

The idea of motion transformations as the foundation of the laws of nature

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Herein the simple analysis of the basic transformation equations reveals that the idea of motion transformations is the foundation of the laws of nature and such that the idea of the arbitrary space-time transformations is in fact only an excursion. Herein it is emphasized that the mass and energy variables are substituted into the equations, instead of the space and time variables, precisely because what is fundamentally and appropriately considered in physics is purely the motion transformation and its result. And herein presented are the kinematical formula for the creation process due to gravity and the kinematical origin of gravity.

Introduction

The laws of nature describe fundamental transformation processes. By the empirical evidence, there are two fundamental processes. They are motion and duration. Motion is the corporeal (i.e., tangible) process that occurs in the space dimension. Duration is the abstract process that occurs along the time dimension. They are the fundamental currents.

The laws of nature basically consider six fundamental essences: the 3-d space dimension, the 1-d time dimension, motion, duration, the substance of existence, and the instance of existence.

The laws of nature describe (1) a duration transformation process and (2) a motion transformations process. Thus, nature has both the duration (time) transformation and the motion (velocity) transformations.

Both Newton and Einstein put forth their famed scientific propositions on the premise of their interpretations of the transformation equations. The transformation equations are simple. But the possibility that the deeper analysis of the fundamental equations could result in a more profound scientific understanding should not be underestimated.

The laws of nature according to classical physics and modern physics

In classical physics the law regarding the duration transformation is that *time*—the duration process—*flows without influence from anything external*. The laws regarding the motion transformations are expressed as the laws of motion and gravitation. And the laws of motion are founded on the Galilean velocity (motion) transformations. The space and time dimensions are the unchanging backgrounds for the transformations in classical physics. And the substance of existence is *matter* that *occupies space and has mass*. As for the instance of existence, it is taken for granted that there are the past instants, present instant, and future instants.

Modern physics departs from the classical idea of the motion (velocity)

transformations. Modern physics emphasizes the idea of the arbitrary transformations of space and time. In modern physics, not much is said regarding the idea of motion transformations. However, there are the ideas regarding motion being applied to the space dimension, to the time dimension, and to the duration process – i.e., the dynamics of space-time. Modern physics tacitly proposes (1) that space (the dimension) may be moved and thus may expand, contract, warp, curve, loop, (2) that time (the dimension) may be moved and therefore warped, and (3) that the time vector may interact with the motion vector and therefore time (the duration process) may be dilated or accelerated.

The transformation equations

A straightforward inspection of the transformation equations helps clarify what transformations really occur in nature.

There are three sets of transformation equations that are valid in their appropriate applications. Without including the associated equations that are of minor relevance, the following are the transformation equations –

- $x'=x(1-v/c)$ the 1-d Galilean transformation equation;
- $x'=x(1-v^2/c^2)^{1/2}$ the 2-d Lorentz transformation equation; and
- $x'=x(1-v^2/c^2)$ the 3-d tensor transformation equation.

The transformation equations are all of the form $x'=x\gamma$, where γ is the transformation factor. Notably, the variables in the transformation factor represent velocities or motions. Physics is about motions. And the basic intent of the transformation equations is clearly to relate the kinematics of the motion interactions. All these facts indicate that the transformation equations describe motion constructs – not space-time constructs.

The Galilean transformation is expressed by the equation $x'=x-vt$. The Galilean transformation equation is called the velocity transformation equation. It is intended to show the resultant velocity when the velocity c as the threshold (the initial) velocity is breached to the extent of the velocity v . In the Galilean equation, the threshold velocity c is any appropriate velocity that is not necessarily the velocity of light. Because $t=x/c$, the term $x-vt$ is equal to $x-vx/c$; and this factors out as $x(1-v/c)$, which shows the Galilean velocity transformation factor $(1-v/c)$.

To clarify, consider the velocity transformation in the example of a bullet fired (shot) forward from a flying airplane. Because the intent of the transformation equation is to determine the velocity transformation and not the space or time transformations, the variables u and u' that represent velocities are substituted into the equation instead of the space or time variables. It is assumed that u is

the resultant velocity of the bullet fired from the flying airplane; u' is the initial velocity of the bullet relative to the ground, which is the velocity of the airplane relative to the ground; and v is the velocity of the bullet relative to the airplane after the bullet was fired. The resultant velocity of the bullet relative to the ground is $u=u'+v$. In accord with the Galilean velocity transformation, we have

$$u'=u(1-v/c)$$

Solving for u , we have

$$u=u'/(1-v/c)$$

And this is

$$u=u'(1-v/c)^{-1}$$

Such that, with the approximation applied on the transformation factor, we therefore have

$$u=u'(1+v/c)$$

Since the velocity $u'=c$, we have upon substitution

$$u=c+vc/c$$

$$u=c+v$$

This is the bullet's resultant velocity $u=u'+v$ relative to the ground.

So, if $c=500\text{mph}$ and $v=700\text{mph}$, the resultant velocity of the bullet relative to the ground is 1200mph . The purely linear velocity addition according to the Galilean transformation is simple.

The Galilean transformation was deemed correct in the classical view. But Maxwell brought forth new ideas regarding the phenomenon of light. Maxwell put forth that the characteristics of light fit that of the electric and magnetic waves with the velocity $c=\lambda f$, and that the propagation of these waves are independent of the motion of their sources. These suggested that the *linear* velocity of light is the same in all frames of reference. And therefore, these suggested transformations affecting the electromagnetic phenomenon other than the simple velocity additions.

The question was essentially asked: *how must the known laws of nature be modified in order to account for the postulate of the constancy of the velocity of light?* The modifications to the Galilean transformation equations resulted in the Lorentz transformation equations.

The modified transformation equations must show $u'=u=c$. Therefore, the Galilean transformation factor $(1-v/c)$ was modified into the factor that is essentially equal to 1 in order to have $u'=u(1)$ to show that the velocity of light c is the same in all frames of reference. The modification basically required the

introduction of the factor $\beta=(1-v/c)^{-1}$, which is the reciprocal of the Galilean transformation factor $(1-v/c)$. The modification of the transformation factor is basically as follows:

$$\gamma=(1-v/c)\beta$$

$$\gamma=(1-v/c)(1-v/c)^{-1}$$

Upon applying the approximation on the β factor, we have –

$$\gamma=(1-v/c)(1+v/c)$$

And this yields the modified transformation factor –

$$\gamma=(1-v^2/c^2)$$

But this transformation factor expresses a *four-vector* interaction in the essentially spherical translation of the electromagnetic phenomenon. The required factor was for a *two-vector* interaction involving just one velocity v and one velocity c for the essentially 2-d linear translation of the phenomenon – half that of the spherical translation. So, the fitting factor is the square root of $(1-v^2/c^2)$, which is the Lorentz transformation factor $\gamma=(1-v^2/c^2)^{1/2}$.

The Lorentz transformation factor allows the following equation –

$$u'=u(1-v^2/c^2)^{1/2}$$

$$u=u'(1-v^2/c^2)^{-1/2}$$

$$u=u'(1+1/2v^2/c^2)$$

Since $u'=c$, we have

$$u=c+1/2(v^2/c)$$

Because $1/2(v^2/c)$ is too small that in the approximation it is essentially 0, we therefore have –

$$u=c$$

Such that, therefore, we have

$$u=c=u'$$

This satisfies the requirements for the postulate of the constancy of the velocity of light. Thus, the transformation is the velocity v rotations on the velocity c translation as prescribed by the Lorentz factor.

Now, the idea of the rotations on the translation of the electromagnetic phenomenon is evidently the underlying idea of the Doppler-shifts. But, in spite of the empirical explanations involving the Doppler-shifts, the interpretations of the motion transformation equations were unnecessarily complexified with the idea of the arbitrary space-time transformations.

Now, the detail that puts good sense in the interpretations of the equations is the appreciation that the essence of motion is the underlying essence of the gravitational field, the electromagnetic fields, and particulate mass.

The Galilean velocity transformation

The Galilean velocity transformation describes the purely linear motion transformation. When the appropriate mass variables are substituted into the equation, it presents the seminal ideas that prefigure the conclusions reached by the more advanced 2-d Lorentz transformation and 3-d tensor transformation. The Galilean transformation shows –

$$x'=x(1-v/c)$$

$$m_0=m(1-v/c)$$

$$m=m_0(1-v/c)^{-1} \approx m_0(1+v/c)$$

$$m-m_0=[m_0v-m_0(0)]/c$$

$$\Delta m=\Delta p/c$$

$$\Delta p=\Delta m(c)$$

The above suggests that the change in momentum effects a change in mass or that the change in mass effects a change in momentum. But this suggestion was inconclusive. However, it presented the seminal ideas regarding mass and momentum. Apparently, the Galilean transformation led to the idea of inertia and was contributory to the idea of gravitation. All of these are in Newton's laws of motion and gravitation.

The Lorentz transformation

The Lorentz transformation describes the motion transformations that involve the mass phenomenon, the electromagnetic phenomenon, and the kinetic energy phenomenon. This is apparent when the variables for mass are introduced by substitution as shown below.

$$x'=x(1-v^2/c^2)^{1/2}$$

$$m_0=m(1-v^2/c^2)^{1/2}$$

$$m=m_0(1-v^2/c^2)^{-1/2} \approx m_0(1+1/2v^2/c^2)$$

$$m=m_0+1/2m_0v^2/c^2$$

$$m-m_0=[1/2m_0v^2-1/2m_0(0)^2]/c^2$$

$$\Delta m=\Delta K.E./c^2$$

$$K.E.=mc^2$$

The mass formula above indicates that motion is transformed into mass, which indicates that motion is fundamentally the underlying essence of mass. Thus, mass is a motion construct, a kinetic construct.

The 3-d tensor transformation and the genesis formula

The 3-d tensor transformation affirms the distinct suggestion of motion transformations in the derivation of the genesis formula, where we have –

$$\begin{aligned}
 x' &= x(1-v^2/c^2) \\
 m_0 &= m(1-v^2/c^2) \\
 m &= m_0(1-v^2/c^2)^{-1} \approx m_0(1+v^2/c^2) \\
 m &= m_0 + m_0 v^2/c^2 \\
 m - m_0 &= m_0 [v^2 - (0)^2]/c^2 \\
 \Delta m &= m_0 [\Delta v]^2/c^2 \\
 \Delta m &= m_0 [\mathbf{at}]^2/c^2
 \end{aligned}$$

Or

$$\begin{aligned}
 m &= m_0(1+v^2/c^2) \\
 m &= m_0(c^2/c^2 + v^2/c^2) \\
 mc^2 &= m_0c^2 + m_0v^2 \\
 E &= E_0 + m_0v^2 \\
 E - E_0 &= m_0[v - 0]^2 \\
 \Delta E &= m_0[\Delta v]^2 \\
 \Delta E &= m_0[\mathbf{at}]^2
 \end{aligned}$$

The above are the two forms of the genesis formula derived according to the idea of the 3-d gravitational translation (e.g., consider the simplified picture of continuous concentric *spherical* flow). Here we have **a** for the gravitational acceleration according to the gravitational field intensity of the seed mass m_0 , and **t** is for the assumed elapsed time.

Note that in the Galilean transformation the explanatory focus is on the change in the linear momentum (i.e., $\Delta p = [m_0v - m_0(0)]$). In the Lorentz transformation the explanatory focus is on the change in kinetic energy (i.e., $\Delta K.E. = [\frac{1}{2}m_0v^2 - \frac{1}{2}m_0(0)^2]$). But in the 3-d tensor transformation the explanatory focus is on the change in 3-d velocity (i.e., $[\Delta v]^2$), instead of the change in the 3-d tensor momentum (i.e., $\Delta P = [m_0v^2 - m_0(0)^2]$). This is because the idea of momentum in the 3-d translation does not have the explanatory significance that $[\Delta v]^2$ has for the clarification of the idea that *because of* or *out of* the gravitational field mass

gets created as suggested by the formula $\Delta m = m_0 [at]^2 / c^2$.

The ramifications from the genesis formula

The genesis formula provides comprehensive explanations regarding the nature of mass and energy, the nature of gravity, the origin of gravity, the structure of the cosmos, and the nature of the cosmos as a whole.

- The genesis formula affirms that mass is a motion construct.
- The genesis formula affirms that mass gets created out of gravity.
- The genesis formula affirms that the cosmos is infinitely hierarchical.
- The genesis formula reveals the nature and origin of gravity.
- The genesis formula explains the cosmic background radiation.
- The genesis formula explains the observed expansion of the universe.
- The genesis formula suggests how the kinetic quantum is quantized.

The genesis formula indicates that mass is a kinetic construct. This is obvious because mass (i.e., c^2/c^2) is increased with the added velocity (i.e., v^2/c^2) when mass accelerates, and because motion (kinetic energy, mc^2) is released when mass is lost in the nuclear reactions. Mass and velocity are motion constructs – they are configurations of motion.

The genesis formula indicates that, as mass accelerates, new mass gets created. The genesis formula indicates a tensor acceleration as signified by the squared velocities of the four-vector interaction. The only tensor acceleration fundamental in nature is the gravitational acceleration. And every particle of mass has a gravitational field around it. Thus, mass gets created out of the gravitational motion that is condensed and amassed.

The genesis formula indicates that new mass gets created because of mass and gravity. Therefore, this implies an infinitely hierarchical cosmos of mass creating new mass because of gravity. This is also the clue to the most plausible explanation regarding the origin of gravity.

In accordance with the principle of the relativity of motion and of the principle of equivalence, gravity must necessarily be the motion of mass relative to an infinitely hierarchical cosmos. The motion that fits the bill is the *infinite revolutions* of mass in an infinitely hierarchical cosmos. The motion vectors that represent the infinite revolutions with respect to an infinitely hierarchical cosmos are evidently the relative vectors that represent the gravitational field. This implies that the origin of gravity is the infinite revolutions of mass in an infinitely hierarchical cosmos.

It now becomes obvious that the full spectrum of the observable cosmos (all

electromagnetism and mass) is rendered by the kinematic projections provided by the infinite revolutions in an infinitely hierarchical cosmos. And the kinematic projections are pretty much in holographic 3-d. And so, gravity is the origin and cause of all the phenomena in nature.

The genesis formula accounts for both the foreground creation of mass and the background cosmic radiation. Plug in the seed mass m_0 for the gravitational domain and the appropriate gravitational acceleration value into the genesis formula. The result of 50% for the cosmic background radiation is right smack on the CMB curve. The full result accounts for the domain's contribution of ideally the 50% foreground mass and 50% background radiation into the overall spectrum of cosmic phenomena.

The genesis formula also provides the explanation regarding the cause of the observed cosmic expansion. It becomes obvious that the increasing mass causes increasing momentum, which causes the spiraling orbits of the revolutions in the infinitely hierarchical cosmos. And so, gravity is also the cause of the observed cosmic expansion.

The genesis formula implies a motion condensation (the cosmic mass formation) process and a motion attenuation (the cosmic expansion) process. So, the observable cosmos is maintained between the darkness of super dense blackholes and the darkness of super tenuous voids. This implies that the kinetic quantum is governed by the condensation and expansion processes wrought by gravity – which gravity is caused by the infinite revolutions of mass. But this is a generalized picture. This implies but does not detail the gauged kinematics of the quantized toroidal particulate and radiant electromagnetic configurations.

Conclusion

The details are as yet incomplete. But it is obvious that the fundamental idea of motion transformations, as indicated and explained by the three motion transformation equations, is the true foundation of the laws of nature – of physics. It is no surprise that Newton's laws of motion, Einstein's $E=mc^2$ and the genesis formula $\Delta E=m_0[at]^2$ are all founded on the fundamental idea of motion transformations. It now becomes apparent that the bending of light in gravitational fields, celestial mechanics and the field equations may all be interpreted in accordance with the idea of motion transformations. Physics is fundamentally about the motion of motions – not the motions of space or of time. Evidently, the idea of the arbitrary transformations of space and time is not necessary. So, apparently, the mathematics in our physics may correctly be considered only according to the idea of purely the motion transformations. □

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