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Application of Expanded Field Theory to describe the basic characteristics of matter and energy

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ABSTRACT : *The present study uses Expanded Field Theory that has two new axioms and eight laws. It was described from previous work of this author and change the Classic Field Theory to a more general theory .*

It is known that Maxwell's laws (1864) are based on a single axiom which states that the movement in a closed loop leads to even movement (with constant speed) of a vector E: div rot E = 0 . The author replaces this axiom with a new one, according to the movement in an open loop or vortex leads to uneven movement (with variable speed) of a vector E : div rot E ≠ 0 or div Vor E ≠ 0. Later on are created another axiom and are generated eight new laws that lead to the following results: The movement in a closed loop is replaced with movement in an open loop (vortex) and even movement is replaced with uneven movement that can be decelerating or accelerating; in 2D there is a cross vortex and in 3D there is a longitudinal vortex; decelerating vortices emit free cross vortices; accelerating vortices suck in the free cross vortices ;the cross vortex in 2D is transformed to a longitudinal vortex in 3D through a special transformation Δ1 and the longitudinal vortices in 3D is transformed to a cross vortex in 2D through another special transformation Δ2 and so on.Cross vortices are visible to an external observer because they reflect the sun's rays. Cross vortices form 2 types of vortices: a vortex that is formed by the amplitude vector (or is generated by primary free cross vortices) and plays a role as an emitting type and a vortex that is formed by the velocity vector and plays a role as a sucking type.Even more, each of these may be accelerating or decelerating. They are prototypes of 4 kinds of material creations. . Longitudinal vortices are invisible to an outside observer because they do not reflect and diffract the sun's rays.

Longitudinal vortices form 2 types of bundles: a bundle in which the fastest vortex is in the center and forms a gravitational sucking funnel and a bundle in which the fastest vortex is at the periphery and forms a gravitational repellent funnel.In addition, each funnel has two ends - pulling and pushing. This gives 4 prototype energy creations.

KEY WORDS: *Maxuel' s Axiom; Maxuel' s Law; Classic Field Theory; Accelerating vortex; Decelerating vortex; Transform Operator; Gravity Funnel*.

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I. THE ESSENCE OF AXIOM 1.

1a. The Classic Axiom

The classic axiom in the Theory of the Electromagnetic Field certifies Maxwell's laws (1864). It postulates that the movement of an electric vector E in a closed loop is evenly:

$$\mathbf{div(rot\ E) = 0,} \qquad \mathbf{1.}$$

where (rot E) is the movement of the vector E in a closed loop; div (rot E) is the divergence (the variation in increase or decrease) of the vector E during its movement in a closed loop (rot E) ; the movement of the vector E in a closed loop (rot E) with zero divergence (variation) of the vector E is equivalent to evenly movement or to movement with constant velocity V.[1].

The defect of the classic axiom (1) is that it does not describe movements in an open loop or a vortex, or movements with a non-constant or variable velocity V.

1b.The New Axiom for rotor

For the purpose of describing a larger range of movements,

it is obviously necessary to expand the foundation of service theory. This means that such an axiom must be used which can certify wider set of movements.

The main motivation for altering the classic axiom (1) follows after the need to describe the causative relationships in uneven movements in open systems. It turns out that open vortices are the cause of closed vortices, which means that open vortices are more fundamental than closed ones [2].

So it is the necessity to change the existing axiom of the Classic Field Theory for close loop to axioms of Expanded Field Theory for open loops [3].
In order to expand the concepts, the notion (1) of movement of vector E in a closed loop (div (rot E) = 0) in 2D (Figure 1A,a) is replaced by the notion (2) of movement in an open loop (div (rot E) ≠ 0 in 2D (Figure 1A,b).
The new axiom describes an open loop movement:

div (rot E) ≠ 0 , **2.**

1c. The extension of the term of vortex (vor) from Classic Fluid Theory

-Unreal term of vortex **:** evenly vortex (vor) is used in Classic Theory:

The term vortex (vor) is used in fluid dynamics and defined as "an area in fluids, where the flow rotates evenly along a spiral around an axis line, which can be straight or curved" [4]. Fluid movement is uniform (evenly) in 3D .To begin with, we can use this classic definition, having in mind that here the term (vortex, vor) is for a uniform vortex in the classical sense .

-Real term of vortex **:** unevenly vortex (Vor) means that the velocity (V) is variable and as a result –the steps are not constant.

For the purposes of the present study the the term must extend to both 3D and 2D and modified for an unevenly vortex or a vortex with uneven movement .

In fact, in nature it does not exist evenly vortex with the constant steps between the rotations. If a movement is evenly, it forms a closed circle rather than an open vortex. There is an unevenly vortex in nature, and because it is uneven it is not centered, but it is eccentric.

Thus the designation of an evenly vortex "vortex, vor" is replaced with a designation for an uneven vortex "Vortex, Vor" with a capital letter.

So the description of an "evenly vortex**"** ,that can not exist in nature: div (vorE)> 0; div (vorE) <0 will replace of description of an unevenly (natural) vortex that exists in nature: div (VorE)> 0; div (VorE) <0

Definition: The monotone accelerated or decelerating vortex (VorE) of the vector En is called a natural vortex (vorE) for which:

div (VorE)> 0; div (VorE) <0 .

Definition: An unevenly cross vortex (E_{2D}) is an unevenly vortex (E) spinning transversally in a 2D plain.
The cross open vortex in 2D is designated as Vortex E_{2D} or simply Vor E_{2D} (Figure 1A,b).
Definition: An unevenly longitudinal vortex (H_{3D}) is an unevenly vortex (H) spinning in the volume of 3D.
The longitudinal open vortex in 3D is designated as Vortex H_{3D} or simply Vor H_{3D}(Figure 1A,d).
Both definitions for natural unevenly vortices ignore the thickness of the vortex itself, be it cross or longitudinal. Differences in geometry reflect the difference in distance between the coils and the diameter of the coils.

1d.The New Axiom for rotor and vortex

It exists a vortex div (VotE) ≠ 0 as an open loop (div (rotE) ≠ 0) in 2D and 3D or :

div (VotE) ≠ 0 **3.**

The existence of an open loop means that it can exists a decelerating or an accelerating vortex:

div (VorE) <0; div (VorE)> 0; **4.**

<u>Axiom</u> 1. The motion of vector along the vortex: div ($VorE_{2D}$) ≠ 0, div ($VorH_{2D}$) ≠ 0
is done at monotone-decreasing or monotone-increasing velocity in 2D or 3D for which:
div ($VorE_{2D}$) <0, div ($VorE_{2D}$)> 0; div ($VorH_{3D}$) <0 , div ($VorH_{3D}$)> 0. **5.**

We immediately received 4 types of movements - cross, which can be accelerated or decelerating and longitudinal , which can also be accelerated or decelerating.

<u>Consequence</u> (of visual perception):

It is known that light is spreading crosswise.

-Therefore, the cross vortex will reflect the light rays, and an external observer will perceive the image of the cross vortex.

-But the thread of the longitudinal vortex does not reflect the light. The light crosses the thread of longitudinal vortex , surrounds the thread, and continue its path without reflecting the longitudinal vortex. So it forms diffraction. Therefore, the longitudinal vortex is invisible to an external observer .

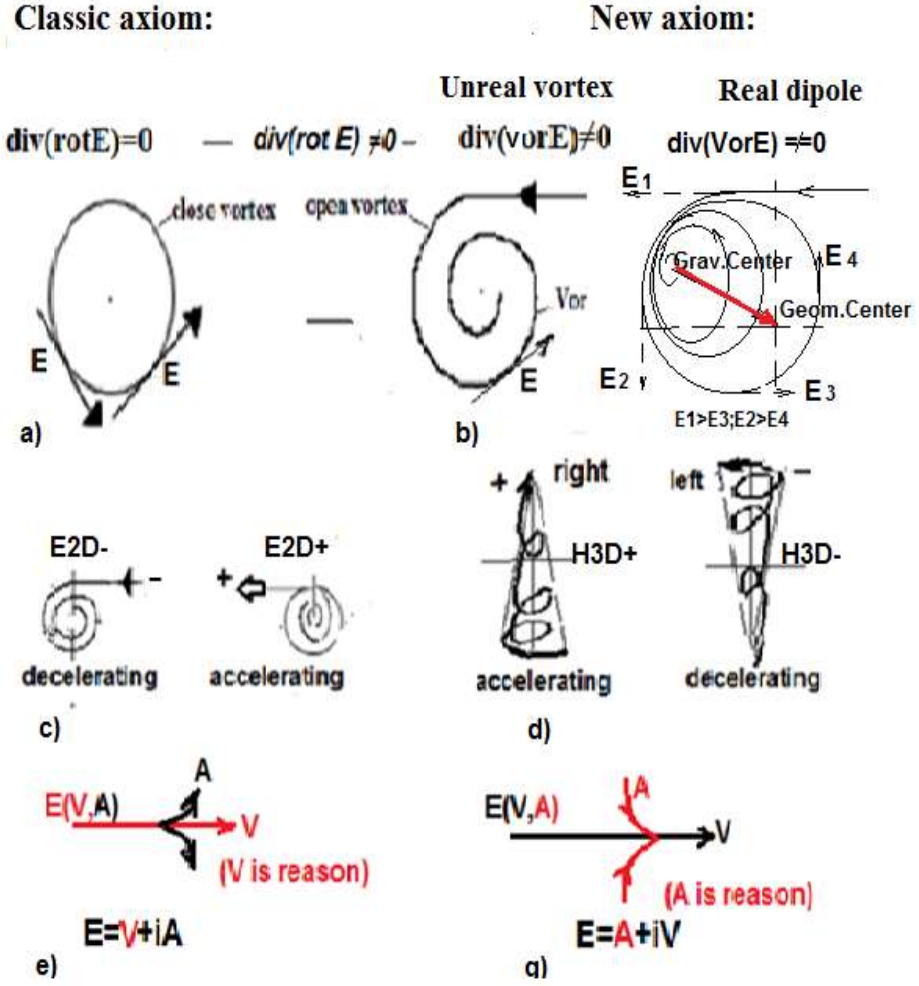
The Classic axiom uses the definition of a closed loop (div (rot E) = 0) (1)[1]. The new Axiom 1(5) postulates that the movement of vector E in an open loop is always unevenly and uses a new definition (2) with an open loop (div (rot E) ≠ 0) (Figure 1A,b). [2 , стр 233- 241], [3].

<u>Consequence</u> (of difference in derivative) **:**

The main difference is that the longitudinal vortex (H_{3D}) stands higher in the hierarchy compared to the cross vortex (E_{2D}). For example the longitudinal vortex (H_{3D}) (Figure1A,d) is a higher derivative of the cross vortex (E_{2D}) (Figure 1A,c).

Consequence (of variation of moving):
The main result of Axiom 1 is that there have been four types of vortices : a cross vortex in 2D (E_{2D}) that can be accelerated(E_{2D+}) or decelerated (E_{2D-}) and a longitudinal vortex in 3D (H_{3D}) that can also be accelerated (H_{3D+}) or decelerated (H_{3D-}) ,(Figure1A,c,d) .

Figure 1A.The classical axiom is replaced by a new axiom



Consequence (of complex vector)
The vector E is not a simple but complex vector. It contains the velocity (V) of the real(reason) flow and the amplitude (A) of the imaginary (result) cross vortices (Figure1A,e) or the amplitude (A) of the real (reason) cross vortices and velocity (V) of the imaginary (result) flow (Figure1A,g) .

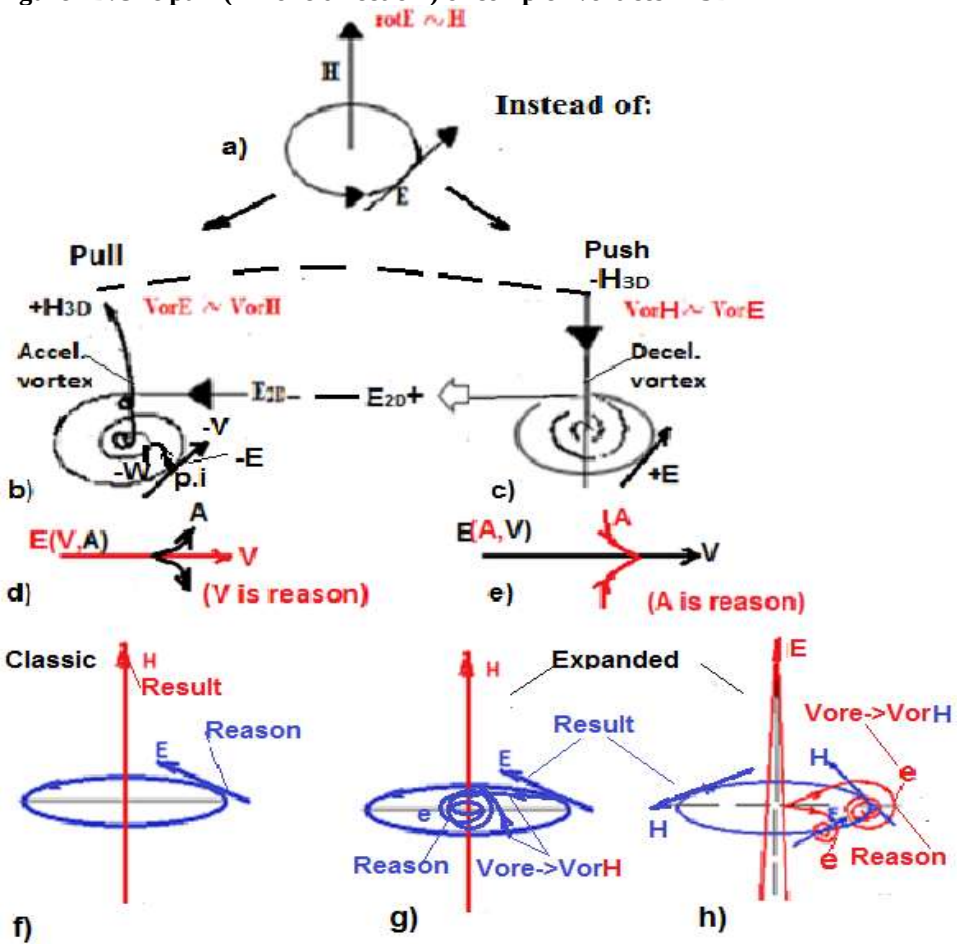
II. THE ESSENCE OF AXIOM 2.

2a. Two directions of pair of complementary objects

Definition: A pair of object for which actions are complementary , are called pair of complementary objects.
If one object pushes (Figure1B,c) ,but other pulls (Figure1B,b) ,they form a pair of complementary objects. Because of one object pushes (Figure1B,c) ,the other- pulls (Figure1B,b) , the both of them are active generators or they form a pair of active generators in complementary work.

Consequence :
- The first pair is in straight direction: amplitude (A) can be the reason but the speed (V) is the result (E = A + iV) (Figure1B,c) and the velocity (V) can be the cause and the amplitude (A) - the result (E = V + iA) (Figure1B,b) .
- The second pair is in the oposite direction: amplitude (-A) can be the reason but the speed (-V) is the result (E = -A - iV) and the velocity (-V) can be the cause and the amplitude (A) is the result (E = -V - iA) (this situation is not depicted in the figure) .

Figure 1B.One pair (in one direction) of complex vortices in 3D



Axiom 2: Two complex vortices of one complementary pair in one direction in 2D: E_{2D} =+ A + iV; E_{2D} =+V + iA, or two complex vortices of complementary pair in opposite direction in 2D : E_{2D} = - A - iV; E_{2D} = -V – iA, exist simultaneously in 3D. 6.

2b. A pair of active generators

Because of one object pushes (Figure1B,c) ,the other- pulls (Figure1B,b) , the both of them are active generators or they form a pair of active generators in complementary mode.

Consequence : In the pair of complementary objects, the both of them are active generators . That's why the efficiency is always more than one.
-In the Electromagnetic Field, the electrical circuit contains one generator element and one or several consumers. That's why the efficiency is always less than one.

III. EXPANDING OF MAXWELL'S LAW

3a. The inconvenience of the first Classic Maxuell's Law

According to the classic axiom (1), the first classic law of Maxwell named "the law of electromagnetic induction" is presented as follows:

$$\mathbf{rot\ E = -\mu\ \partial H/\partial t} \quad , \qquad \mathbf{7.}$$

where (rot E) is the evenly movement of the electric vector E in a closed loop, μ is the coefficient of magnetic permeability, $\partial H/\partial t$ is the variation of the magnetic vector H in time t [1].

-On the one hand, a change in magnetic induction over time ($\partial H / \partial t$) creates a evenly movement of the electric vector (rot E) .It is named "the law of electromagnetic induction" :

$$-\mu\, \partial \mathbf{H}/\partial t \rightarrow \mathbf{rot\ E}\ . \qquad \textbf{7a.}$$

-On the other hand, an evenly movement of the electric vector (rot E) must generate a magnetic induction vector (H) in the center of the closed loop:

$$\mathbf{rot\ E} \sim \mathbf{H}\ , \qquad \textbf{7b.}$$

where the sign (**~**) means proportionality .

Consequence (about the sense of the first Classic Maxuell's law):
This presentation of Classic Maxuell's law refers only to evenly movement of the electric vector (rot E) that must generate a magnetic induction vector (H) in the center of the closed loop. .

3b. Expanded Law of Maxwell

-According to the new axiom (2) (div (rotE) ≠ 0) and the new definition of vortex (3)(div (VorE) ≠ 0),the Expanded Maxwell's Law is modified like this: a cross vortex in 2D(Vor E) of vector (E) continues in the center as an one single and simple longitudinal vortex in 3D (VorH) of vector (H)(Figure 1B, b)

- According to the new axiom (2) Expanded Maxwell's Law states that the cross vortex (Vor E) of vector (E) generates an one single and simple longitudinal vortex (VorH) of vector (H) in the center:

$$\mathbf{(Vor\ E)_{2D} = k(.Vor\ H)_{3D}}, \qquad \textbf{7c.}$$

where (Vor E) is a cross vortex in 2D of vector (E); (VorH) is an one single and simple longitudinal vortex in 3D of vector (H), (k) is an estimator of medium viscosity.

-The direction of the resulting vector (H) is determined by the well known Right-hand Rule .If the right hand is facing down and the fingers indicate the direction of the velosity (V)(right), and the thumb indicates the amplitude direction (W)(left), the piercing through the palm will show the upward direction of the vector (H).

-It expands the content of the meanings of movement of vector (E) and vector (H) in the development of laws later. Their main philosophy is affirmed as (E) is the cause vortex, and (H) is the result vortex. So in particular the cross vortex (VorE) generates in center a longitudinal vortex(VorH) (7c).

IV. LAWS OF TRANSFORMATION (TRANSFORMATIONS Δ1, Δ2) [2].

4.1.Laws of the transformation of a cross vortex (E_{2D}) into a longitudinal vortex (H_{3D}) .

At every (i) point p(i) of a decelerating cross vortex E there are two simultaneous movements: velocity vector (-V) and amplitude of the cross vortex(-W) . The two simultaneous movements (V and W) also exist at all points of longitudinal vortices .The cross vortex (E_{2D}-) is transformed into a longitudinal vortex (H_{3D}+).

This is accomplished through a specific operator (Δ1) for cross-longitudinal transformation (Figure 1B,b).

The cross (E_{2D}) and the longitudinal (H_{3D}) vortex are not an original and an image by analogy with the well-known transformations of Laplace or Fourier. They are representatives of spaces with qualitatively different structures. Therefore the introduced operator (Δ1) connects the original in one type (transverse) of space with its image in another type (longitudinal) of space, i.e. the transformation Δ1 connects two spaces with different qualities.

Law 1 : The open cross vortex (E_{2D}) generates (inward or outward) an open longitudinal vortex (H_{3D}) in its center through a cross-longitudinal transformation Δ1:

$$\mathbf{Vor\ (E_{2D})} \xrightarrow{\Delta 1} \mathbf{-Vor\ (H_{3D})}, \qquad \textbf{8.}$$

where Vor (for Vortex, meaning an unevenly vortex) replaces rot (for rotor, meaning closed loop) ;the cross vortex in 2D (E_{2D}) continues its development in 3D as a longitudinal vortex (H_{3D}) (Figure1Bb).

While Maxwell's law (7) states that vector E generates vector H, the present law (8) postulates that the cross vortex Vor (E_{2D}) of E in 2D generates a longitudinal vortex Vor (H_{3D}) of H in 3D. The sign (-) for Vor (H_{3D}) 3D means that E_{2D} and H_{3D} have opposite dynamics .For example when div (Vor E_{2D}) < 0 (is decelerated) , div (Vor H_{3D}) > 0(is accelerated).

Definition: A decelerating cross vortex (E_{2D}^{-}) is a cross open vortex (E_{2D}) for which div (Vor E_{2D}) < 0.

Figure 2c shows a decelerating cross vortex (E_{2D}^{-}) inward.

Definition: A decelerating longitudinal vortex (H_{3D}^{-}) is a longitudinal open vortex (H_{3D}) for which div (Vor H_{3D}) < 0.

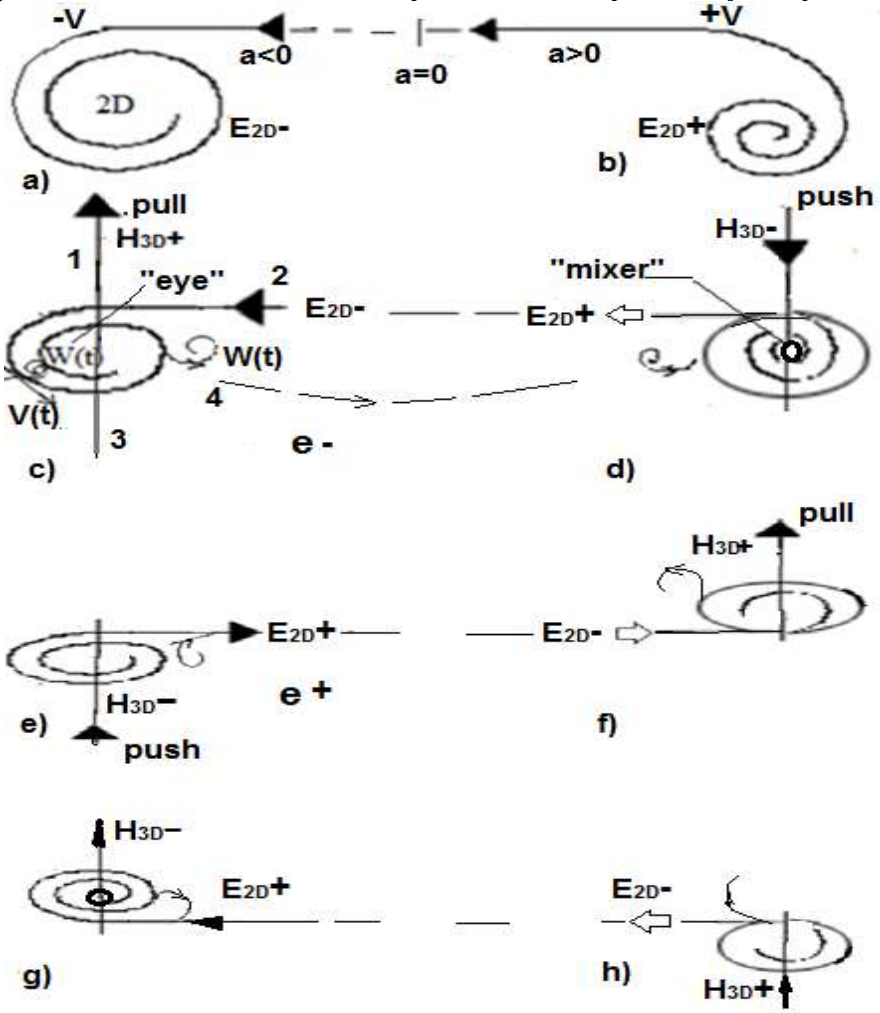
Figure 2d shows a decelerating longitudinal vortex (H_{3D}^{-}) inward.

Definition: An accelerating cross vortex (E_{2D}^{+}) is a cross open vortex (E_{2D}) for which div (Vor E_{2D}) > 0.

Figure 2b,d shows an accelerating cross vortex (E_{2D}^{+}) outward.

Definition: An accelerating longitudinal vortex (H_{3D}^{+}) is a longitudinal open vortex (H_{3D}) for which div (Vor H_{3D}) > 0.
Figure 2c shows an accelerating longitudinal vortex (H_{3D}^{+}) outward.

Figure 2.Two Transformation Laws. Options in two complementary complex objects .



The present paper describes only the chain of matter : the push-pull chain (Figure 2d - Figure 2c) or inverse pull-push chain(Figure 2f - Figure 2e) . The decelerating cross vortex (E_{2D}^{-}) inward generates an accelerating longitudinal vortex (H_{3D}^{+}) outward in its center through a physical transformation (Δ1-) (Figure 2c).
-This transformation (Δ1-) is achieved through a phenomenon called full resonance (resonance in amplitude, frequency and phase). This type of resonance will be described in detail in further developments and reports.

Consequence : The open decelerating cross vortex (E_{2D}^{-}) generates inward an open accelerating longitudinal vortex (H_{3D}^{+}) outward . This action takes place in the center of decelerating cross vortex (E_{2D}^{-}) through a particular cross-longitudinal transformation Δ1-:

Δ1-

$$\text{Vor}\,(E_{2D}^{-}) \Rightarrow \text{Vor}\,(H_{3D}^{+})\,. \qquad 8a.$$

Figure 2c shows this transformation in 3D.
-Consequence (8a) of Law1 corresponds only to the pulling part inward (Figure 2c) of the cross vortex pair of objects in 2D (Figure 2c - Figure 2d)**.**
-If the Consequence (8a) of Law1 generates in 3D a simple and single longitudinal vortex, it would describe the Expanded Maxuell's Law(7c) and Electromagnetic Field .

-If the Consequence (8a) of Law1 generates in 3D a pipe - wrapped vortices from longitudinal vortices inserted into each other , it describes another field with properties inverse to the Electromagnetic Field .It describes the Gravity Field as a Gravity Funnel. Gravity funnel is generated in 3D tube of

longitudinal vortices as an longitudinal energy in pulling part outward (Figure2c) of the pair of complementary objects (Figure2c – Figure2d) .

-The Consequence (8a) of Law1 describes in 2D the model of electron as the decelerating inward vortex (dec (e-)) (Figure2c) in the chain of proton-electron (Figure 2d - Figure 2c) . Every electron (dec(e-)) of this type pulsates in 3D in two modes of : " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6A, Figure 6C).

Consequence : The open accelerating cross vortex (E_{2D}^{+}) generates inward an open decelerating longitudinal vortex (H_{3D}^{-}) outward . This action takes place in the center of accelerating cross vortex (E_{2D}^{+}) through a particular cross-longitudinal transformation Δ1+:

Δ1+

$$Vor\ (E_{2D}^{+}) \Rightarrow Vor\ (H_{3D}^{-})\ . \qquad 8b$$

-The Consequence (8b) of Law1 describes in 2D the model of electron (e-) as the accelerating inward vortex(acc(e-)) (Figure2c) in the chain of proton-electron (Figure 2d - Figure 2c) .Every electron (acc(e-)) of this type pulsates in 3D in two modes of : " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6A, Figure 6C).

Consequence : The Consequence (8a) and Consequence (8b) describe decelerating or accelerating **cross vortex to inward** (Figure 6A)**.**

-We immediately obtain 4 tipe of electrons : (dec(e-)) and (acc(e-)) electrons , that each of them pulsates in two modes: " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6A, Figure 6C).

Consequence: It exists another two consequences (not described in the article), but they describe decelerating or accelerating **cross vortices to outward** .This is the 2 type of positrons: (dec(e+)) and (acc(e+)) positrons .

-We immediately obtain 4 tipe of positrons : (dec(e+)) and (acc(e+)) that each of them pulsates in two modes: " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6B, Figure 6C).

4.2.Laws of the transformation of a longitudinal vortex (H_{3D}) into a cross vortex (E_{2D}) .

For the opposite transformation a new operator Δ2 is introduced to transform a longitudinal (H_{3D}) into a cross (E_{2D}) vortex. The physical nature of this Δ2 transformation is quite different in comparison with Δ1.

-Generally speaking, the transformations Δ1 and Δ2 are orthogonal rather than symmetrical to each other**.**

Law 2: The open longitudinal vortex (H_{3D}) generates (inward or outward) an open cross vortex (E_{2D}) in its center through a longitudinal-cross transformation Δ2:

Δ2

$$\mathbf{Vor\ (H_{3D}) \Rightarrow -- Vor\ (E_{2D})} \qquad \mathbf{9.}$$

Consequence : The open decelerating longitudinal vortex (H_{3D}^{-}) inward generates an open accelerating cross vortex (E_{2D}^{+}) outward .This action takes place in the center of accelerating cross vortex (E_{2D}^{+}) through a particular longitudinal-cross transformation Δ2+:

Δ2-

$$Vor\ (H_{3D-}) \Rightarrow Vor\ (E_{2D+}). \qquad 9a.$$

- The Consequence (9a) of Law2 in 3D refers to the pushing part (Figure2d) of the pair of complementary objects (Figure2c – Figure2d).The transformation Δ2 emphasizes that the movement of the longitudinal vortex (H_{3D}) inward is the cause , and the movement of the cross vortex(E_{2D}) outward is the result (Figure 2d).

-When the Consequence (9a) of Law2 are generated by the pipe - wrapped longitudinal vortices , it describes Gravity field .It has the inverse properties to the Electromagnetic Field.

-This Gravity field exists as a tube from inserted one in another the longitudinal vortices .It forms a Gravity funnel which has a pushing and a pulling ends.

-The pushing end of Gravity funnel is attached to the pushing part (Figure2d) of the pair of objects (Figure2c – Figure2d) .This end decelerates inward and generates cross vortex outward as a matter.

Consequence : The open accelerating longitudinal vortex (H_{3D}^{+}) inward generates an open decelerating cross vortex (E_{2D}^{-}) outward in its center through a special longitudinal-cross transformation Δ2+:

Δ2+

$$Vor\ (H_{3D+}) \Rightarrow Vor\ (E_{2D-}). \qquad 9b.$$

-The Consequence (9b) of Law2 describes in 2D the model of proton(p+) as the accelerating outward vortex(acc(p+)) (Figure2d) in the chain of proton-electron (Figure 2d - Figure 2c) .Every proton (acc(p+))

of this type pulsates in 3D in two modes of : " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6A, Figure 6C).

Consequence : The Consequence (9a) and Consequence (9b) describe decelerating or accelerating **cross vortex to outward** (Figure 6A)**.**

-We immediately obtain 4 tipes of proton : (dec(p+)) and (acc(p+)) that each of them pulsates in two modes: " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6A, Figure 6C).

Consequence: It exists another two consequences (not described in the article), but they describe decelerating or accelerating **cross vortices to inward** .This is the 2 models of antiprotons (dec(p-)) and (acc(p-)) (Figure 6B).

-We immediately obtain 4 tipes of antiproton : (dec(p-)) and (acc(p-)) that each of them pulsates in two modes: " expanded cross vortex and a shortened longitudinal vortex" and "shrunken cross vortex and extended longitudinal vortex " (Figure 6B, Figure 6C).

4.3. Antiphase relations in pulse mode

It exists antiphase relations between the two objects of a complementary pairs in both directions (straight and opposite) .

-According to Law 1 and Consequences the decelerating cross vortex shrinks, the longitudinal vortex increases and when decelerating cross vortex expands ,the longitudinal vortex becomes shorter . So when the decelerating cross vortex shrings , an energy quantum of longitudinal vortex is shooted to the imaginery space (Figure 2c) .

-According to Law 2 (9) and Consequences when the longitudinal vortex increases ,the cross vortex object shrinks , when the longitudinal vortex becomes shorter the cross vortex expands (Figure 2d). So when the accelerating cross vortex expands (Figure 2d), an energy impulse quantum is shooted to the decelerating vortex(Figure 2c) .

- The distance between accelerating and decelerating vortices is pulsated simultaneously .When the accelerating cross vortex expands and the energy quantum is shooted to the decelerating vortex and distance between accelerating and decelerating vortex increases (Figure 2c - Figure 2d).

Consequence : In pulsating mode a complementary pair of complex cross-longitudinal vortices work in antiphase.The objects of the two complementary pairs (in one and the opposite direction) pulse in counter-phase .

4.4 .Conclusions

-If Consequence (8a) of Law 1 generates a simple and single longitudinal vortex ,it would refer to the Electromagnetic field .

-If he Consequence (8a) of Law 1 generates a pipe - wrapped vortices from accelerating longitudinal vortices inserted into each other ,it really generates accelerating Gravity Funnel .

-If the Consequence (9a) of Law 2 is generated by a pipe - wrapped vortices from decelerating longitudinal vortices inserted into each other , it refers to the decelerating Gravity Funnel .

-The new extended meaning of the term" Complementarity" is when the two parts are generating and they act anti-phase - one push and the other pulls.

-The two transformations Δ1 (Law1) and Δ2 (Law2) are not symmetrical but rather form pairs of objects that complement each other in their action .So they form a pairs of complementary objects or they are mutually orthogonal.

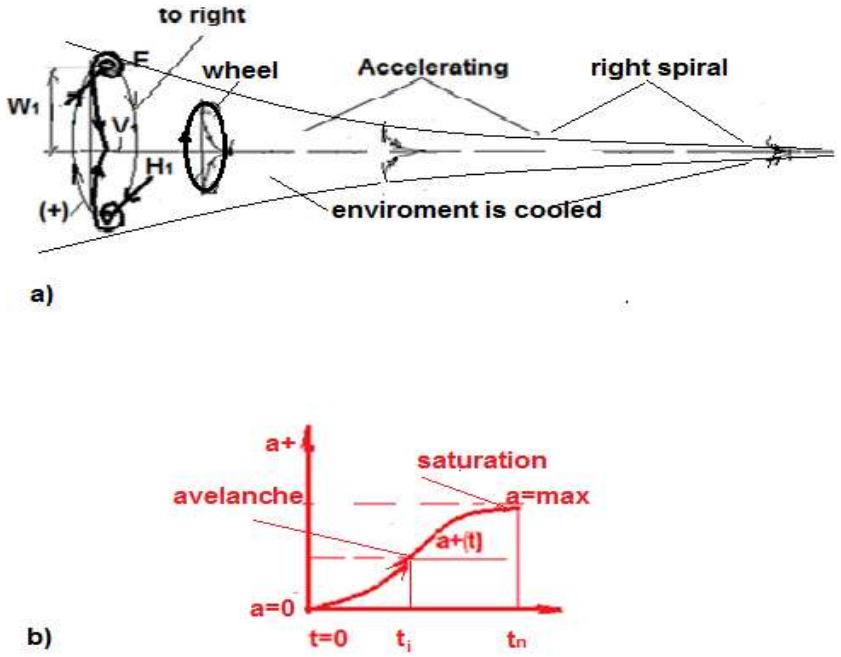
-The two vortices in the described above vortex pairs (Figure 2c - Figure 2d**) play the role of generators** (!) - one push (Figure 2d) , the other –pulls (Figure 2c). Obviously in described above chain (Figure 2c - Figure 2d) there is not the consumer . Therefore this chain has not energy losses. It is well known that in every Electromagnetic chain has generator and one or more consumers .That's why Electromagnetic chain has energy losses.

-Both transformations, Δ1 (Law1) and Δ2 (Law2), are not regulated by external interference or external parameters . Therefore the processes are regulated only by internal laws and are not determined by outside parameters.

V. LAW OF NONPARAMETRIC MOVEMENT OF THE VORTEX[3]

Let us consider a decelerating longitudinal vortex with decreasing acceleration of velocity: V_1, V_2,…, V_n, decreasing acceleration of cross vortices and increasing amplitude of the cross vortices W_1, W_2,…W_n (Figure 3a,b). Let us consider also an accelerating longitudinal vortex with increasing acceleration of velocity: V_1, V_2,…, V_n, increasing acceleration of cross vortices and decreasing amplitude of the cross vortices W_1, W_2,…W_n (Figure 3a,c).

Figure 3 .Positive Feedback



-Obviously the acceleration and deceleration of the longitudinal vortex is a nonparametric process. Accelerating and decelerating longitudinal vortices do not manifest qualitative differences. They only differ quantitatively by their magnitude and sign of the change [5].

-The Law 3(10) shows that when velocity V_i increases, the amplitude of cross vortices W_i decreases (or inverse) . This phenomenon is due to redistribution of the acceleration of the cross and longitudinal vortices . There is also redistribution of mass. The mass of the cross vortices is added in portions (quanta) with acceleration to the initial mass of the longitudinal vortex and thus accelerates it(Figure 3a,c).

-The accelerating longitudinal vortex sucks in more cross vortices from outside that accelerate further the longitudinal vortex and so on (Figure 4a,c).Thus the longitudinal vortex increases of acceleration and increases of mass at the exit which returns as an increase of the acceleration and mass to the entrance. This mechanism of amplification is known in cybernetics as Positive Feedback.

Law 3: A longitudinal vortex is accelerated and decelerating by internal logic as a nonparametric process through Positive Feedback.

-When, for example, an accelerating longitudinal vortex sucks in with acceleration the cross vortex, then in start moment(t=0) its first derivative is minimum: a=0. However the accelerated absorption of the cross vortex increase and when in the end moment($t=t_n$) the positive acceleration of the cross vortex becomes maximum: a_{max} >>0.The mass of this cross vortex is added to the longitudinal vortex accelerating it further (Figure 3b).

-It is an example of the avalanche process. In the next cycle the accelerated longitudinal vortex again sucks in a portion (quantum) of the cross vortex and so on. Through Positive Feedback the level of saturation constantly increases, the time interval needed for saturation becomes longer, etc.

-Positive Feedback turns the described above avalanche process from an amplifier to a generator procces**.**

Consequence : The Positive Feedback in a longitudinal vortex turns the process of amplification to a process of generation. The Positive Feedback can be a base for constructing an energy generator.

-Probably this generative effect of the Positive Feedback was used by Nikola Tesla in the construction of the electronic block for his electro mobile. The original engine worked in generator mode and needed a battery only at start up.

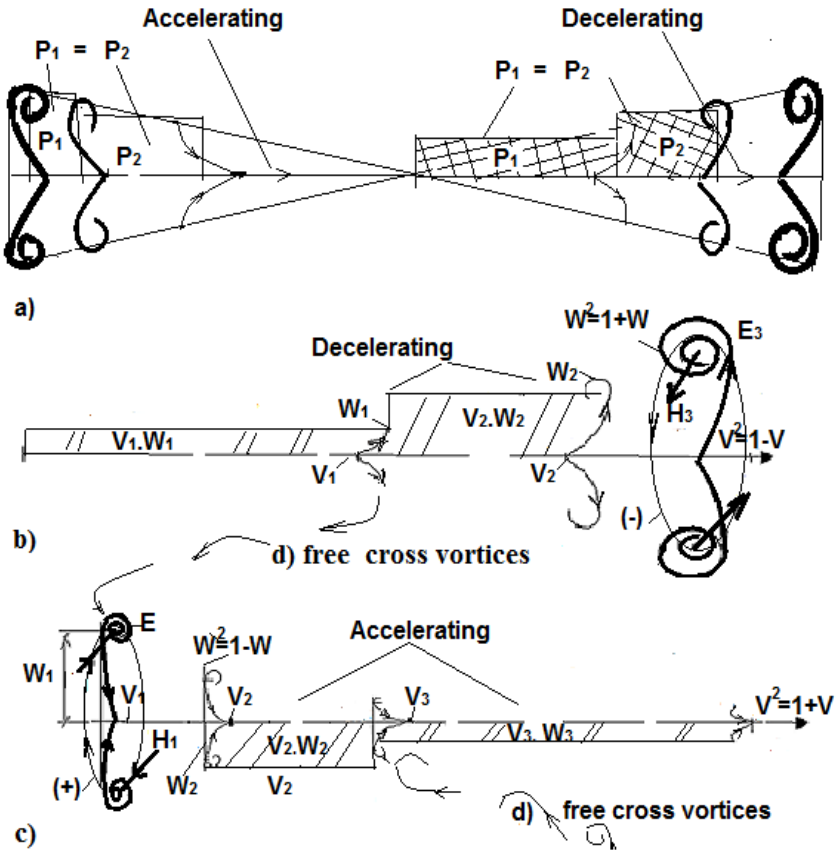
VI. LAW OF THE CONSTANT POWER OF THE VORTEX[5]

As we saw above there are two **qualitatively different** movements at each (i) point p (i) of the decelerating vortex E: longitudinal vector velocity (V) and cross vortex with amplitude (W) (Figure 1B,b).

-It is known that in Classic Mechanic the simultaneous operation of two homogeneous vectors **is equal to the sum** of these vectors.

-According to Law 3 , the transforming one vector (V) into a vortex (W) and vice versa is a nonparametric process. Transformation is done by internal laws but not by setting parameters from outside .The nonparametric transformation of two variables V (t) and W (t) is mathematically described by the product V (t) .W (t) of these variables.

Figure 4.A system of accelerating and decelerating vortices



-The simultaneous operation of two qualitatively different vectors V (t) and W (t) **is equal to the product** of these variables V (t).W (t).We have seen that at each (i) point of the vortex E there is simultaneously a vector velocity (V) in 1D and vortex pressure (W) in 2D (Figure1B,d).

-In the case of the accelerating longitudinal vortex the velocity increases (V+), while the amplitude of the cross vortices decreases (W-) in such a way that their product (V+).(W-) remains constant all along the longitudinal vortex (Figure 4a,b). The product (V+).(W-) is proportional to the power (P+) of the accelerating longitudinal vortex .

-In the case of the decelerating longitudinal vortex the velocity decreases (V-), while the amplitude of the cross vortices increases (W+) in such a way that their product (V-).(W+) remains constant all along the longitudinal vortex (Figure 4a,c). The product (V-).(W+) is proportional to the power(P-) of the decelerating longitudinal vortex .

<u>Law 4:</u> For an uneven (accelerating or decelerating) longitudinal vortex with current velocity (V_i) and current amplitude of the cross vortices (W_i) ,the product (V_i).(W_i) is a constant:

$$(V_i).(W_i) = \text{const.}, \qquad 10.$$

where $i = 0 \div \infty$ and the product (V_i).(W_i) is proportional to the power of the uneven longitudinal vortex (P).

<u>Consequence</u>: The complex action of velocity (V) and the amplitude of the cross vortex (W) at a given moment (t) is equal to the product(10) :V (t) .W (t).

-At a decelerating vortex vector velocity (V) is transformed according to internal law into the amplitude of the cross vortex (W) (Figure 4a,b) . -At a accelerating vortex the amplitude of the cross vortex (W) is transformed according to internal law into a vector velocity (V) (Figure 4a,c)

VII. laws of the velocity of the longitudinal vortex (v) and the amplitude of the cross vortices (w)[7]

Law 4 claims that in the decelerating vortex vector velocity (V) is transformed according to internal law into the amplitude of the cross vortex (W) (Figure 4b) and in the accelerating vortex the amplitude of the cross vortex (W) is transformed according to internal law into a vector velocity (V) (Figure 4c)

Law 5: The velocity of a decelerating longitudinal vortex decreases in (n) portions $(1/\psi)^n$ times, while the amplitude (W) of cross vortices increases reciprocally in (n) portions $(\psi)^n$ times:

$$\mathbf{I\ V^2 = V_0\,(1 - V),} \qquad \mathbf{11a.}$$

$$\mathbf{I\ W^2 = W_0(1 + W),} \qquad \mathbf{11b.}$$

where v_n and ω_n are periodic roots with period n that fulfill the requirement for orthogonality **:** $\mathbf{v_n.\omega_n = V_0.W_0}$; $n = 0 \div \infty$; the roots v_n and ω_n are expressed as: $\mathbf{v_n = (1/\psi^n).V_0}$, $\mathbf{w_n=(\psi)^n.W_0}$ **;** V_0 is the starting value of V_n, W_0 is the starting value of w_n and ψ is a number that fulfills the requirement: $\mathbf{\psi\text{-}1/\ \psi = 1}$.

Consequence: A decelerating vortex(E_{2D}-) with a velocity vector (V) emits to the environment decelerating vortices with increasing amplitude (W)

- The amplitude (W) increases in perpendicular direction to the velocity vector(V).

-In decelerating longitudinal vortex, the amplitude (W) increases only if it is directed from the inside to the outside, ie. if the decelerating vortex **emits outward** cross vortices with increasing amplitude (W) (Figure 4b).

-According to the Law1(11) and Rule of the Right Hand, the decelerating vortex of (E) continues like a longitudinal vortex of(H) rotating to the left. Therefore, the entire decelerating longitudinal vortex twists left-counterclockwise (watched against the movement) (Figure 4b).

Consequence: When velocity (V) decreases and the amplitude (W) increases , the number of revolutions (N) increase ψ **times n n portrions :** $\mathbf{N_n = \psi^n.N_0}$.

Consequence: Decelerating longitudinal vortices wind counterclockwise (-)(Figure 4b)..

Law 6: The velocity (V) of an accelerating longitudinal vortex increases in (n) portions $(\psi)^n$ times while the amplitude (W) of cross vortices decreases reciprocally in (n) portions $(1/\psi)^n$ times;

$$\mathbf{I\ V^2 = V_0(1 + V),} \qquad \mathbf{12a.}$$

$$\mathbf{I\ W^2 = W_0(1 - W),} \qquad \mathbf{12b.}$$

where v_n and ω_n are periodic roots with period n that fulfill the requirement for orthogonality: $\mathbf{v_n.\omega_n = V_0.W_0}$; $n = 0 \div \infty$; the roots v_n and ω_n are expressed as: $\mathbf{v_n = \psi^n.V_0}$, $\mathbf{w_n=(1/\psi)^n.W_0}$ **;** $\mathbf{V_0}$ is the starting value of v_n, W_0 is the starting value of w_n and ψ is a number that fulfills the requirement: $\mathbf{\psi\text{-}1/\ \psi = 1}$.

The first positive root of the first equation (12a) is $v_1 = \psi.V_0 = 1{,}62.V_0$. The first positive root of the second equation (12b) is: $w_1 = 1/\psi.W_0 = 0{,}62.W_0$. The periodic roots of the first equation (11a) are obtained from the expression $\mathbf{v^n = V_0.\ (v^{n-1}+v^{n-2})}$**.** The periodic roots of the second equation (12b) are obtained from the expression $\mathbf{w^{n-2} = W_0.(w^n - w^{n-1})}$**.**

Consequence: When velocity (V) increases and the amplitude (W) decreases , the number of revolutions (N) decrease ψ **times in n portions :** $\mathbf{N_n = (1/\psi^n).N_0}$**. When n is limited to** ∞**,** $\mathbf{N_n}$ **is limited to 0.** That means that the last of n portions **does not rotate**.

Consequence: When velocity (V) increases, the amplitude (W) decreases so that at each step (i) (according to Law 3) the product (Vi). (Wi) is a constant.For an accelerating longitudinal vortex, the amplitude (W) decreases only if it is directed from the outside to inside , ie. if the accelerating vortex sucks in cross vortices with decreasing amplitude (W)(Figure 4c)

Consequence: It exists an expanded sense of the simultaneous action of equations from each of systems (11) and (12).They portray a qualitatively new, specific and combined movement in the form of a system:

-The system expresses the joint action of two movements - longitudinal and transverse vortex;

- This system is mutually orthogonal; the direction of velocity of the longitudinal vortex V is perpendicular to the direction of the amplitude W of the transverse vortices and, respectively, to the direction in which the transverse vortices

- This system is open (not closed) ie. the system contains: a closed inner part - the longitudinal vortex, and an open outer part - the transverse vortices.

- Exactly the openness of the system of two mutually orthogonal, simultaneous and cooperative movements is the cause of the exchange of cross vortices (inward or outward) with the environment.

Consequence: An accelerating vortex(E_{2D}+) with a velocity vector (V) **sucks in** accelerating vortices with decreasing amplitude (W) in perpendicular direction.

According to the Consequence 8b of Law1 the direction of the resultant vortex (H) caused by an accelerating cross vortex (E) is from left to the right. Therefore, the entire acceleration vortex will twist to the right – clockwise (+), viewed against the movement (Figure 4c).

Consequence: Accelerating longitudinal vortices wind clockwise(+) (Figure 4c).

VIII. LAWS OF CONTINUITY [6]

In Euclidean geometry has an axiom that postulates that only one straight line passes through two points. The Axiom 2 for two complementary objects resemble an axiom in Euclidean geometry. But in essence Axiom1 and Axiom 2 are physical, rather than geometrical. Instead of points as geometric objects there is a pair of vortices with different dynamics as physical objects: the both of them are generators-one pulls, the other pushes(Figure 2c,d).

Provisionally vortices can be classified as primary (W) and secondary (E) uneven vortices. The primary uneven vortices are micro cross vortices (W)(Figure 4d) .The secondary uneven vortices are macro cross vortices (E) (Figure 2c,d).The primary cross vortices exist as a free form or free cross vortices .They are also called as " free energy" (Figure 4d).

Definition: Primary vortices are emitted to the environment or sucked in from environment by the secondary (main) vortex .

8.1.Law of continuity in a closed loop in 2D

According Law 5 (11) decelerating cross vortex (E_{2D}^-) emits decelerating primary cross vortices in perpendicular direction (Figure 4b).

-In general the primary micro vortices are derivatives of the main secondary macro vortices.

-Since cross vortex objects are physical, they must fulfill the main Physical Law of continuity cycle of movement. The Axiom2 considers the question of the link in the opposite direction which closes the full circle (loop) of cross vortices in 2D.

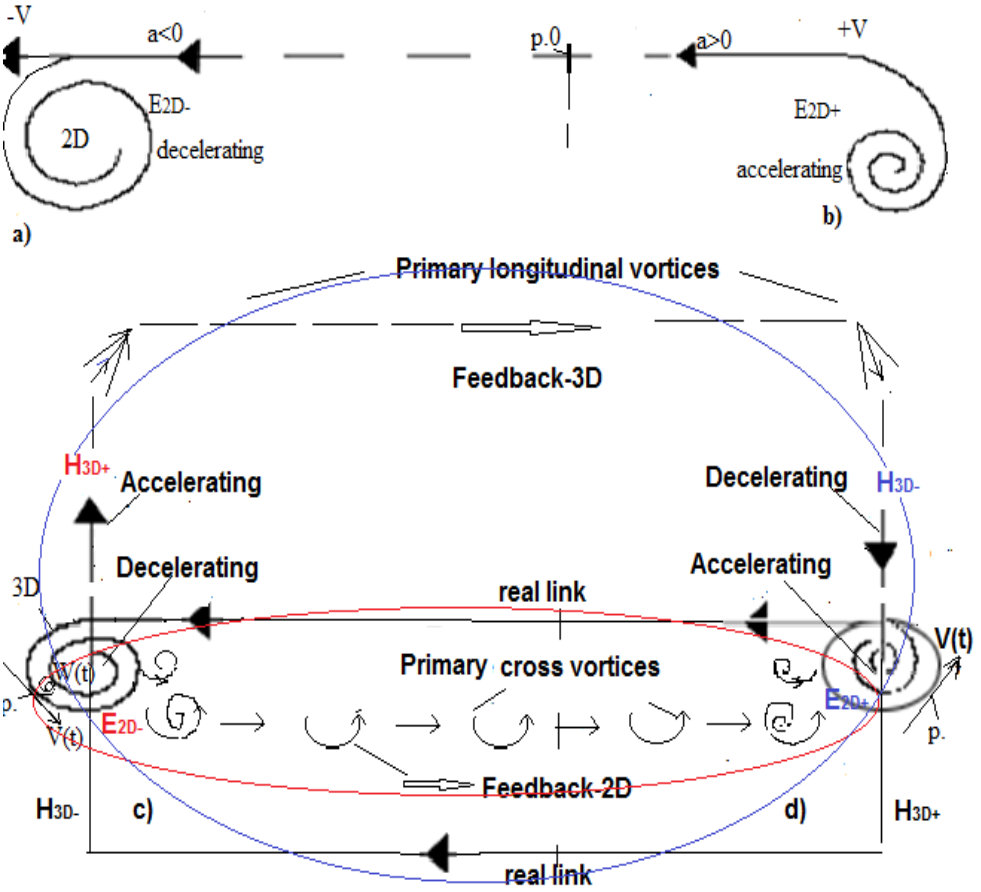
-In order to fulfill the fundamental law of continuity, the feedback must pass through empty space (feedback 2D).It contains elementary primary cross vortices generated and emitted by the secondary decelerating cross vortex(Figure 4c) and consumed and sucked in by the secondary accelerating cross vortex (Figure 4d). This feedback is closed through the so called "empty space ".The feedback has link in inverse direction to link of the main cross vortices.

-Therefore, in order to satisfy this fundamental law in physics, apparently this space cannot be "empty", as we often call it. The imaginary space is filled with primary cross vortices: copies of the secondary cross vortices but at a much smaller scale.

Law 7: A pair of open cross objects in 2D forms a closed loop in 2D by feedback in 2D of primary cross vortices . This pair conducts energy through the real connection: (Figure 5d - Figure 5c) ,($E_{2D}^+ - E_{2D}^-$) **and conducts matter through the back link: (Figure 5c -Figure 5d) ,**($E_{2D}^- - E_{2D}^+$) **or through the feedback 2D.**

The reason for the emission of primary elementary cross vortices is the deceleration of the main longitudinal vortex (E_{2D}^-) (Figure 4b,Figure 5c).) .But their movement in the space between the two vortex objects in 2D is due to the sucking action of the accelerating main longitudinal vortex (E_{2D}^+) (the second vortex in the pair) (Figure 4c, Figure 4d).

Figure 5. System of one pair of complementary vortices



8.2.Law of continuity in a closed loop in 3D

Let us consider the nature of the link in the opposite direction that closes the full circle (loop) of main longitudinal vortices in 3D, perpendicular to the circle (loop) in 2D**.**

-In order to fulfill the fundamental law of physics the feedback of the main longitudinal vortices in 3D must close through the space (feedback 3D).It contains elementary primary longitudinal vortices, generated and consumed by the main secondary longitudinal vortices.

-This imaginary space is filled with primary longitudinal vortices resembling copies of the secondary longitudinal vortices but at a much smaller scale. All longitudinal vortices (primary and secondary) create a new type of field that contributes to our knowledge of the field as a form of matter.

The real link (Figure 5d - Figure 5c) of the chain in 3D conducts real pulsating energy (H_{3D} +) ÷(H_{3D} -) .The back link (Figure 5c- Figure 5d)) of the 3D chain conducts pulsating matter.

-The reason for this is that the pulsating accelerated longitudinal vortex(H_{3D} +) is made to dashes in the form of primary longitudinal vortices. As these longitudinal vortices are highly accelerated they attract, suck and form longitudinal packet as a funnel [6]. They will move in the opposite direction as a feedback in 3D.

<u>Law 8</u>: A pair of open complex objects in 3D forms a closed loop in 3D by feedback of primary longitudinal vortices: (H_{3D}+) ÷(H_{3D} ¯) .This pair conducts energy through the real connection and conducts matter through the imaginary link.

<u>Consequence</u> : The reason for the emission of primary elementary longitudinal vortices is that the secondary longitudinal vortex tears in dashes by high frequency pulses (H_{3D}^{+})(Figure 5c) .

-The primary elementary longitudinal vortices form the feedback link (Figure 5c - Figure 5d).The reason for their movement in the space between the pair of vortex objects in 3D is the sucking action of the entrance of secondary longitudinal funnel that has a decelerating exit (H_{3D}^{-}) (Figure 2d).

-The real links in 2D and 3D are simple, but the imaginary links in 2D (feedback 2D) and 3D (feedback 3D) are most likely multi ciphered.

-Feedback (2D and 3D) connects a pair of different vortex objects (Figure 5 c, d). When these objects include both cross and longitudinal vortices, connected internally with reason-result transformations, either (Δ1) or

(Δ2), they are called complex vortex objects.

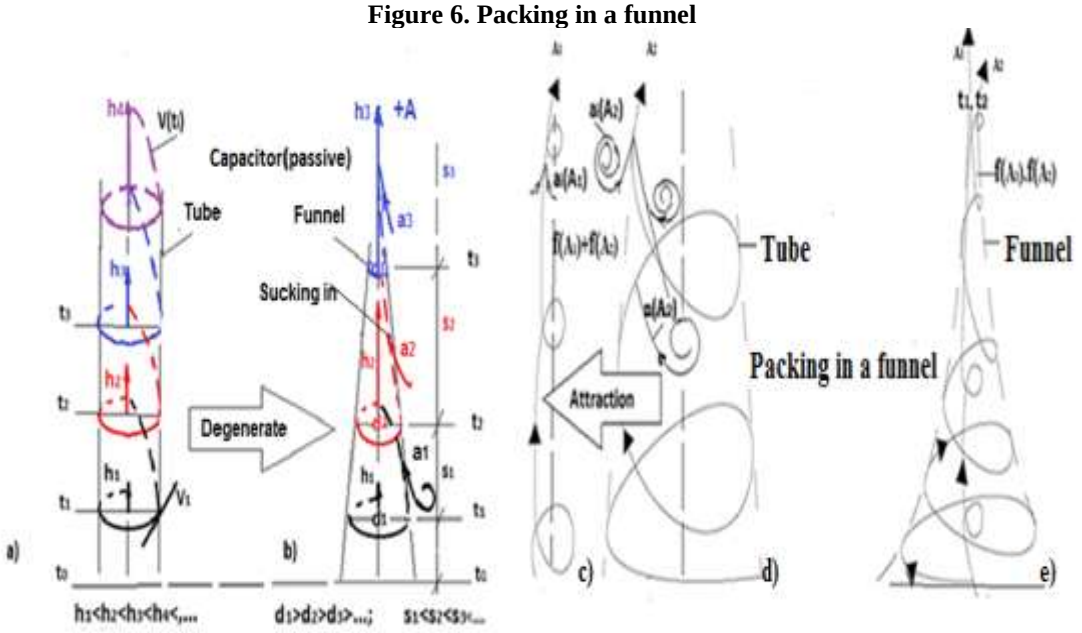
Definition: A complex vortex object is an object that contains a cross and a longitudinal vortex connected internally by reason-result transformations, either (Δ1) or (Δ2).

Consequence : (of continuity in two mutually perpendicular closed loops in 2D and 3D**).**

Two complex vortex objects are connected with mutually perpendicular closed loops in 2D and 3D. The closed loop: $\{E_{2D}(+) \div E_{2D}(-)\} \div$ {(feedback(2D) (Figure 5d,c).} is perpendicular to the closed loop: $\{H_{3D}(-) \div H_{3D}(+)\} \div$ {(feedback (3D)}, (Figure 5c,d).

IX. ATTRACTION BETWEEN ACCELERATING LONGITUDINAL VORTICES AND PACKING TO THE FUNNEL[5,6].

Figure 6. Packing in a funnel



According to Consequences of the Law 1, Law 6 :

-Longitudinal velocity (V) of longitudinal accelerating vortex is right proportional to the acceleration of its cross vortices(a_n): $\mathbf{V \sim a_n}$.

-The faster vortex has less amplitude of cross vortices (Wn) .It is narrower than the slower one:

$\mathbf{V \sim 1/W_n}$

-The faster vortex attracts(F) the slower one, because the faster vortex has less amplitude (W_n) of cross vortices ,but has bigger acceleration(a_n): $\mathbf{a_n \sim 1/W_n}$; $\mathbf{F_{att} \sim a_n}$; $\mathbf{F_{att} \sim 1/W_n}$

-The faster vortex inserts into the slower one and form some kind of tube .The reason is that the faster vortex has less diameter (d_n) than the slower one: $\mathbf{V \sim 1/d_n}$

-Because of acceleration this tube turns to the funnel called Gravity Funnel.

-The Gravity Funnel attracts in direction across to the velocity and acts so called Gravity Attraction:

$\mathbf{F_{att} \sim a_n}$; $\mathbf{F_{att} \sim 1/W_n}$, [5,6].

-The Gravity Funnel attracts in direction along to the velocity and acts so called Gravity Force:

$\mathbf{F_{force} \sim V}$; $\mathbf{F_{force} \sim 1/W_n}$,[8].

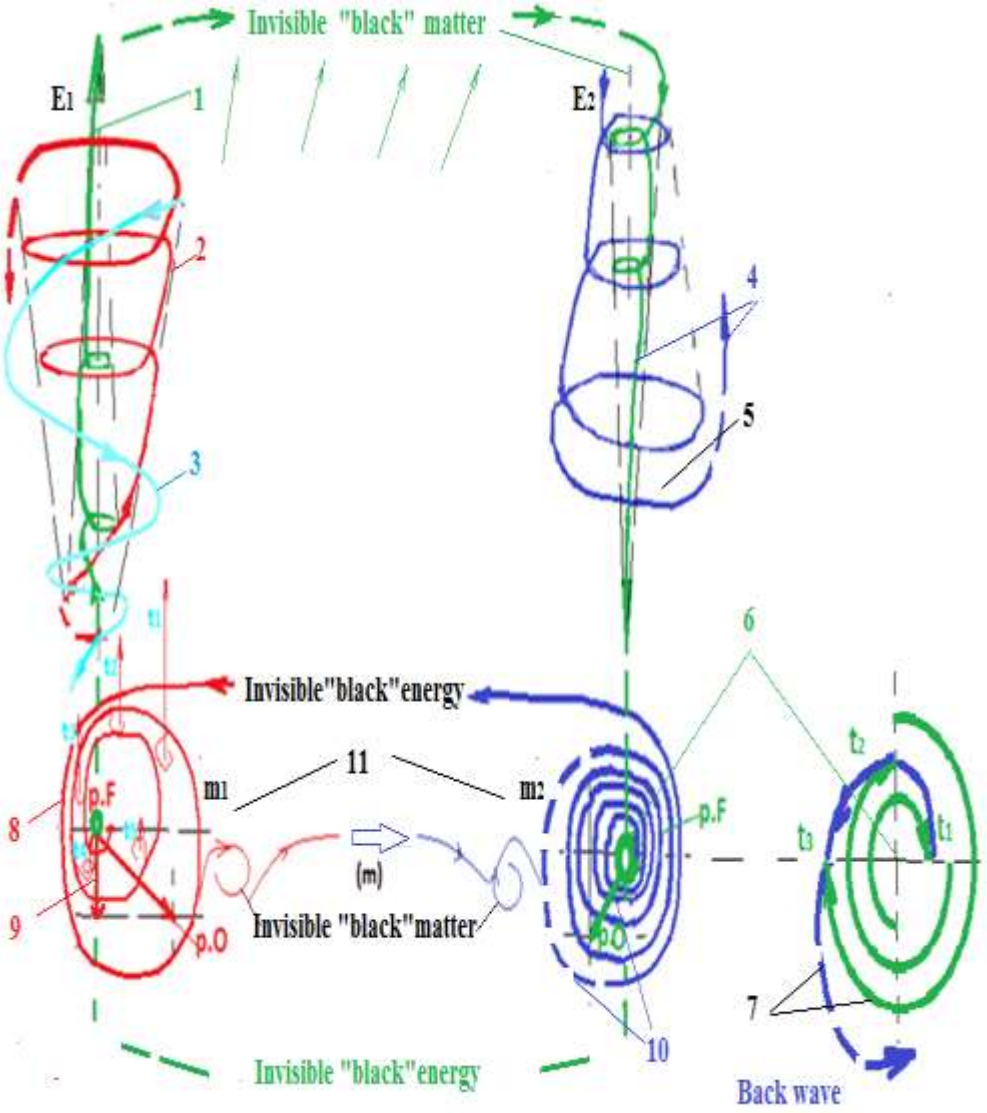
X. CONCLUSIONS

10a. Common results

-The extension of the classical axiom led to a new first axiom that certifies open uneven and non-uniform vortices. As a result, the decelerating and accelerating longitudinal vortices were obtained. Their acceleration realizes forces both in the direction of the axis and in the perpendicular direction of their axis. They describe the gravitational field in repulsion or in suction mode.

-The introduction of a new second axiom certifies the presence of complementary pairs. Both objects in a pair are complex transverse-longitudinal vortices that operate in generator mode. They describe complementary relations between the vortex objects, which include the gravitational impact of both types

Figure 7. Complex design of one pair of complementary objects



10b . Results by description the complex design

Let's look at Figure 7 and describe all the points shown on it:

Point 1. In center it has an accelerating longitudinal vortex down-up.

Point 2. In middle, because of resistance , it has an decelerating longitudinal vortex .

Point 3. At the periphery of the funnel, because of the resistance, a negative acceleration occurs. It causes a delayed movement, that reduces the distance between the coils and increases the funnel radius. Finally, the energy splashes and returns from top to bottom . It forms external longitudinal "Back wave".

Point 4.Longitudinal vortices are invisible. They do not have mass as a substance. They exist alone or in package such as pipe or funnel.

Point 5.When the pipe(funnel) is not active, the energy inside the package exists as a standing wave.

Point 6. When funnel is active , it enters into denser environment of primary free cross vortices and it acts as a mixer.

Point 7.At center cross vortex turns to clockwise. Because of viscosity each layer is delayed relative to the previous layer. In such way they form cross "Back wave" .

Point 8.The decelerating cross vortex is similar to an eccentric toroid (empty inside). It is prototype of an element electron. Vector of eccentricity (p.F-p.O) decomposes along x-axis and y-axis.

Point 9.The y-axis part rotates the decelerating element (electron) around accelerating element.

Point 10.The accelerating cross vortex is similar to a very tight eccentric ball. This element is prototype of a proton. Vector of eccentricity (p.O-p.F) is much smaller than that one if decelerating vortex.

Point 11.The number of turns are much more than ones of decelerating vortex .This is the reason the accelerating vortex to has much more mass than the mass of decelerating vortex: m1>>m2.

10c.What are invisible "black" matter and energy

We have seen from point 9b, that only the cross vortices(m1 and m2) are visible(Figure 6) .

-The free cross vortices in feedback between m1 and m2 are invisible .They are called "black "matter. The free longitudinal vortices in feedback between E1 and E2 are invisible too. They are called "black "matter" too(Figure 6).

-The longitudinal real link between m1 and m2 is invisible. It is called "black "energy. The longitudinal imaginery link between E1and E2 is invisible. It is called "black "energy too(Figure 6).

XI. ANIMATION

Comp 2.wmv

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