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RESEARCH ARTICLE

THREE SPACETIMES, OBTAINED BY COMBINED VORTEX MOVEMENTS

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ABSTRACT

The present paper contributes to the description of combined vortex movements considered in previous articles (1). It develops further the reasoning behind the substitution of the old axiom of the Classical Field Theory with a new, broader and more universal axiom (2). The paper explains how a minor extension of the main axiom creates new laws and leads to surprising and significant changes in the subsequent structures and designs covered by the Field Theory. Furthermore, the whole philosophy of the new designs proves to be largely consistent with the real natural structures. The possibility of the new field structures to acquire a particular type of movement in a specific spacetime framework is demonstrated. The transverse vortex movement develops in a spacetime with constant time and it is established that the motion is with a direct wave. The longitudinal vortex movement develops in a spacetime with constant external distance and it is established that it generates tubes of transverse vortices nested one inside the other. Furthermore the motion is with a reverse wave from the inside-out in tubes of the first order and from the outside-in in tubes of the second order. There is also a third spacetime with constant speed. It is proved that the Theory of Relativity applies only to one of three spacetimes- to the spacetime with constant time.

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INTRODUCTION

The Classical Theory of the Electromagnetic Field is described by Maxwell's laws based on a fundamental axiom: div (rot E) = 0 (Landau and Lifshitz, 1988). This axiom is relevant to the even movement of a vector (E) in a closed loop. Therefore the electromagnetic theory considers even and simple motions. A previous paper suggests an extension of this axiom to: div (rot E) ≠ 0 (Markova, 2015). While the classic axiom div (rot E) = 0 defines even movement of the vector (E) in a closed loop, the extended axiom div (rot E) ≠ 0 defines uneven motion of the vector (E) in an open vortex.

It is known that in nature movements are complex, uneven and combined. Therefore the extended axiom may prove to be more suitable to describe natural processes, movements and structures. These natural structures include all previously considered technological and artificial structures and designs such as, for example, the structure of the electromagnetic field (Markova, 2005).

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2.Description of the classic axiom in the Theory of the Electromagnetic Field: div(rotE)=0

The main axiom of the electromagnetic field states that: The divergence (div) of the electric vector (E) during its rotation (rot E) in a closed loop equals zero: div (rot E) = 0 (Landau and Lifshitz, 1988). This means that the electric vector (E) moves evenly in a closed loop. With this formulation of the axiom one of Maxwell's Laws has the following representation for even movement of the vector E in a closed loop: **rot (E) = H** (Landau and Lifshitz, 1988). Therefore the type of field covered by the axiom for even movement in a closed loop {div(rotE)=0} is undoubtedly defined as an electromagnetic field with a definite velocity (v) of propagation equal to the speed of light (c). Nevertheless this is an idealized movement and has a meaning only within its own framework. Even movement does not occur in nature – neither at a straight line, nor in a closed loop. In order to create a more universal Field Theory and to adapt it accurately to the natural field forms, an extension of the axiom is proposed with the following condition: div (rot E) ≠ 0 (Markova, 2015).

3. Description of the extended axiom: div (rot E) ≠ 0.

3.1. Definition of the variables

The classic axiom {div(rotE)=0} which describes ideally the laws of the electromagnetic field (Figure 1a) is replaced by an extended axiom, div(rotE) ≠ 0 (Figure 1b). In order to define open vortex, we need to replace the “rotor” operator (rot) (Figure 1c) with the “vortex” operator (vor) (Figure 1d).

Thus the movement of a vector (E) in a closed (rotor) loop (rotE) (Figure 1c) needs to be replaced by movement of vector (E) in an open loop (vortex) or open vortex (vor E) (Figure 1d).

Definition 1. An open vortex (vor E) of vector (E) is obtained by the uneven movement of vector (E) in an open (vor E) loop.

Definition 2. The uneven movement of vector (E) in an open loop is such that the divergence (div) of vector (E) during its rotation (vorE) does not equal zero: div (vor E) ≠ 0.

The classic axiom {div(rotE) = 0} (Figure 1a) defining the movement of a vector (E) in a closed loop in a plain (2D) is substituted with an extended axiom {div(rotE) ≠ 0} defining the movement of a vector (E) in an open vortex {div(vorE) ≠ 0} in a plain (2D) (Figure 1b). Maxwell’s law for space (3D) (supported by the classic axiom {div(rotE) = 0}) is: rot E = H (Landau and Lifshitz, 1988). Therefore a new vector (H) is generated in the center of the circle, circumscribed by the vector (rot E) and rot E = H (Figure 1 c).

Maxwell’s law for space (3D) (supported by the extended axiom {div (vor E) ≠ 0}) is: (vor E → (Δ1) → vor H) (Markova, 2015). Therefore due to a special transformation (Δ1) another vortex (vor H) with an opposite sign (-) and different qualities emerges in the center of the open vortex (vor E) (Figure 1d). The connection between the two is not an equation but a one-way transformation (Δ1). The opposite operation (to obtain vor E from vor H) is impossible with this transformation (Δ1). The opposite operation is achieved through another transformation (Δ2) (Markova, 2015).

The extension of the axiom means that a transverse open vortex {vor (E_{2D})} would generate another open but longitudinal vortex {vor (H_{3D})} with an opposite sign (-) through a special transformation (Δ1) (Markova, 2015).

In four-dimensional space (4D) the open vortex (vor E /vor H) pulsates in time (t1, t2,…) (Figure 1e, f). In the initial state (t1) the vortex of the vector (vor E_{t1}) is expanded and the vortex in the center (vor H_{t1}) is small (+vor E_{t1} /-vor H_{t1}) (Figure 1e). When a steep positive impulse (t2) reaches the inlet of the open vortex (vor E_{t1}), the vortex of the vector (vor E_{t2}) shrinks and the vortex in the center (vor H_{t2}) expands (-vor E_{t2} / +vor H_{t2}) (Figure 1f). Thus the open vortex (vor E) pulsates in time (t1, t2,…) and changes both in one plain (vor E_{t1} ,vor $E_{t2,\ldots}$) and in space (vor H_{t1},vor $H_{t2,\ldots}$), but with an opposite sign. These types of impulsive movements suggest that the new axiom may even have a broader application.

The abovementioned definitions lead to the conclusion that the movement of each open vortex (E) in 2D is uneven and conforms to the new extended axiom: div{rot (E)} ≠ 0. If we substitute the operator (rot) used for movement in a closed loop with operator (vor) defining movement in an open loop, we will obtain a precise representation of the new, extended axiom.

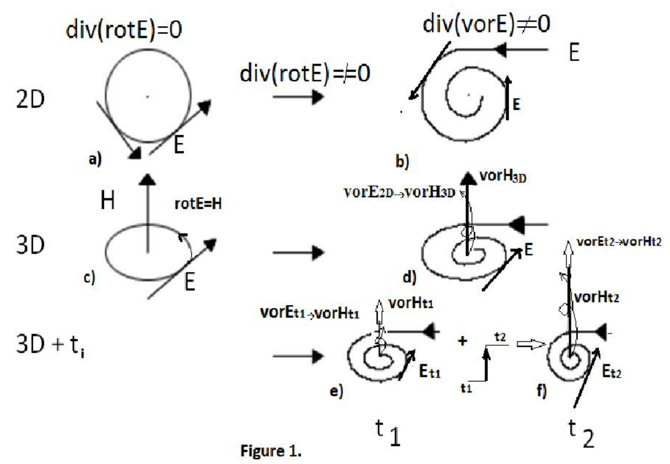

Figure 1.

Axiom 1. The movement of an open vortex (E) is uneven and fulfills the requirement:

$$\mathrm{div}\{\ \mathrm{vor}\ (E_o)\} \neq 0.$$

Definition 3. A transverse vortex (E_{2D}) is an open, uneven vortex winding in one plain (2D): {vor (E_{2D})} (Figure 1b).

Definition 4. A longitudinal vortex (H_{3D}) is an open, uneven vortex winding in a volume (3D) around an axis perpendicular to the plain (2D) of the open vortex (E_{2D}): {vor(H_{3D})} (Figure 1d, e, f).

The transverse vortex is transferred into a longitudinal vortex through operator (Δ1) of a transverse-longitudinal transformation (Markova, 2015). The transverse (E_{2D}) and the longitudinal (H_{3D}) vortex are not simply an original entity and an image by analogy with the well-known transformations of Laplace or Fourier. They are representatives of spaces with different structure. Therefore the introduced operator (Δ1) of transverse-longitudinal transformation connects the original in one type (transverse, E_{2D}) of space with its image in another type (longitudinal, H_{3D}) of space, i.e. transformation (Δ1) connects two spaces with different qualities and two radically different types of movement.

Definition 5. The operator (Δ1) of transverse-longitudinal transformation connects the original filled with transverse vortices (E_{2D}), with its respective image filled with longitudinal vortices (H_{3D}). The transformation (Δ1) by definition connects two types of space with different qualities: transverse (where the originals are found) and longitudinal (where the respective images are located). The original plain of the transverse vortices (E_{2D}) is perpendicular to the direction of the longitudinal vortices (H_{3D}) of the respective images. Therefore the originals represented by the transverse vortices (E_{2D}) and the images represented by the longitudinal vortices (H_{3D}) are not symmetrical but rather orthogonal.

Axiom 2. The originals represented by the transverse vortices (E_{2D}) and the images represented by the longitudinal vortices (H_{3D}) are orthogonal. The well-known law of Maxwell concerns a closed, even vortex rot (E) which generates a perpendicular vector (H) at its center, i.e. {rot (E) = H}. When Maxwell’s law is extended, it becomes evident that this perpendicular vector (H_{3D}) is also a vortex and, more precisely, an open longitudinal vortex. Thus we can postulate a law about an open, uneven vortex {vor (E_{2D}) → vor (H_{3D})} (Figure 1d). The extended law {vor (E_{2D}) → (Δ1) → vor (H_{3D})} is described in a previous publication (2). It is so different from the classic law {rot (E)=H}(3) that it actually represents a new law.

The law postulates that the open transverse vortex (E_{2D}) generates an open longitudinal vortex (H_{3D}) with an opposite sign in its center through an operator for transverse-longitudinal transformation Δ1:

$$\text{vor}\,(E_{2D}) \overset{\Delta 1}{\Longrightarrow} -\text{vor}\,(H_{3D})\,, \qquad \text{f}^*$$

where vor (for vortex) replaces rot (for rotor, meaning closed loop) and the transverse vortex in 2D (E_{2D}) continues its development in 3D as a longitudinal vortex (H_{3D}) (Figure 1d) (Markova, 2015). The negative sign (-) in the law means that a decelerating transverse vortex vor (E_{2D}) generates through transformation (Δ1) an accelerating longitudinal vortex vor (H_{3D}) and vice versa. This transformation in 3D corresponds to the right-hand side of Figure 1d. The law is valid for transformation Δ1 when the movement of the transverse vortex (E_{2D}) is the cause and the movement of the longitudinal vortex (H_{3D}) is the effect.

4.Combined vortex movement

4.1.Essence of the combined vortex movement

The transverse and longitudinal vortex movements are a combination between rotational and translational motion. The transverse vortex movement describes a spiral in a plain (2D). The longitudinal vortex movement also describes a spiral but in volume (3D), in a direction, perpendicular to the plain of the spiral (2D). Transverse vortices are visible; they reflect light due to the fact that they are stacked in a package, they have inertia and mass. Therefore they are perceived as matter (Markova, 2005).

Longitudinal vortices are invisible because light refracts around their thread and is not reflected by them. They are not inert, have zero mass and are thus perceived as energy (Markova, 2015). An example of combined movement is that of fluids: transverse-vortex and longitudinal-vortex movement. Many natural phenomena such as windspouts, tornados, cyclones an anticyclones are well studied. It is also known that a river spilling in a plain decelerates (V-) and generates transversal vortices (W-) from the main stream, outwards and to the sides, in a direction, perpendicular to the movement, thus depositing silt (Figure 2b). On the contrary, a river flowing down a steep mountain slope (V+) is accelerating and sucking in accelerating transverse vortices (W+) from the outside into the main stream, thus eroding the banks (Figure 2e). In order to simplify the perception of transverse and longitudinal vortices, we can introduce the functions of velocity (V) and amplitude (W) of the vortex. We must remember that V is velocity and W is travelled distance or amplitude. When the velocity (V) is lower than the amplitude (W), then ($V<W$) the movement is perceived as a transverse vortex (Figure 2a). When the velocity (V) is greater than the amplitude (W), then ($V>W$) the movement is perceived as a longitudinal vortex (Figure 2d).

Definition 6. Secondary transverse vortices are transverse vortices generated by a change in the time of the main longitudinal vortex.

Decelerating secondary vortices (2) are created by a decelerating longitudinal vortex (1) (Figure 2c), while accelerating secondary vortices (2) are sucked in by an accelerating longitudinal vortex (1) (Figure 2f).

4.2.Decelerating longitudinal-transverse vortex movement

If we exert a positive (+) stationary force (+in) at the inlet of a longitudinal vortex, then the constant push (+in) would result in a constant velocity of the longitudinal vortex. However, due to the resistance of the medium, the longitudinal vortex would slowly decelerate (Figure 2c) and expand in terms of transversal vortices and amplitude (W+) (Figure 2 a, c). Moreover the secondary vortices (2) emitted by the main decelerating vector (1) would wind from the inside-out in a 2D plain created by the main vector (1) and the perpendicular (x) to it (Figure 2c). Longitudinal vortices with vector directions (f-) determined by the right-hand rule would be generated in the center who twisted all vortex against (-) clockwise (Figure 2c) (3). Figure 2b demonstrates the right-hand rule as a right-oriented 3D vector system: if the observer is facing the force vector (f), the cause vector (v-) is to the right and the effect vector (w-) is to the left. Figure 2c shows how, due to the directions of these vectors (f-), the whole decelerating longitudinal vortex would wind counterclockwise (-) if the observer is facing opposite to the direction of the movement (*) of the longitudinal vortex (Figure 2c).

Remark: We must note that on Figure 2c the rotation of (f-) appears to be clockwise (+). This illusion is due to the fact that the observer is facing in the direction of the movement and not opposite to it, which would be more appropriate.

4.3.Accelerating longitudinal-transverse vortex movement

If we exert a negative (-) stationary force (-in) at the inlet of a longitudinal vortex, then the constant pull (-in) would result in a constant velocity of the longitudinal vortex. Due to the constant suction of secondary vortices, the longitudinal vortex would overcome the resistance of the medium. Therefore the longitudinal vortex would gradually accelerate (Figure 2f) and compress transversally (W-) (Figure 2d, f). Moreover the secondary vortices (2) sucked in by the main decelerating vector (1) would wind from the outside-in in a 2D plain created by the main vector (1) and the perpendicular (x) to it (Figure 2f). Longitudinal vortices with vector directions (f+) determined by the right-hand rule would be generated in the center (Figure 2f). Due to the directions of these vectors (f+) the whole accelerating longitudinal vortex would wind clockwise (+) if the observer is facing opposite to the direction of movement (*) of the longitudinal vortex (Figure 2f).

Conclusion 1. There are combined mutually perpendicular movements: longitudinal-vortex movement and transverse-vortex movement (Figure 2c, f).

Conclusion 2. In combined movements a stationary force is applied at the inlet. Its action results in a constant velocity of the longitudinal fluid flow. However, at the outlet, in a direction perpendicular to the fluid flow, a stratification of transversal vortices occurs with respect to amplitude, velocity and acceleration (Figure 2 c,f).

5.Laws of combined vortex movement

5.1.Description of decelerating and accelerating longitudinal-transverse vortex movements.

If we present only half of the decelerating (Figure 2c) and the accelerating (Figure 2f) longitudinal-transversal vortex, then we obtain a general representation for a decelerating (Figure 3a) and an accelerating (Figure 3b) longitudinal-transverse vortex.

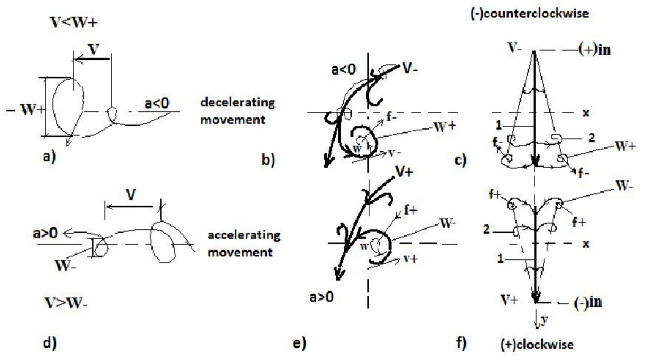

Figure 2. (*)

The x-axis represents the magnitudes of the amplitude (V_x) of the velocities of the longitudinal vortices which are highly non-linear and decreasing (Figure 3a). The y-axis represents the amplitude (W_y) of the transversal vortices which are also highly non-linear, but decreasing. For Figure 3a we have the following system of equations:

$$\left| \begin{array}{l} Vx^2 = 1 - Vx \\ Wy^2 = 1 + Wy \end{array} \right. \qquad 2^*$$

Let us label the magnitudes of the velocities of the highly non-linear increasing longitudinal vortices with Vx along the x-axis (Figure 3b) and the amplitudes of the highly non-linear decreasing transversal vortices along the y-axis with Vy. For Figure 3b we have the following system of equations (Markova, 2015):

$$\left| \begin{array}{l} Vx^2 = 1 + Vx \\ Wy^2 = 1 - Wy \end{array} \right. \qquad 3^*$$

Both systems have periodic (n) roots (v^n and w^n), which are connected in the following manner:

$$\mathbf{(v^n).(w^n) = 1}, \qquad 4^*$$

where n≥1. In order to simplify the record for both cases (Figure 3a, b) we can assume that the initial velocities V_0, W_0 of V_x and W_y are equal to one ($W_0=V_0=1$) (Markova, 2005).

We must clarify that the speed of the longitudinal vortex is V_x, while the distance travelled is W_x, and $W_x = V_x.t$ (Figure 3a, Figure 5a). Therefore in the first equations of the systems 2* and 3* we take into account mainly the velocity (V_x) of the longitudinal vortex, while the distance is inferred. For the transversal vortex the velocity is V_y and the external distance travelled is W_y, where $W_y < V_y.t$ (Figure 3a, Figure 5a). Therefore in the second equations of the systems 2* and 3* for the transversal vortex we take into account mainly the external distance travelled (W_y) along the y-axis, rather than the actual internal distance (W_s) along the length (s) of the transversal vortex. There is a difference between the external (W_y) and the internal (W_s) length and this difference explains the phenomenon in the pipes of longitudinal vortices with constant external length.

5.2.Laws

LAW 1. In longitudinal-transverse combined movement when the longitudinal vortex (W_x, V_x) decreases in amplitude ($dW_x/dt<0$) and velocity ($dV_x/dt < 0$), the transverse vortex (W_y, V_y) increases in amplitude ($dW_y/dt > 0$) and velocity ($dV_y/dt > 0$). Then V_x and W_y are connected through the system:

$$\left| \begin{array}{l} V_x^2=1-V_x \\ W_y^2=1+W_y , \end{array} \right.$$

where the roots: (v^n) and (w^n) are periodic (with period n) and are connected in the following manner: $\mathbf{(v^n).(w^n) = 1}$, (Figure 3a), (system 2*). In both types of combined movements roots (v^n) and (w^n) have different signs. **LAW 2.** In longitudinal-transverse movement when the longitudinal vortex (W_x , V_x) increases in amplitude ($dW_x/dt > 0$) and velocity ($dV_x/dt > 0$), the transverse vortex (W_y , V_y) decreases in amplitude ($dW_y/dt < 0$) and increases in velocity ($dV_y/dt > 0$). Then V_x and W_y are connected through the system:

$$\left| \begin{array}{l} V_x^2=1+V_x \\ W_y^2=1-W_y , \end{array} \right.$$

where the roots (v^n) and (w^n) are periodic (with period n) and are connected in the following manner: $\mathbf{(v^n).(w^n) = 1}$(Figure 3b), (system 3*).

Root (1.618 ... ≈1.62) of system 3* is known as the **"golden section".** . We must note that the movements along the x-axis and the y-axis are qualitatively different. The movement along the x-axis is longitudinal- vortex, while the movement along the y-axis is transverse - vortex. As described in detail in previous papers, the longitudinal- vortex movement carries primarily energy and is represented mainly as a field. Instead of being reflected by the longitudinal thread, light circumvents it by diffraction. Therefore the longitudinal vortex is invisible. The transverse-vortex movement, due to its transverse rotation, leads to increased density and is represented mainly as matter. The transverse vortices are packed and congested; they reflect light and are visible to the human eye (Markova, 2005; Markova, 2015). During the movement of uneven longitudinal vortices, secondary transversal vortices are either emitted or sucked in. Equation 4* shows that any change in the longitudinal vortex leads to a change in the transversal vortex and vice versa. Interestingly the directions of change in the main and the secondary vortex are opposite. It should also be noted that when the main vortex is decelerating (Figure 3a, c) it emits energy and matter from the inside-out, while when the main vortex is accelerating (Figure 3b, d) it sucks energy and matter from the outside-in.

Conclusion 3 The decelerating longitudinal vortex emits to the outside secondary vortices that emit energy and matter in the environment from the inside-out and twist clockwise (watch for traffic) (Figure 3a, c).

Conclusion 4. The accelerating longitudinal vortex sucks in secondary vortices that pull energy and matter from the outside-in and twist clockwise (watch for traffic) (Figure 3b,d).

The positive feedback between the outlet (decelerating longitudinal vortex) and the inlet (decelerating transversal vortex) exists up to the point when optimal proportion is reached. If it is **reduced** the rate and flow of the main longitudinal vortex, then, due to sufficient capacity of the pipes of the cross vortices, they will increases the rate and the amplitude of the cross secondary vortices and will be **reduced** the rate of the main longitudinal vortex.

Conclusion 5. The optimum point of operation during the movement of combined vortices is reached by steep-front impulses through **positive feedback.**

Negative feedback is used to maintain this optimal proportion. If it is **increased** the speed and flow over the longitudinal vortex, then, due to limited capacity of the pipes of the cross vortices, they will return to the longitudinal vortex of the stream and so will **reduce** the speed and flow of the main longitudinal vortex.

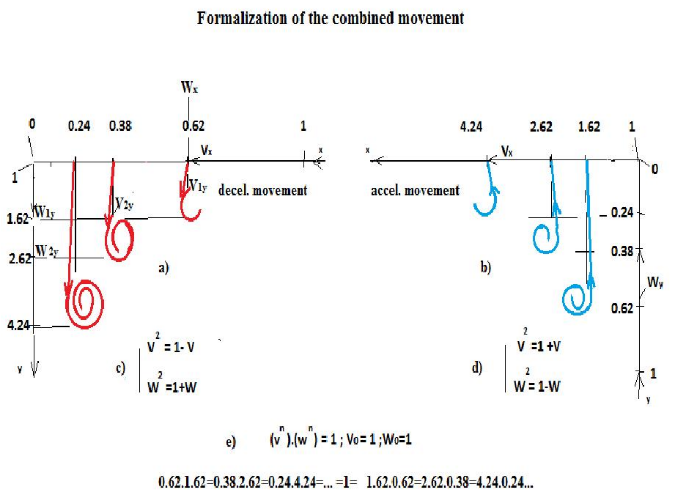

Figure 3.

Conclusion 6. The maintenance of the point of operation in or near the optimal proportion is achieved continuously through **negative feedback.**

Conclusion 5 for positive feedback is relevant to the attainment of the operation point, while Conclusion 6 for negative feedback concerns its maintenance.

6. Spacetimes with different constants

In order to develop, the different types of movement require spacetimes with different constants (Figure 4). The explanation for the different spacetimes is rooted in the difference between the external (W_x, W_y) and actual (W_s) travelled distance (Figure 4a).

6.1. Movement at constant time: $t= s/v= W_s/ V_s=$ const

All points in a transverse wave move at the same time. Therefore the movement of transverse vortices occurs in a spacetime with constant time: t = s/v = const (Figure 4b). A previous paper explains that for a pulsating transverse wave the external (W_x, V_x) and the internal (W_s, V_s) variables are identical: $W_x= W_s = s$; $V_x = V_s = v$ (Markova, 2005). In the old axiom every move on closed circuit (rot) takes place in its own time. In the new axiom every move in the open vortex (vor) takes place at the same time (Figure1b). The reason is that all points move with the same velocity (v) and travel proportionally corresponding distances (s), while the ratio between the two remains constant (s/v = const) (Figure 4b).

The great physicist Albert Einstein created the Theory of Relativity for movement at different velocities (Einstein, 2005). This theory is based on the assumption that material objects move in a spacetime with constant time (t = s/v = const.). Therefore the travelled distance (s) increases at the same rate as the velocity (v), i.e. the distance is directly proportional to the velocity. As clarified in a previous paper, each material object consists of discrete elements of pulsing, packed transversal vortices (Markova, 2005; Markova, 2015). The parameters of pulsation are identical for the microsystems of all material objects and coincide with the parameters of the macrosystem of the Earth. The microsystems of material objects and the macrosystem of the Earth pulse in one and the same time (t = const). Therefore the transversal wave of movement with parameter (t = s/v = const) of a material object, consisting of packed transversal vortices, will correspond to its velocity (v). The greater the velocity, the greater the distance (s) that the object will travel. Therefore the distance (s) is directly proportional to the velocity (v) with a constant coefficient (t). Beyond any doubt this theory provides an accurate explanation of the movement of material objects in a spacetime with time as a parameter (Einstein, 2005).

LAW 3. For transversal vortices travelled distance is directly proportional to velocity.

Conclusion 5. Spacetime of the transverse vortices in which (t = const), contains the most probable and mostly matter.

6.2. Movement at constant external distance: $S=W_x= V_s. t_s=$const

The accelerating longitudinal vortex sucks in secondary transversal vortices from the environment. These are indeed the secondary transversal vortices emitted by the decelerating longitudinal vortex.

Thus the couple of accelerating and the decelerating longitudinal vortex exchanges their secondary transversal vortices and forms a systematic couple **as attract** (Markova, 2015).

Conclusion 6. The accelerating longitudinal vortex draws (sucks) decelerating longitudinal vortex.

In contrast, the couple accelerating and the decelerating transverse vortex also exchanges their secondary cross vortices but forms a systematic couple **as repel** (Markova, 2015).

Conclusion 7. The accelerating transverse vortex repels decelerating transverse vortex.

-Let two longitudinal acceleration vortices are located near each other at a distance comparable to the length of the secondary cross vortices .The accelerating longitudinal vortex sucks secondary transverse vortices of force (F), directly proportional (~) the number (n) and the sum of accelerations (Σa_i) secondary transverse vortices i.e.: $F_j \sim \Sigma a_i$, where i = 0-n, n is the number of secondary transverse vortices; j = 1- N, N is the number of accelerating longitudinal vortices.

For example , in the case of a tube of a first order of Figure 4c, the more accelerating longitudinal vortex (1) sucks a greater number of secondary vortices (n_1) with a greater sum of accelerations (Σa_i) (i = 0-n_1) and therefore with greater force (F_1).The less accelerating longitudinal vortex (2) sucks in a lower number of secondary vortices (n_2) with a lower sum of the accelerations ($\sum a_i$) (i=1-n_2) and therefore with a smaller force (F_2) . Since $n_1 > n_2$, then $F_1 > F_2$. This difference (F_1-F_2) draws less accelerating (2) to more accelerating (1) longitudinal vortex. Thus, although no systematic form two pair of longitudinal vortices accelerator (1), (2) attract: the more accelerating longitudinal vortex (1) sucked **to the center** the less accelerating longitudinal vortex (2) (Fig. 4c) .To the case where longitudinal vortices are nested into one another and form the tube of second order, the more accelerating longitudinal vortex (2) draws **to the periphery** the less accelerating longitudinal vortex (1) (Fig. 4d).

Conclusion 8. The more accelerating longitudinal vortex always pulls (sucks in) the less accelerating longitudinal vortex.

Due to the nesting of longitudinal vortices one inside the other in tubes, the external travelled distance of the tube is approximately the same for all longitudinal vortices. This means that the movement of the longitudinal vortices inside the tube occurs in another spacetime where time is not constant ($t \neq$ const) (Figure 4c).

When the internal velocity ($V_{s,1}$) increases, the internal vortex distance decreases ($W_{s,1}$), and then: $t_1 = W_{s,1} / V_{s,1}$ (Figure 4c). When the internal speed ($V_{s,2}$) decreases, the internal vortex distance increases ($W_{s,2}$) (Figure 4c), and then: $t_2 = W_{s,2} / V_{s,2}$. Therefore: $t_1 < t_2$. In longitudinal movement greater speed travels shorter distance ($W_{s,1}$) i.e. distance is inversely proportional to velocity (Figure 4c).

That so **the Law of Relativity** (A. Einstein) where distance is directly proportional to velocity cannot be applied. In the case of tubes of longitudinal vortices, the opposite is valid: distance is inversely proportional to speed.

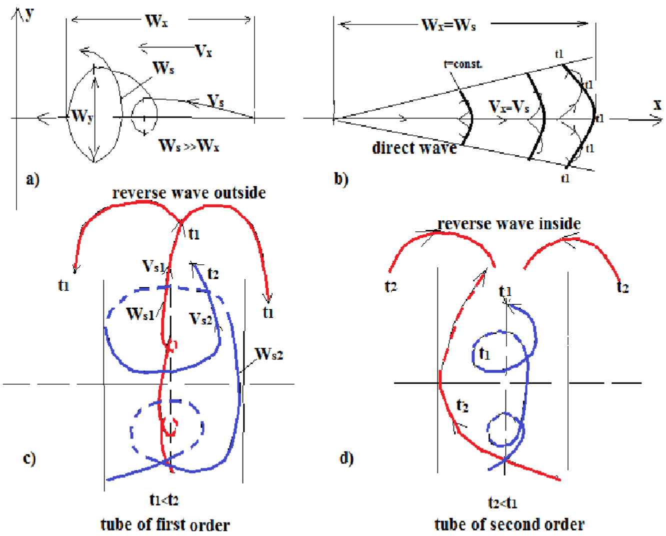

Figure 4.

LAW 4. For tubes of longitudinal vortices nested one inside the other distance is inversely proportional to velocity.

Conclusion 9. The Law of Relativity is valid only for spacetimes with constant time (t = s/v = const).

Thus longitudinal vortices with greater velocities will travel less distance ($W_{s,1}$),while moving in the center, and will arrive at the outlet in less time (t_1). Longitudinal vortices with lower velocities ($V_{s,2}$) will travel greater distances ($W_{s,2}$), while moving in the periphery, and will arrive at the outlet for a longer time (t_2) (Figure 4d).

This may lead to the formation of **tubes of the first order** where the fastest ($V_{s,1}$) longitudinal vortices will be positioned in the center, while the slower ($V_{s,2}$) longitudinal vortices will wind along the periphery of the tube. A reverse wave will be generated from the center to the outside (Figure 4c). For example, this is very similar to the movement of an electric field along a conductor. The presence of a reverse wave (t_1) explains why the direction of the electric current (t_1) is opposite to the direction of movement of the electrons (t_2). The fact that the reverse wave is outside the conductor also explains the significant energy losses (Figure 4c) (Markova, 2005).

Alternatively, **tubes of the second order** may be formed. In this case the fastest ($V_{s,2}$) longitudinal vortices will be positioned in the periphery, while the slower ($V_{s,1}$) longitudinal vortices will wind in the center of the tube. A reverse wave from the exterior to the center of the tube will be generated (Figure 4d). For example, this is very similar to the movement of an electric field along a superconductor. The presence of a reverse wave (t_2) from the outside-in explains the formation of a standing wave locked inside the superconductor. Therefore there is no emission to the outside and no energy losses are observed (Figure 4d) (Markova, 2005).

Conclusion 10. Spacetime longitudinal vortices and the pipes of longitudinal vortices in which (S = const), contains the most probable and mostly field that does not reflect light and is invisible to the outside observer.

6.3. Movement at a constant external velocity: $V_x= W_s/ t_s$ =const.

This movement connects all points in space with identical velocity V_x =const. This strange movement is performed in a special and unknown mode .It probably include unknown type resonance. This special arrangements will be subject to further developments and will likely be subject to large surprises. This connecting spacetime associated matter and the field in a single system.

7. Final conclusions

7.1. The extended axiom transforms even motion in a closed loop to uneven motion in an open vortex. It explains the causal connection between a transversal vortex in a plain (2D) and a longitudinal vortex in space (3D).

7.2. The first law shows that when the longitudinal vortex decreases at a particular optimal proportion, the transversal vortex increases reciprocally. The second law shows that when the longitudinal vortex increases at a particular proportion, the transversal vortex decreases reciprocally.

7.3. The deceleration of longitudinal vortices is accompanied by the emission of secondary free transversal vortices that fill the surrounding space. The acceleration of longitudinal vortices leads to suction of secondary free transversal vortices from the surrounding space.

7.4. In the spacetime with constant time (t = const) the distance is directly proportional to speed and in this spacetime are shaped up the transversal vortices of substantial matter.

7.5. In the spacetime with constant outer distance (S = const) the distance is inversely proportional to speed and in this spacetime are located the pipes nested longitudinal vortices of the field matter.

8. REFERENCES

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