The Space-Time Model According to Dimensional Continuous Space-Time Theory

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Abstract. This article results from the Dimensional Continuous Space-Time Theory for which the introductory theoretician was presented in [1]. A theoretical model of the Continuous Space-Time is presented. The wave equation of time into absolutely stationary empty space referential will be described in detail. The complex time, that is the time fixed on the infinite phase time speed referential, is deduced from the New View of Relativity Theory that is being submitted simultaneously with this article in this congress. Finally considering the inseparable Space-Time is presented the duality equation wave-particle.

1. Introduction
In the Dimensional Continuous Space-Time Theory, time is not the fourth dimension but it is an integrant part of the space and it is a dynamic energy of the space.

So the time is the dynamic energy of the empty space responsible to provide movement energy for everything that has movement into the Universe.

Therefore the movement of everything is only possible thanks to the Energy provided by Space-Time. For example, everything that is above the absolute zero temperature is in a vibratory movement, our brain is thinking because has electrical movement, so, without time energy there is no electric movement, no vibratory movement and no temperature above zero Kelvin.

Space is the physical environment of the movement and time is the fuel of the movement. Space and time are inseparable. Time is dynamic and space is stationary. The dynamic time energy and the static energy of the empty space have the same intensity because each elementary axis of the potential empty space energy is occupied by a dynamic elementary time energy axis.

So, the time has elasticity and movement but the empty space does not have elasticity and mobility.

In [1] was deduced that the elementary axis of potential energy inside the matter and energy structure has a component that depends on the time given by

\[
\frac{\alpha}{2} \cos \left( \omega t + \frac{\pi}{4} \right) + \frac{\alpha}{2}
\]

were \( \alpha \) is a mathematic dimensional length given by

\[
\alpha = \frac{1}{\pi}
\]
and $t_s$ is a subjective time that is increasing, differently from the real time $t$ that oscillates like a pendulum between $-\frac{\pi}{c} \leq t \leq \frac{\pi}{c}$, $\omega_j$ is the angular frequency of the time. In [1] was concluded that in the complete stationary state $\omega_k = 1$.

However in this article it will be proved that matter in movement with $v$ speed the angular frequency $\omega_k$ is equal to $1$ over the Lorentz Factor.

$$\omega_k = \sqrt{1 - \left(\frac{v}{c}\right)^2}$$

In [1] was deduced the primitive equation of the Continuous Space-Time given by

$$E(D) = \alpha e^{2\alpha_0(D^{(\alpha)})} e^{\beta t} e^{\alpha_0 f(t_s)}$$

(3)

So, in the reference [1] was presented the primitive equation of the continuous Space-Time in its derivative form that in the ref. [1] is the equation 3.23 and is presented below as the equations of the continuous space-time before the Big-Bang in the derivative static primitive form:

$$E(D) = \omega_k \alpha e^{2\alpha_0(D^{(\alpha)})} e^{\beta t} e^{\alpha_0 f(t_s, t_{sr})}$$

(4)

where

$f'(t_s, t_{sr})$ is one dynamic derivation of a static condition in the time function $f(t_s)$ and

$$f'(t_{sr}, t_{sr}) = -\frac{\alpha}{2} + \frac{\alpha}{2} = 0$$

where $\omega_k = 1$ for the static condition

$$\omega_k = \sqrt{1 - \left(\frac{v}{c}\right)^2}$$

for the general case with $v$ speed.

the space constant is $\alpha_0$ given by

$$\alpha_0 = \frac{1}{2} \ln(2)$$

(5)

the time function is $f(t_s)$ which $t_s$ is a subjective time that increase indefinitely than

$$f(t_s) = -\frac{\alpha}{2} \cos \left(\omega_k t_s + \frac{\pi}{4}\right)$$

(6)

the equations of the continuous space-time before the Big-Bang in the integrative static primitive form is.

$$E(D) = \frac{1}{\omega_k} \alpha e^{2\alpha_0(D^{(\alpha)})} e^{i\beta t} e^{\alpha_0 f(t_s, t_{sr})}$$

(7)

The function time $f(t_s)$ belongs to elementary cell of potential energy that produces mass, charge end energy and $f(t_s)$ is synchronized with time equation that is responsible by the stability of matter and energy.
2. Modelling the Space-Time

The primitive equation of the continuous Space-Time can be separated in two parts that are totally independent from each other

\[ E(D) = \alpha TS \]  

(8)

Where \( T \) is the time equation of the elementary cells given by

\[ T = e^{\alpha(D+\alpha)} e^{\beta_t} \]  

(9)

and \( S \) is the Space equation of the elementary cells given by

\[ S = e^{\alpha(D+\alpha)} e^{\alpha f(t')} \]  

(10)

to the elementary cells of potential energy \( D \) is equal to \( D_0 \) given by

\[ D = D_0 = 56 \]  

(11)

Both the time and space equations have infinite dimensional axis of zero width and a specific defined length. Their elementary cells of continuous space-time are cubic shaped.

3. Deduction of the angular frequency \( \omega \) to the matter in movement.

To the stationary matter in the empty space the time function of the matter and energy is

\[ f(t_s) = -\frac{\alpha}{2} \cos \left( \omega_1 t_s + \frac{\pi}{4} \right), \text{ where } \omega_1 = 1 \]

This time function receive energy from the time wave equation of the absolutely stationary empty space given by

\[ t(t_s) = \alpha \cos(\omega_1 t_s) + \alpha, \text{ where } \omega_1 = 1 \]  

(12)

If the matter is in movement at \( v \) speed, \( \omega_1 \) will change.

The \( \omega_1 \) angular frequency for the matter in movement is deduced from the New View of the Relativity Theory which space is not elastic.

Consequently the length \( \lambda_s \) of the time function to the stationary matter is the same to the matter in movement.

To the stationary matter

\[ \lambda_s = 2\pi \frac{c}{\omega_1} = 2\pi c \]  

(13)

\( \lambda_s \) keep on the same to the referential fixed on the matter in movement because in the New View of the Relativity Theory the space is not elastic.

Considering the fixed time \( t \) in the absolutely stationary empty space and \( t' \) the time in the referential fixed on the matter with \( v \) speed.

The relationship between \( t \) and \( t' \) is

\[ t' = t\sqrt{1 - \left(\frac{v}{c}\right)^2} \]  

(14)

If is done
In the stationary referential the wave length is

$$\lambda_s = c t'$$  \hspace{1cm} (15)$$

so

$$\lambda_s = c t' = c t \sqrt{1 - \left(\frac{v}{c}\right)^2}$$

$$\hat{\lambda}_s = \frac{\lambda_s}{\sqrt{1 - \left(\frac{v}{c}\right)^2}}$$

then

$$\omega_s = 2\pi \frac{c}{\lambda_s}$$

$$\omega_s = \sqrt{1 - \left(\frac{v}{c}\right)^2}$$  \hspace{1cm} (17)$$

So when $v = 0$ it has $\omega_s = 1$

When $v = c$ it has $\omega_s = 0$

In this case the time no more transfer movement energy to the mater, the time stops, the matter do not present relative movement and the temperature goes to zero Kelvin. The matter do not became older.

4. The complex time fixed in the infinite phase speed

Considering $t_s$ the subjective time fixed in the referential stationary space and $t'_s$ the subjective time fixed on the infinite phase speed of time.

According the New View of the Relativity Theory, given a $t_s$ time fixed in the stationary empty space relatively to $s$, course given by

$$s = v_j t_s = c t_s$$  \hspace{1cm} (18)$$

Now is necessary to find a point with $c$ velocity to use the Light Speed Invariance Postulate, so

$$s = v_j t_s = c t_s$$  \hspace{1cm} (19)$$

or

$$t_s = \frac{c}{v_j} t_i$$  \hspace{1cm} (20)$$

The relation between $t'_s$ and $t_s$ is

$$t'_s = \sqrt{1 - \left(\frac{v_j}{c}\right)^2} t_s$$  \hspace{1cm} (21)$$

As $v_j$ is infinite

$$t'_s = j \frac{v_j}{c} t_i$$

it is found
\[ t'_t = j t_s \]  
(22)

Than the time \( T'_t \) fixed on the infinity phase speed of time has the same module as the time \( t_s \) in the absolute stationary empty space, but is complex.
So the time equation that is fixed on the infinite phase speed of time is
\[ T = e^{\alpha_0 (D + \alpha)} e^{j \beta} \]
(23)

Of which the number of dimensional axis of the time is \( D = \infty \)
the space constant is \( \alpha_0 = \frac{1}{2} \ln(2) \) and the dimensional mathematic length is \( \alpha = \frac{1}{\pi} \)
The time equation is responsible to maintain stability to the matter and energy and provides movement to them.

5. The frequency spectrum of the time
The time at stationary empty space in an infinitesimal volume is represented by wave equation
\[ t(t_s) = \alpha \cos(t_s) + \alpha \]
(24)

This wave equation is the same for all infinitesimal volumetric points that constitute the empty space. However the time only exist at the present moment, so the wave equation is rigorously describe by
\[ t(t_s) = \left[ \alpha \cos(t_s) + \alpha \right] i(t_s - t_p) \]
(25)

where \( t_p \) is the present time
\[ i(t_s - t_p) = 1 \text{ to } t_s = t_p \]
\[ i(t_s - t_p) = 0 \text{ to } t_s \neq t_p \]
(26)
The present time phase is \( \alpha \cos(t_p) + \alpha \), and the frequency spectrum of \( t(t_s) \) is \( X(f) = \alpha \cos(t_p) + \alpha \)

The frequency spectrum is infinite, all frequencies with the same amplitude \( \alpha \cos(t_p) + \alpha \) that depends on only the present time \( t_p \).
To demonstrate the above affirmation substitute
\[ i(t_s - t_p) = \lim_{\varepsilon \to 0} \left[ \frac{t_s - t_p}{\varepsilon} \right] \]
(27)
where
\[ \frac{t_s - t_p}{\varepsilon} = \begin{cases} 1; & \text{to } -\frac{\varepsilon}{2} < t_s - t_p < \frac{\varepsilon}{2} \\ 0; & \text{others values} \end{cases} \]
(28)
\( \varepsilon \) is the volumetric infinitesimal dominium of the present time
So
\[ t(t_s) = \left[ \alpha \cos(t_s) + \alpha \right] \lim_{\varepsilon \to 0} \left[ \frac{t_s - t_p}{\varepsilon} \right] \]

The above wave equation is representing an infinitesimal space volumetric point.
On the other hand the time has infinite dimensional energy axis in a limited volume. This non specified limited volume has \( 2^D \) dimensional axis of zero width, where \( D \) is infinite.
Considering the wave equation in a unitary volumetric elementary cell. This cell has \( \frac{1}{\varepsilon} \) volumetric infinitesimal points of wave equations.
The volumetric space incremental \( \varepsilon \) is the same \( \varepsilon \) incremental time because space and time constitute the same unit.

So in an elementary cell has

\[
t(t_s) = \left[ \alpha \cos(t_p) + \alpha \right] \lim_{\varepsilon \to 0} \left[ \frac{1}{\varepsilon} \text{ret} \left( \frac{t_s - t_p}{\varepsilon} \right) \right]
\]

Where \( \lim_{\varepsilon \to 0} \left[ \frac{1}{\varepsilon} \text{ret} \left( \frac{t_s - t_p}{\varepsilon} \right) \right] \) is the unitary impulse function at the present time \( t_p \), \( \delta(t_s - t_p) \) produce a frequency spectrum \( G(f) = e^{-j2\pi f_p} \).

But as there is only the present time, with present time is a new time origin and, in this case there is no delay time to consider so

\[
t(t_s) = \left[ \alpha \cos(t_p) + \alpha \right] \delta(t_s - t_p)
\]

(29)

will produce the frequency spectrum for the volumetric cell of time

\[
X(f) = \left[ \alpha \cos(t_p) + \alpha \right]
\]

(30)

Where the time delay is inconsiderate because there is only present time \( t_p \), so each instant \( t_p \) is a new origin of time.

It means that the time has infinite frequency components with same amplitude but this amplitude change with the present time \( t_p \).

6. The inseparable Space-Time

The infinite speed phase of time has a complex time equation \( T \) and it is simultaneously present in all space of the Universe.

\[
T = e^{\alpha_0(D+a)} e^{\beta_s}
\]

(31)

The empty space otherwise is stationary and reflex of the time and has a complex equation of antispace given by

\[
S_i = e^{\alpha_0(D+a)} e^{-\beta_s}
\]

(32)

So the Space-Time equation is the combination of this two equations.

So \( T \) is to be replaced by

\[
T_0 = T + S_i
\]

(33)

In this case the result would be

\[
T_0 = e^{\alpha_0(D+a)} 2 \cos(t_s)
\]

On the other hand \( t_s \) is the subjective time that increase indefinitely. The real time \( t \) oscillates as a pendulum between \(-\pi/c \leq t \leq \pi/c\).

With the above constitution it can be proved that

\[
e^{i\omega_0 t} \text{ is replaced by } \cos(\omega_0 c t_s) \cdot i(\omega_0 c t_s - n\pi) + j \sin(\omega_0 c t_s)
\]

(34)

\[
e^{-i\omega_0 t} \text{ is replaced by } \cos(\omega_0 c t_s) \cdot i(\omega_0 c t_s - n\pi) - j \sin(\omega_0 c t_s)
\]

(35)

where \( n \) is a integer number

And the results should be
\[ T_0 = e^{\alpha_0(D+\alpha)} 2 \cos(\omega_t c t_s) \cdot i(\omega_t c t_s - n\pi) + 0j \]

where
\[ i(\omega_t c t_s - n\pi) = 1 \text{ to } \omega_t c t_s = n\pi \text{ and zero otherwise} \]

Other condition is that the empty space is not elastic. This condition will change the result above because the elastic equation \( e^{-j\omega t} \) has his components in cosine and sine as grounded referential and this results in fact that
\[ T_0 = \cos(\omega_t c t_s) i(\omega_t c t_s - n\pi) + \sin(\omega_t c t_s) \]

So the resultant particle mass from the fundamental equation of the continuous space time [1] is
\[ m = \left( \frac{1}{\omega_t} \right) m_0 \left[ \cos(\omega_t c t_s) i(\omega_t c t_s - n\pi) + \sin(\omega_t c t_s) \right] \]

where \( m_0 \) is resting mass of the particle.

In the above equation appears the duality-wave-particle.

Some results of this theory:

\[ N = 7 \quad \text{Number of atomics Shells} \]

\[ RT1 = \frac{1}{2\sqrt{2}} \frac{1}{4\pi \sqrt{2}} \quad \text{Partial reduction of the time function} \]

\[ RT2 = \frac{1}{2\pi \sqrt{2}} \quad \text{Complete dimensional reduction of the time function} \]

\[ M(0) = \frac{1}{2} \left( e^{\frac{\alpha_m}{\sqrt{2}}} + e^{-\frac{\alpha_m}{\sqrt{2}}} \right) \quad \text{Dimension al factor of correction} \]

\[ Z(0) = \frac{1}{2} \left( M(0) + \frac{1}{M(0)} \right) \quad \text{Dimensional factor correction} \]

where the factor \( M(0) \) is associated to the space and the \( \frac{1}{M(0)} \) factor is associated to the anti-space.

The factor \( Z(0) \) is associated to the conjugated actuation between space and anti space.

Light speed into the empty space
\[ c = e^{\alpha_0(D+\frac{1}{\pi})} = 2,9974385630 \times 10^8 \text{m/s} \]
\[ \text{PD} = -0,016 \]

where PD is the percentage difference.

Static proton mass
\[ m'_p = \frac{\alpha_n}{\pi} (-\alpha_n \frac{1}{\pi}) \alpha_0^{RT1} \left( \frac{1}{M(0)} \right) \text{kg} = 1,671795279 \times 10^{-27} \text{kg} \]
\[ \text{PD} = -0,049 \]

Static neutron mass
\( m'_a = \frac{\alpha_0}{\pi} (-\alpha_0^D) \alpha_0^{RT} Z(0) \mathrm{kg} = 1.674341082 \times 10^{-27} \mathrm{kg} \) \hspace{1cm} (40)

PD = -0.034

Boltzmann constant \[8\]
\[
k = \frac{1}{\alpha_0 \alpha_0^{2RT} - \alpha_0} e^{-D_0} = 1.380299907 \times 10^{-23} \mathrm{J/K} \hspace{1cm} (41)
\]

PD = -0.0262

Bohr Radius \[8\]
\[
r_0 = \frac{1}{(m(8) - 1)c} = \frac{1}{63c} = 5.29526678 \times 10^{-11} \mathrm{m} \hspace{1cm} (42)
\]

PD = 0.070

where
\[
m(8) = \sum_{l=0}^{2} (2l + 1) = 64
\]
\[
m(8) - 1 = D_0 + N
\]

Static electron mass
\[
me = \left( \frac{\alpha}{\pi} \right)^2 \alpha_0^{D_0} \alpha_0^S \alpha_0^{RT} \frac{1}{M (0)}
\]
\[
me = 9.127735158 \times 10^{-31} \mathrm{Kg}
\] \hspace{1cm} (43)

absolute percentage deviation = 0.201%

Elettric Charge
\[
Q = K m_{p.e}
\] \hspace{1cm} (44)

onde
\[
m_{p.e} = \left( \frac{1}{\alpha_0} \right)^3 \alpha_0^{RT} M (0)
\]

\[
K = (4\pi \varepsilon_0) G
\]

and \( G \) is the gravitational constant and \( \varepsilon_0 \) is the dielectric permittivity of vacuum.

Using the real value of \( \varepsilon_0 \) and \( G \) we obtain \( Q = 1.601789478 \times 10^{-19} \) coulombs

absolute percent deviation = -0.024%

7. Conclusion
From the Dimensional Continuous Space-Time theory, the time and the space are inseparable. The Space-Time is tridimensional and the time does not is the fourth dimension. The time is a dynamic energy of the empty space and it is the fuel of the movement.

Everything that moves inside the Universe only have movement because receives energy from the time. The time is also responsible to keep stability for matter and energy.
There are three kinds of time equation. One is the time wave equation of the empty space; the second is the time equation that gives stability to the matter, propagation energy and others energy forms.

The third is the time function that belongs to the structure of the matter and energy and receive energy from the time equation to keep the matter and energy structures.

The time of the empty space has infinite frequency spectrum and its phase speed is infinite.

The time of the empty space is the same inside the whole Universe.

The time only exist in the present time. From the action of the time equation on the matter and energy was found the duality-wave-particle.

In this theory the space does not have elasticity and the Space-Time is no more a mystery.

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