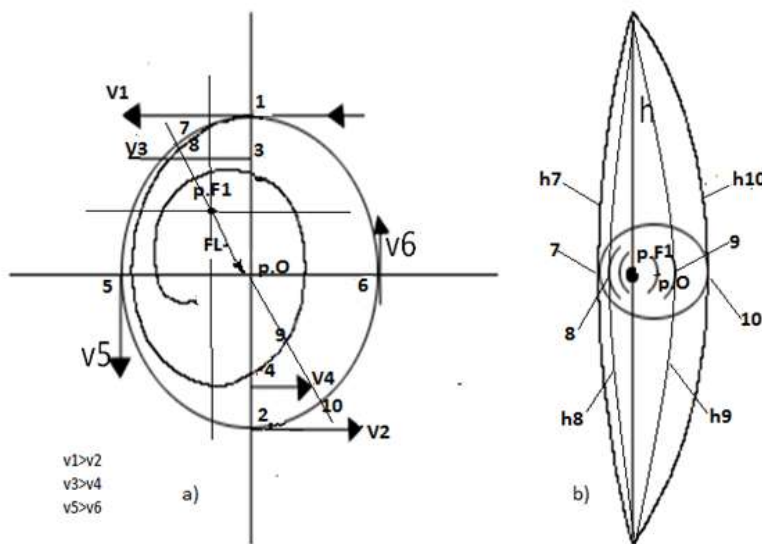

Figure 2.

Conclusion 2 : *The accelerating element (2) has a less shifted center, less eccentricity and a smaller force of eccentricity (FL +).* This force (FL +) is directed from the point of eccentricity (p.F) to the point of the geometric center (p.O) and is decomposed into two perpendicular to each other components: the first one (F1+) is directed to the decelerating element (1) and the second one (F2 +) is perpendicular
(in a plan of view from the top downwards) and it is situated on the left of the first (Figure 3b).

3.3.2. Distance (D).
The power of eccentricity (F_L) is decomposed into two components: (F_1) and (F_2). Thus, we obtain that (F_1-) of the decelerating element (1) is in the opposite direction (F_1+) of the accelerating element (2) and is larger in absolute value (Figure 3). Therefore :

$$|\mathbf{F_1}\text{-}| > |\mathbf{F_1}\text{+}|.$$

Since (F_1-) and (F_1+) are in opposite directions and face each other, they precisely determine the distance (D) between the accelerating (2) and the decelerating (1) vortex (Figure 3).

Conclusion : The distance between the two vortex elements (D) is proportional to the sum of absolute value each of the two forces (F_2-) and (F_2+) , with which they push one another away :

$$\mathbf{D} \sim |\mathbf{F_2}\text{-}\square + \square \mathbf{F_2}\text{+}|.$$

3.3.3. Speed (V_0) .
On the other hand the force (F_2-) of the decelerating element (1) and the force (F_2+) of the accelerating element (2) is one-way, but also (F_2-) is greater than (F2+) in absolute value as we show in paragraph 3.3.1 :

$$|\mathbf{F_2}\text{-}| > |\mathbf{F_2}\text{+}|.$$

This is the cause , the decelerating element (1) to turn at a certain speed (V_0) (Figure 3a) around the accelerating element (1) (Figure 3b).

Conclusion: The speed of movement (V_0) of the decelerating element (1) around accelerating element (2) is proportional to the difference of absolute value of the two forces (F_2-) and(F2+)(Figure 3) :

$$\mathbf{V_0} \sim |\mathbf{F_2}\text{-}\square - \square \mathbf{F_2}\text{+}\square.$$

3.3.4 Frequency pulsation in time (T) .
Paragraph 2.4. shows that the decelerating element (1) does not rotate in a circle, but in an ellipse around the accelerating element (2) due to low frequency pulsation of the whole system over time. The generating longitudinal vortex (8)) (Figure 1) should do one period so that the decelerating object (1) makes *one turn in an ellipse* around the accelerating object (1) (Figure 3).

Conclusion: The decelerating element (1) describes a full ellipse around the accelerating element (2) (Figure 3) for one period of the generating vortex (8) (Figure 1)

IV. The open vortices rotate in around their own axes, too.
4.1. The rotation of the decelerating element around its axis by internal primary vortices.
4.1.1. The internal primary vortices.
From the paragraph 2.1. we realize that the internal primary vortices(11,13;15,17) are resulted by the secondary-main vortices (2,1). They (11,13;15,17) have the same shape and dynamics as the main vortices(2,1) but in the smaller scale(Figure 1).
For example ,the main accelerating vortex (2) has accelerating primary vortices (3)(Figure 4b) and the main decelerating vortex (1) has decelerating primary vortices (3) (Figure 4a).
4.1.2. Directions.
Inside the decelerating element (1) there is a large number (n_1) of powerful in amplitude (W_1) *internal primary vortices* (3) (Figure4a).They are closed inside and can't be emitted
outside into the surrounding area as *external primary vortices*(5) to form the free elementary vortices and to be involved in the feedback(4) (Figure 1) .
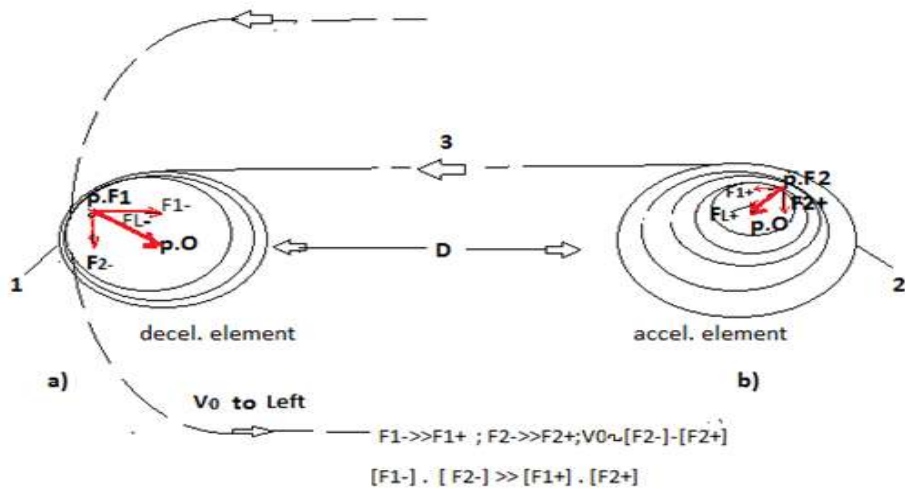
Figure 3.

For the decelerating element these *internal primary*   vortices(3) with amplitudes (W_1) *are curved to the left (3)* and rotate the decelerating element (1) to the left (4) with velocity (w_1) (Figure 4a).The direction*" left"* is at relation to observer standing against the sketch (Figure 4).

Conclusion : The direction of the *rotation of the decelerating element (1) around its axis is* **to the** *left (4)* and the *magnitude of the speed (w_1) of the   rotation is proportional to the product of the   number (n_1) and the amplitude (*W_1) *of the* internal primary vortices (3)*(Figure 4a). *Therefore* :

$$w_1 \ \sim \ \ n_1 . W_1 .$$

4.2 The rotation of the accelerating element around its axis by primary internal vortices.
Inside the accelerating element (2)   there are also *internal primary*   vortices (3), though much fewer in number (n_2) and with a much smaller amplitude (W_2)(Figure 4b). They are completely closed and they can't be involved in the *external feedback* (4) (Figure 1). These *internal primary*   vortices (3) with amplitudes (W_2) are curved to **the right** (3) and rotate the accelerating element (2) at a speed (w_2) to the right (4) (Figure 4b). The   direction*" right"* is at relation to   observer standing against the sketch (Figure 4).

Conclusion: The direction of the *rotation of the accelerating element around its axis (2) is* **to the right** *(4)* and the *magnitude of the speed (w_2) of the rotation is proportional*

to the product of number (n_2) and the amplitude (W_2) of the internal primary   vortices (3) (Figure 4b) *:*
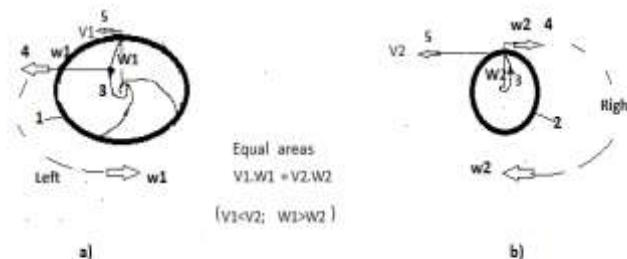
$$w_2 \ \sim \ \ n_2 . W_2 .$$

Figure 4.

Note : "Left- right" directions are in relation to observer standing against the sketch on the paper.

4.3 Difference in the speed of rotation around the axis of the decelerating and the accelerating elements.
Inside the decelerating element (1), the number (n_1) and the amplitude (W_1) of the *decelerating internal primary vortices* (3) are much larger than the number (n_2) and the amplitude (W_2) of the *accelerating internal primary vortices* (3) of the accelerating element (2) (Figure 4b) Therefore :

$$n_1 > n_2; \quad W_1 > W_2, \quad or \quad n_1.W_1 > n_2.W_2.$$

Conclusion: Since the speed around the axis (w_1) of the decelerating element (1) is proportional to the product ($n_1.W_1$), and the speed around the axis (w_2) of the accelerating element (2) is proportional to the product ($n_2.W_2$), and $n_1 > n_2$ and $W_1 > W_2$, then the decelerating element rotates much faster than the accelerating one i.e. :

$$w_1 > w_2.$$

V. General conclusions.

5.1   The internal structure of the accelerating and the decelerating elements are the reason for their properties.
5.1.1. **The acceleration**   is the same at the output of the accelerating element and at the input of the decelerating element. The acceleration   is the reason for "the charge" of the two elements. The decelerating element emits external primary vortices ,while the accelerating element sucks external primary vortices .These external primary vortices fill the space (vacuum)
 between the elements and form a feedback between them. The acceleration is the reason why the accelerating element has the form of a solid thick sphere and the deceleration – has the form of an empty light ring (thoroid) (Figure 1,Figure 3)[4].

5.1.2.The eccentricity of the decelerating element is greater than the eccentricity of the accelerating element. This is the reason why the *decelerating element turns around the accelerating element(Figure 2,Figure 3)*.
5.1.3.The pulsing in time of the system of two elements. It is low and high frequency pulsing.
The low frequency pulsing of the two elements and the connection between them is the reason why the decelerating element rotates ***in an ellipse*** (not a circle) around the accelerating element(Figure 1). The low frequency pulsing of the decelerating cross vortex generates longitudinal vortices in the center , which wrap(packed) themselves in longitudinal pipes with extremely interesting ***antigravity properties***. [7].
High frequency pulses generate ***gravitational attraction*** (***pressure***)and acceleration into the corresponding object by the transverse vortices [8]

5.1.4. Different directions of rotation of the primary internal open vortices. The primary internal open vortices have different accelerations and different directions of rotation .This   cause on the one hand both elements to rotate around their axes. On the other hand ,the fact that the vortices of the decelerating element are more in number and they have a greater amplitude than the vortices of the accelerating element , is the cause the decelerating element to rotate faster around its axis than the accelerating element. The primary internal cross vortices of the decelerating element are curved to the left (from the periphery to the center), and those of the accelerating element are curved to the right (from the center to the periphery)(Figure 3,Figure 4).
5.1.5. **Visibility and invisibility** structures.The open cross vortices of both elements are visible and the open longitudinal vortex of the connection between them is invisible. That is why, so far the two elements were are perceived and are registered one by one, without a connection between them, not as a united, synergistic and sustainable system. Except that the longitudinal vortex of the main connection is invisible *(invisible energy)*, but also and primary vortices are invisible. The external primary vortices from the feedback are also invisible *(external* Invisible matter) the   internal primary vortices in the internal space of elements are also invisible *(internal* invisible matter) (Figure 1,Figure 3).

5.2. Prototypes and application of gravitational elements.
Given an account   exhibited   properties of gravitational element we should note the following:
5.2.1.Prototype of gravitational acceleration element   is the proton (p+) as part of the Nuclear of Atom system and as a part of Sun of solar system[2].
5.2.2.Prototype of gravitational   decelerating   element is the electron (e -) as part of the shell of Atom system and as a part of planet of solar system[6] **.**
5.3. Proof of existence of transverse gravitational waves
The gravitational waves were discovered on September 14, 2015 by means of the detectors of the Laser Interferometric Gravity-Wave Observatory (LIGO) located in Livingston, Louisiana and Hanford, Washington, USA. LEAG is funded by the US National Science Foundation and tools are built and coordinated by the

California Institute of Technology and the Massachusetts Institute of Technology. The discovery was published in the journal Physical Review Letters.

Scientists are of the opinion that the black holes that produced gravitational waves have a mass of 29 and 39 times that of the Sun. The event happened 1.3 billion years ago. About three times the mass of the Sun has been converted directly into gravitational waves within a fraction of a second. The Livingstone detector has identified the event 7 milliseconds before the Hanford detector.

According to Einstein's general theory of relativity, a pair of black holes circling one another lose energy through the emission of gravitational waves, which makes them approach slowly and gradually within billions of years. The process accelerates much faster in the last minutes. Within the last second of a second, the two black holes collide

at a speed of about half that of the light, and this results in a massive black hole, whereby a portion of the combined mass is converted into energy according to the equation $E = mc^2$. **This energy is emitted as a strong explosion in the form of gravitational waves. They have been observed by the LEO Observatory[9].**

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