Wrong Assumptions of Relativity
Hindering Fundamental Research in Physical Space

by

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14th August 2012

Abstract: The founding assumptions or postulates of Relativity and some of the resulting consequences confound the logic and common sense. In Relativity the Newtonian notions of absolute motion, absolute time, and absolute reference frame have been replaced with the Einsteinian notions of relative motion, relative time, and inertial reference frames in relative motion. This relativity dominated viewpoint has effectively abandoned any critical study or advanced research in the detailed properties and processes of physical space for advancement of Fundamental Physics. In this essay I show that the founding assumptions and postulates of Relativity are fundamentally wrong. To reinforce this argument two practically doable experiments are proposed for detection of absolute motion and establishment of a universal or absolute reference frame. After establishing the Newtonian absolute space, we can focus on the physical properties of space and examine the formation and existence of matter and fields in this physical space. Feasibility of such an advanced study of physical space as an elastic continuum is also discussed. It is shown that all forms of stable and unstable matter particles and fields exist as localized dynamic stress/strain 'bubbles' in the elastic space continuum.

1 Introduction

As per the Newtonian notion of absolute time and length, an absolute reference frame is the one which is at rest with respect to the center of mass of the universe, is non-rotating, and speed c of light propagation in vacuum is an isotropic constant in that frame. Any motion with respect to such a reference frame is called absolute motion. However, according to special theory of relativity (SR) all motion is relative and existence of an absolute inertial frame of reference which could be practically distinguished from all other inertial frames, is ruled out. As per the second postulate of SR the speed of light propagation in vacuum is an isotropic constant c in all inertial reference frames (IRF) in relative motion. In this essay I will show that the second postulate represents a fundamentally wrong assumption of Relativity which needs to be discarded. In addition, physical nature of spacetime continuum, spacetime curvature, length contraction, time dilation and hypothetical inertial reference frames in relative motion, are some of the associated wrong assumptions of Relativity which also need to be abandoned.

However, the theory of Relativity is being regarded as a pillar of Modern Physics, essentially on the basis of mass-energy equivalence which is believed to have been introduced by Relativity. Yet it is a documented fact that the concept of mass-energy equivalence, in one form or the other, was already in existence prior to Einstein's 1905 paper. Nikolay Umov, in his ether based studies of 'Energy in Moving Bodies', had alluded to the inertial property of the energy as $dE/dm = c^2$ in 1873. In 1900, Henri Poincaré had deduced that the electromagnetic field energy of an electromagnetic wave behaves like a fictitious fluid with a mass density of E/c^2. In 1903, Olinto De Pretto had used the expression mv^2 for the "*vis viva*" and the energy store within

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matter, where he identified v with the speed of light. From the inertial property of all forms of entrapped energy, we can derive the notion of dynamic mass and develop its quantitative relationship with the rest mass, without employing the postulates of Relativity.[1]

Striving to understand and grasp the intricacies of physical phenomena is an integral part of Human evolution. In the process we have evolved a scientific method through logical application of cause and effect sequencing in natural phenomenon. However, during the 20th century, scientific method adopted sophisticated mathematical modeling techniques wherein the logical application of cause and effect sequencing was no longer explicit. As a result certain mistaken beliefs and erroneous assumptions crept into the scientific method. Apparently, growing complexity of mathematical models developed to represent physical reality, often obscure the physical reality to such an extent that the difference between the two is lost in the specialist jargon. In the process however, we have lost our intuitive guide, the common sense, to judge whether these abstract representations do really describe physical reality or simply lead us to a world of fantasy. This has resulted in blurring the distinction between physical and mathematical dimensions, and between physical and coordinate spaces.

2 Blurred Distinction between Mathematical Notions and Physical Concepts

Since the wrong assumptions of Relativity have been sustained by the prevailing ambiguity between mathematical notions and physical concepts, let us first discuss this ambiguity in some detail.

2.1 Role of Dimensional Analysis

The fact that mathematics mainly deals with dimensionless numbers, distinguishes its domain from that of physics. Physical dimensions provide an important linkage between mathematical representations and physical reality. All mathematical equations, representing certain physical phenomenon, are required to be dimensionally balanced. Some of these dimensions are considered base dimensions like mass [M], length [L], time [T], while others are derived from established physical laws and observed inter-relationship between various physical quantities. All dimensional attributes of physical objects can be quantified or measured through the use of certain well-defined reference standards called units of measurement. For each dimensional attribute or parameter many different reference standards or unit systems have been introduced from time to time. For example the units of measurement for length [L] can be meter, feet or yard etc.

The notion of physical dimensions is quite distinct from the mathematical degrees of freedom and constitutes a distinguishing feature of physical entities. All physical entities can be represented through parameters with physical dimensions and all such parameters can be measured in terms of physical units. Even though abstract mathematical notions play an extremely important role in the study of physical phenomena, they must not be mixed up with physical entities. For example, an abstract mathematical notion of probability waves cannot be accepted as a physical entity.

2.2 Distinction between Physical Space and Coordinate Spaces

The cardinal idea responsible for the invention of coordinate systems by Descartes consists of the assumption that to each real number there corresponds a unique point on a straight line. We choose a straight line X and a point O on it, which we call the origin. We choose a point A and call the length of the line segment OA, the unit length. Next we pick up any point P on this line X and take the ratio of the lengths of the line segments OP and OA. Let this ratio OP/OA be equal to x. The number x is called the coordinate of P. The coordinate x of point P is a dimensionless number and to obtain the length of the line segment OP we have to multiply x with the unit length OA. Similarly, an essential feature of a three-dimensional (3D) coordinate space is the concept of one-to-one correspondence of points in space with the ordered triplet of numbers. The predefined notion of unit length or scale for different coordinate axes, constitutes the metric for quantifying the notion of distance. The notion of physical space implies the spatial extension of the universe wherein all material particles and all fields are embedded or contained. The true void between material points is in essence the physical space, or free space. It is important to note here that the coordinate space, along with its unit scale or metric, is our human creation intended to facilitate the quantification of relative positions of material particles and fields. The existence of physical space does not depend in any way on the existence or nonexistence of coordinate systems and coordinate spaces. Of course, for the study and analysis of physical space and the material particles and fields embedded in it, we do need the structure of coordinate systems and coordinate spaces as a quantification tool. The most significant point to be highlighted here is that whereas the metric scaling property is only associated with coordinate space, the physical properties of permittivity, permeability and intrinsic impedance are only associated with physical space. As such, the four dimensional coordinate structure known as spacetime, along with its metric tensor, is an abstract mathematical (or geometrical) construct and cannot be accepted as a physical entity.

2.3 Center of Mass Reference Frame and Inertial Reference Frames

A reference frame is a set of space coordinates, fixed in some defined way, for taking physical measurements. Let us consider a closed volume V of space containing a system of N particles of matter. We consider a closed volume of space in the sense that there is no transfer of mass or energy across the boundary surface of this volume. Let K be a non-rotating Cartesian coordinate reference frame with its origin located at the center of mass (CoM) of these N particles. In the CoM reference frame K, the total momentum of all of its domain particles is zero. Out of all other inertial reference frames which could be constructed for referring the positions and velocities of given N particles within a closed volume V, the total mass-energy content measured in a CoM reference frame is the minimum. Hence, a CoM reference frame may be considered as an absolute or fixed reference frame for the given N particles contained within a closed volume V. The reference frame K can also be regarded as a unique fixed inertial reference frame (IRF) for the system of N particles under consideration. The Barycentric Celestial Reference Frame (BCRF) is kinematically defined by the position of some extragalactic radio sources and is a CoM reference frame for our solar system. The origin of space coordinates defining BCRF is located at the barycenter or the CoM of our solar system.

In Relativity, all non-rotating reference frames that move with uniform velocity with respect to one another, are defined as Inertial Reference Frames. The origins of all inertial reference frames are in a state of constant, rectilinear motion with respect to one another and are not accelerating. All IRF constitute a group and no particular member of this group can be considered a preferred reference frame.

3 Logical Flaws in Postulates and Implicit Assumptions of Relativity

The first postulate of SR enunciates the special ‘Principle of Relativity’ in which it has been assumed that the laws of physics are the same in all inertial frames, regardless of their state of motion. Physically, this means that all IRF in relative uniform motion are equivalent for the description of the laws of Nature and that there is no absolute or preferred frame of reference. The second postulate enunciates the constancy and isotropy of the speed of light in all IRF in relative uniform motion.

3.1 Logical Flaw in Principle of Relativity

Let the solar system reference frame BCRF represent the system of coordinates K, and let K' be any other IRF moving in uniform translation relative to BCRF. We know that in BCRF, being a CoM reference frame, the total linear momentum of all particles within the solar system will be zero, but not in any other IRF K', which is in motion relative to BCRF. Further, the total kinetic energy of all particles within the solar system will be a minimum in BCRF, and not in any other IRF K'. This fundamental difference between their total momentum and total kinetic energies, becomes a distinguishing feature between IRF K and K' and sets the reference frame K or the CoM reference frame as the unique, preferred reference frame for our solar system. With this the principle of relativity stands violated and a logical flaw in the first postulate of SR is established.

Basically, all laws of Nature will remain valid and operative independent of reference frames. However, in physics we quantify the laws of Nature, so as to represent them through certain mathematical equations involving various dimensional physical parameters. The laws of Nature and the characteristic interactions among material particles cannot be influenced by the arbitrarily defined coordinate systems. Of course, the form of mathematical representation of the laws of Nature can change with the change in coordinate system or reference frame but not the laws themselves. Hence, it is wrong to assume any *linkage* between the laws of Nature and the arbitrarily defined inertial reference frames in relative uniform motion. This establishes second logical flaw in the first postulate of SR.

3.2 Logical Flaw in the Second Postulate of SR

The second postulate of SR depicts an assumption that the speed of light in vacuum is the same isotropic constant c in all inertial reference frames (IRF) in relative uniform motion. It is well known from Maxwell's theory that the speed of light in vacuum depends on the permittivity ε_0 and permeability μ_0 of the physical space ($c = 1/\sqrt{\varepsilon_0\mu_0}$). Since permittivity and permeability are properties of the physical space, the speed of light in vacuum is also a property of physical space and cannot be derived from the metric properties of coordinate space. Hence the speed c of light in vacuum can be an isotropic constant only with respect to a reference frame which is at rest or fixed in the physical space; that is, with respect to an absolute reference frame. It is therefore, wrong to define the speed of light as the same isotropic constant in different inertial reference frames in relative motion.

To comply with this assumption, the notion of time as an absolute measure of change has been sacrificed in SR, leading to the notions of relative time and consequent length contractions. According to SR, the time interval dt of a standard atomic clock and a length segment dx of a standard meter rod, will be *seen to be different* in each of the infinitely many inertial reference frames in relative uniform motion. This is built in to the following relation involving space-time interval dS which is an invariant in all IRF.

$$(dS)^2 = (dx)^2 + (dy)^2 + (dz)^2 - (c.dt)^2 \tag{1}$$

However, the notions of length contraction and time dilation are not physical but only apparent or hypothetical effects, resulting from hypothetical measurements made by fictitious observers from abstract IRF in relative motion.

3.2.1 Notion of Length Contraction. A rod of length L_0 at rest in BCRF will be found to be of shorter length L when 'hypothetically measured' in an IRF (K') moving parallel to the length of the rod, at a uniform velocity 'v' with respect to BCRF. We say 'hypothetically measured' because as per the prescribed method of measurement, the measuring rods are supposed to be carried in the moving IRF (K') while the rod to be measured is located in the BCRF, and the measurements are to be carried out through exchange of light signals. Practically it is impossible to carry out such measurements.

$$L = L_0\sqrt{1-\left(v^2/c^2\right)} \tag{2}$$

Let us consider a thin spherical glass shell of diameter L_0 in BCRF. It will not be seen broken when viewed from the moving IRF (K'), even though its size in the direction of motion of K' will appear contracted. Normally, the glass shell is bound to break when its size physically contracts, even slightly. This shows that the length contraction in SR is not physical but apparent or hypothetical effect. Further, a rod of length L_0 will be seen to be of different lengths L_1, L_2, etc. when viewed from different IRF moving parallel to the length at different velocities. Hence, we may conclude that the length contraction in SR is an apparent effect, induced by the assumed constancy of the speed of light 'c' in all IRF in relative motion. This implies a logical flaw in the second postulate of SR.

3.2.2 Notion of Time Dilation. Consider an IRF (K'), moving with a relative uniform velocity **v** with respect to BCRF. Let us position one precision clock in BCRF and another identical clock in the moving frame K'. Now, as per SR, a small time interval Δt of the BCRF clock will appear to be longer or dilated when observed from the moving frame K'.

$$\Delta t' = \frac{\Delta t}{\sqrt{\left(1-v^2/c^2\right)}} \tag{3}$$

This 'time dilation' is not physical but an apparent effect because different observers, moving with respect to BCRF at different velocities, will find the same clock in BCRF to be running slow by different amounts. Thus the notions of 'Length Contraction' and 'Time Dilation' in SR, are just the props required to support the assumed isotropy of the light speed 'c' in all IRF in relative motion.

3.3 Logical Flaw in the Concept of Curved Spacetime in GR

Relativity has extended the notion of 3D coordinate space to 4D spacetime to facilitate geometrical representations of gravitational trajectories. But the *geometrical interpretation of gravitation* in GR implies the spacetime continuum to be a physical entity which can even be deformed and curved. Albert Einstein had asserted in a matter of fact way, "*the world in which we live is a four-dimensional spacetime continuum*."[2] Broadly GR implies that, '*mass curves spacetime, and spacetime tells the mass how to move*.'

The notion of invariance of the arc element ds in all admissible coordinate transformations is most crucial in the representation of a rigid 3D continuum. This invariance of an arc element ds, is given by,

$$(ds)^2 = g_{ij}(x)\, dx^i dx^j = g_{\alpha\beta}(y)\, dy^\alpha dy^\beta \,. \tag{4}$$

where $g_{ij}(x)$ and $g_{\alpha\beta}(y)$ are the metric tensor components in X and Y coordinate systems respectively. Since representation of vectors and tensors in the Euclidean geometry rely on the invariance of arc element ds, it implies that the Euclidean 3D space is effectively treated as a rigid 3D space continuum. In the linear or infinitesimal theory of deformation, the strain tensor components are computed from the covariant derivatives of the displacement vector. However, the strained state of a deformable continuum can also be represented by the metric h_{ij} of the deformed sate as,

$$(ds')^2 = h_{ij}(x)\, dx^i dx^j \,. \tag{5}$$

We can say that the deformable continuum is strained whenever arc element ds' given by equation (5) is different from the arc element ds given by equation (4). The covariant strain tensor components e_{ij} of the deformed state are related to this difference through following relations.

$$(ds')^2 - (ds)^2 = (h_{ij}-g_{ij})\, dx^i dx^j = 2e_{ij}\, dx^i dx^j \,. \tag{6}$$

The spacetime continuum of GR is not a Euclidean Continuum. In GR, the coefficients of metric tensor $[h_{ij}]$ of the pseudo-Riemannian spacetime manifold are obtained from Einstein's Field Equations (EFE). Riemann curvature tensor R_{ijkl} computed from the metric h_{ij} of the Riemannian 3D space, associated with the pseudo-Riemannian spacetime manifold, is non-zero. On the other hand, the Riemann tensor computed from the metric tensor g_{ij} of the Euclidean space, is always zero. As such the Riemannian 3D space of GR is *defined* to be a deformable space which is generally *perceived* as curved space. It can be shown from the Saint Venant's integrability or compatibility conditions for a continuous media, that the Riemann tensor composed from strain components e_{ij} must be a zero tensor to ensure that the displacement vector components, obtained from integration of these strain components, are finite, continuous, and single valued. This can be true only if both metrics of equation (6), namely g_{ij} and h_{ij} are Euclidean, which however contradicts the basic postulate of curved spacetime in GR. Hence, all strain components in the space continuum, induced by the Riemannian metric, will fail to satisfy the integrability or compatibility conditions, leading to discontinuities in the induced displacements. Therefore, if we treat the 4D spacetime manifold to be a physical entity, we end up with physically invalid discontinuities in the space continuum. Hence the 4D spacetime cannot be a physical entity.

3.4 Logical Flaw in the Block View of Spacetime in GR

Let us consider the physical space of our solar system located in a particular spatial section of a Cartesian space-time manifold XYZ-T. Let t_p depict the present instant on the time axis. As per the standard presentist view of the XYZ-T space-time manifold, only the present ($t=t_p$) section of the manifold represent the physical entities and not the whole manifold. As per this viewpoint, the physical state of the solar system at the next future instant ($t=t_p+\delta t$), evolves from its present ($t=t_p$) state through the operation of physical laws of nature, through the operation of cause and effect. On the contrary, as per the eternalist view of the spacetime, all 3D XYZ sections of the manifold are supposed to be physically occupied with our solar system. This eternalist viewpoint represents a situation wherein the physical state of all matter particles and fields, is *predetermined* at all future locations of the solar system, or at all 3D XYZ spatial sections for $t>t_p$ of the 4D XYZ-T spacetime manifold. This predetermined physical state of the

'Block Universe' does not permit a causal evolution of the physical state and violates the fundamental principle of cause and effect which is the basis of all scientific study of the universe. Thus, the eternalist viewpoint, depicting whole 4D XYZ-T spacetime manifold as a physical entity, a 'Block Universe', is fallacious on the grounds of causality violation. Hence, the spacetime continuum is not a physical entity but just an abstract mathematical construct.[3]

3.5 Spacetime Coordinate Structure used as a Graphical Template in GR

Let us consider a particle moving in a circular orbit in XY plane. The motion of this particle can be represented as a helical trace in a XY-T coordinate space. An important feature of this graphical representation of distance-time data points is that the XY-T coordinate space is not metrized like the Euclidean space to ensure the invariance of space points (equation 4). Here the metric coefficients g_{ij} of this XY-T coordinate space or manifold are not constrained by the invariance of arc element ds. The shape of this data curve can be varied arbitrarily by adjusting the individual coordinate scale or the metric coefficients. However, it is possible to introduce an important constraint on the metric coefficients, on the lines of Minkowski space-time manifold, such that with a suitable differential scale or the metric along the X,Y and T axes, the parabolic space trajectory on linear scale manifold, changes into a geodesic on the differential scale manifold.

We can extend this methodology for obtaining trajectories of particles moving in 3D physical space, under gravitational field of a body of mass M. For this we can first obtain a differential scale 4D manifold XYZ-T as a template by correlating its metric with mass M, in conjunction with an invariance constraint, such that the Newtonian trajectories in the given gravitational field appear as geodesic curves in this template manifold. The invariance constraint linking space and time coordinate scales is,

$$(dS)^2 = g_{tt}\,(c.dt)^2 - \{g_{xx}\,(dx)^2 + g_{yy}\,(dy)^2 + g_{zz}\,(dz)^2\}, \qquad (7)$$

where dS is an invariant, g_{tt} is the metric coefficient of the time coordinate and g_{xx}, g_{yy} and g_{zz} are the metric coefficients of the X, Y and Z coordinates respectively. Of course, we need to adjust the differential scale or the metric coefficients of this template manifold according to the mass M of the gravitating body to account for different acceleration profiles. This is precisely what has been attempted through Einstein Field Equations (EFE) in the spacetime model of GR. In GR, the pseudo-Riemannian 4D spacetime manifold is used as an abstract mathematical differential scale template manifold for getting the trajectories of particles as geodesic curves. The differential scale or metric coefficients of this 4D template manifold are correlated through EFE with the mass-energy density in the physical space, to simulate the gravitational trajectories with geodesic curves. It may be emphasized here that the correlation between the mass-energy density in physical space and the metric coefficients of the 4D template manifold or coordinate space, as established through EFE, is essentially an empirical correlation obtained by arbitrarily equating the physical dimensions of length [L] and time [T].

4 Proposed Experimental Invalidation of the Second Postulate of SR

Since the speed of light in vacuum is a property of physical space, it can be an isotropic constant only with respect to an absolute reference frame. Quoting Albert Einstein, from his 1905 paper, "…*We have not defined a common 'time' for A and B, for the latter cannot be defined at all unless we establish by definition that the 'time' required by light to travel from A to B equals the 'time' it requires to travel from B to A*." [4] This arbitrary definition of 'common time' constitutes a fundamental departure from the Newtonian notion of absolute time. Of course, this departure was required to support the assumed isotropy of light speed 'c' in all IRF in relative motion. Consequent to this arbitrary definition, which became Einstein's famous clock synchronization (e-synchronization) convention, clock times in different IRF in relative motion, had to be adjusted by introducing time rate dilation and time offsets as a function of position and velocity. Consider a line segment AB of length D, moving in the absolute reference frame at velocity U_{ab} along AB. The time taken by a light pulse to propagate from point A to B, for $U_{ab} << c$, is

$$T_{ab} = \frac{D}{c - U_{ab}} = \frac{D}{c} + \frac{D.U_{ab}}{c^2}. \quad (8)$$

Similarly, if T_{ba} is the time taken by a pulse of light to propagate from point B to A, then,

$$T_{ba} = \frac{D}{c + U_{ab}} = \frac{D}{c} - \frac{D.U_{ab}}{c^2} \quad (9)$$

From equations (8) and (9), it can be shown that,

$$\frac{U_{ab}}{c} = \frac{T_{ab} - T_{ba}}{T_{ab} + T_{ba}} \quad (10)$$

When a line segment AB is moving with absolute velocity U_{ab} along AB, a signal pulse will take longer to propagate from the trailing end (A) to the leading end (B) but will take shorter time to propagate from B to A. Equation (10) shows that the absolute velocity U_{ab} of the line segment AB can be measured by practically measuring the to and fro pulse propagation times between points A and B. Feasibility of a doable experiment on this basis has been established in my paper titled, "*Proposed Experiment for Detection of Absolute Motion*", published in Physics Essays in September 2010.[5]

From equations (8) and (9) it can inferred that to meet the requirements of Einstein's arbitrary definition of common time, the clocks A and B will have to be adjusted or synchronized in such a way that the leading end clock (B) is set to lag behind the trailing end clock by DU_{ab}/c^2. This is precisely the implication of e-synchronization in SR. When two clocks A and B are synchronized through a GPS satellite in common view mode, their synchronization is effectively equivalent to e-synchronization. An absolute time offset of $D.U_{ab}/c^2$ between the two GPS synchronized clocks gets created as a consequence of Sagnac effect of absolute motion. In essence, the time distributed through satellite links, on the assumption of isotropy of light speed in the ECI frame, is the Relative time and not the absolute time. This absolute synchronization offset between the master clocks at two distant timing Labs can be physically measured with an appropriate portable clock and such measurements can in fact be used to determine the unknown absolute velocity vector **U** of earth. By incorporating the absolute velocity vector **U** in the time transfer software, we can account for the anisotropic speed of light in the ECI reference frame and thereby ensure the distribution of absolute time to different clocks all over the globe. In that case it should even be possible to achieve absolute synchronization in space clocks in deep space flights. On this basis a simple doable experiment has been proposed in my paper titled, "*Detection of absolute motion through measurement of synchronization offsets*", recently submitted for publication in Applied Physics Research (APR) Journal.

5 Physical Space as an Elastic Space Continuum

The physical measurable properties of permittivity (ε_0), permeability (μ_0) and intrinsic impedance Z_0 are only associated with physical space and cannot be derived from or linked to the metric of coordinate space. Just like the intrinsic impedance $Z_0 = \sqrt{\mu_0/\varepsilon_0}$ of about 376.73 ohms, the speed of EM wave propagation $c = 1/\sqrt{\varepsilon_0\mu_0}$ is also a measurable property of physical space. The electromagnetic wave propagation may be compared with a transverse strain wave propagation. In this comparison ($1/\varepsilon_0$) may be seen to be identical to the elasticity property and (μ_0) may be seen to be identical to the inertial property of an elastic continuum. All notions of physical space, empty space, vacuum, aether and their modern reincarnation the quantum vacuum, mean the same entity which is the seat of all physical phenomenon and needs to be studied extensively. In view of the characteristic properties of permittivity and permeability that enable transverse strain wave propagation, the physical space manifests itself as an Elastic Space Continuum.[6]

The equilibrium equations of elasticity in the Elastic Space Continuum turn out to be a vector wave equation as $\nabla^2\mathbf{U} = (1/c^2)\, \partial^2\mathbf{U}/\partial t^2$ where $\mathbf{U}$ is the displacement vector. These equilibrium equations, subject to appropriate boundary conditions, do not permit of any static strained state in the continuum and all permissible solutions in terms of displacement vector components u^i will be functions of space and time coordinates. Particular solutions of these equilibrium equations, satisfying appropriate boundary and stability conditions, can be shown to represent various strain wave fields or packets. The electromagnetic field as well as all other forms of energy and matter can be shown to exist in the physical space as strain wave fields or strain wave packets. The matter particles essentially exist as packets of standing strain wave oscillations whose total strain energy remains conserved in the absence of any interaction with other strain waves or packets.

A closed region of Elastic Space Continuum in a strained state, satisfying the equilibrium equations & boundary conditions, may be termed as a strain bubble, provided the total strain energy content in this closed region is time invariant constant. Although the strain components at any point within the strain bubble are always functions of space and time coordinates, yet the strain energy density at that point may or may not vary with time. If the strain energy density at all points within a strain bubble is time invariant, the strain bubble is likely to be stable, otherwise unstable. The total strain energy content E_0 of a strain bubble will represent its 'rest mass' m_0 through the famous energy equivalence relation $E_0/c^2 = m_0$. The Quantum Mechanics also needs to be recast in terms of longitudinal strain waves accompanying the micro particles in motion instead of probability waves.

However, any serious study of physical space can only be undertaken after we come out of the *mesmerizing influence* of Relativity through experimental invalidation of its wrong assumptions.

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