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According to 'MATTER (Re-examined)'

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Abstract: 'Action at a distance through empty space' is an illogical assumption. An all-encompassing medium is essential to facilitate physical actions. Aether, used in aether theories, is too vague and fails to logically describe many physical actions involving 3D material bodies. An alternative concept presented in the book 'MATTER (Re-examined)' envisages an all-encompassing medium that has real constituent matter-particles, structure, properties, and actions. For details, kindly refer to the same [1].

Keywords: Aether, Universal medium, Quantum of matter, 2D energy-field, Matter-field, Structural distortion-field, Disturbance.

Introduction:

'Action at a distance through empty space' is the worst assumption in physics. Rational thought suggests an all-encompassing medium that fills the entire space, including inter-particle spaces within macrobodies. Past proposals, suggested in various aether theories, assumed that the medium fills the entire space and all material bodies are immersed in it. All actions were attributed to the material bodies, whose actions would affect other material bodies through the medium. These assumptions required that the medium should have certain properties, which, when taken together, often contradicted themselves. Although efforts could be transmitted through the medium, matter-bodies were assumed to move in relation to the medium. Relative motion (between the medium and the material bodies) raised the question of friction between them and culminated in an assumption that a moving material body experiences certain friction (or drag) to its motion in the medium. Many scientists attempted to determine such drag until an experiment to determine aether drag on Earth's motion in space failed to show positive results. Failure to determine aether drag temporarily put an end to further search for the all-encompassing medium, and we have returned to the illogical assumption of 'action at a distance'.

However, in many of the current theories, vague forms of universal media are used – various types of fields, etc. They have no particular structure or properties. Each type of field is associated with a particular phenomenon. They are mainly used in analytical explanations to indicate the region of influence of a phenomenon in space. Lines of force in these fields facilitate better analytical understanding of a phenomenon.

This article summarises an alternative concept about a universal medium that has definite constituents, structure and properties. It is made of matter and fills the entire space outside 3D matter-particles. It has the same matter density as the matter density of a basic 3D matter-particle, yet it behaves like a perfect liquid to relative motions of 3D matter-particles. It causes no friction to moving 3D material bodies but acts as an all-encompassing medium for all apparent interactions between them. Above all, it is a universal medium that creates and sustains basic 3D matter-particles out of disturbances in it. It cannot interfere with any apparent actions of 3D material bodies, because the universal medium itself produces all such actions rather than the 3D material bodies. Universal medium inherently seeks serenity in nature. All statements made in this article are logically explained in the book. For details, kindly refer [1].

Space:

Space is treated differently in different aspects. In physics, space is understood as a boundless three-dimensional extent of the universe, where all material objects, including organisms (including rational beings like

ourselves) exist and in which objects and events occur. All material objects have their relative positions and displacements in space. Space, itself, has no material existence. It is a functional entity that serves the purpose of locating various material bodies in it, and where the rational beings relate them to each other. The extent, outside material bodies, becomes the space.

Perception is a process by which living organisms become aware of the relative positions of objects around them (and of their own bodies). For perception, living organisms use data received by their senses to conjure their own version of their surroundings. This helps their orientation and activities with respect to their surroundings. It aids individuals to understand their location in space, in relation to other objects with respect to depth, distance, etc., which are important for accounting for their various movements. In order to be perceived, an object should be real, i.e. it should have positive (real) existence. With respect to the rational beings, only 3D material bodies can have positive existence. Since space has no material existence, it is a functional entity that is visualised by the rational beings for the purposes assigned to it. Space has no real form or structure. An entity that has no form or structure cannot deform or distort. Curvature, expansion or contraction of (structure-less) space, etc., used in some physical theories, is pure imagination, which may aid mathematical exercises to prove illogical and mysterious laws.

All spatial concepts are related to contact experiences of 3D material bodies (information gained by rational beings). This has made it necessary to envisage an entity independent of 3D material bodies and yet embodying their locations. This entity, outside the material bodies yet enclosing them, is understood as space. When the rational mind envisages a real object, it logically presupposes a place for its existence. This is understood not by sensing such a place but by the necessity of a place for a real entity's existence. This does not happen in the case of functional entities like emotions. In this sense, space appears to have a physical reality that solely depends on the existence of (real) material objects in it. As a result, the notion of space is somewhat incoherent, because it professes to be a container that is logically prior to its contents. Space turns out, in practice, to be merely an indefinitely extensible collection of its contents – 3D material bodies. Everything that occupies space falls within this wider spatial context. Space denotes a property by virtue of which different real entities occupy different positions in the universe. The possibility of arranging an unlimited number of material bodies next to one another denotes that space is infinite in its extent.

There is no logical argument for theories based on these types of concepts. That is why it was believed that an entity, named aether, filled the entire space. In these theories, aether replaced space by filling it entirely. Therefore, all properties assigned to space could be the properties of aether. Aether had an ambiguous form, but it was regarded as a real entity. Since aether was real, it could deform, move or otherwise interact with other material objects. Unfortunately, no one could describe a satisfactory structure, constituents or properties for aether. It was assumed to be weightless, transparent, frictionless, chemically or physically undetectable and literally permeating all matter and space.

Aether theories met increasing difficulties as the nature of light and the structure of material objects became better defined, even if that was on an imaginary basis. Since there is no accepted definition of aether, scientists concentrated their effort to find the effects aether may have on other macrobodies. For this, they assumed that when a large macrobody moves through aether, it should essentially experience drag due to friction between the two. Aether theory was seriously weakened (1881) by the Michelson-Morley experiment, which was designed specifically to detect resistance to the motion of the Earth through ether. Experiments showed no such tangible effect. Finally, when aether's existence could not be proved experimentally by experiments based on illogical theories, the majority of scientists abandoned the concept of aether. They returned to more mysterious concepts of space.

Everyday experience of natural phenomena shows that mechanical things are moved by contact between a force-applying body and a force-receiving body. Thus, we came to conclude that for any action to take place between two material bodies, there must be a contact between them. The nature of this contact is expressed as an action of effort between them. Cause and effect, without a discernable contact between participating material bodies ('action at a distance through empty space') contradicts common sense and has been an unacceptable notion since the earliest of time. Whenever the nature of transmission of actions and effects over a distance was not understood, even today, aether (in the form of various fields) is resorted to as a conceptual solution of

transmitting medium. However, descriptions of its functions remain vague, and its existence in the form of various fields was required by common sense and thus not questioned.

Aether, expressed as various types of fields, were discovered during the heyday of aether-theories, according to which the whole space is permeated by a medium capable of transmitting actions between material bodies. Electric and magnetic fields were interpreted as descriptions of the state of strain of aether, so that the location of stored energy in space was like it would be in a compressed spring. With the abandonment of aether theories, following the rise of relativity theory, this imaginary model ceased to be valid. However, the original aether is preserved in the form of various fields in theories. This is because an all-encompassing universal medium is essential to destroy the myth of 'action at a distance', which is the worst (illogical) assumption of modern science. There are many forms of fields, used in various theories, each one proposing different types of fields with vague properties of aether.

Space is also viewed only as a conception. Since space provides an extent for real or 3D material bodies to exist, the concept of '3D material object' is necessary to define space. The concept of '3D material object' is linked to our sense-experiences, which continue through certain time. The existence of real objects is thus of a conceptual nature, linked to our sense-experiences. The existence or reality of material bodies are defined simply as the concepts of our mind, which depend wholly on their being connected with our sense experiences. The argument supporting these types of theories is that a rational being's thoughts and concepts are created by experiences of his senses with 3D material objects. They are meaningful only with reference to his senses. His thoughts are products of his mind's activity. As long as the mind can act in a certain way, the existence or reality of objects is immaterial to understanding the surroundings. Therefore, no wise logical consequences of sense-experiences are required to understand the universe or actions in it. Although this argument overlooks the presence of real objects, it is necessary to produce sense experiences without which the mind's activity cannot take place; it is very useful to produce exotic and mysterious physical theories. In these theories, space is often linked with another functional entity, 'time', to form another functional entity called 'space-time continuum'.

Quantum of matter:

'Quantum of matter' is derived (postulated) from the single assumption used in this concept ('Substance is fundamental and matter alone provides substance to all real entities'). No other imaginary particles or assumed properties are envisaged. A quantum of matter is a bit of unstructured matter that has positive existence in space. It exists in all spatial dimensions, however small such measurements may be. Each quantum of matter is an independent unstructured matter-particle, and it keeps its individuality under all conditions. Quantum of matter cannot be divided, destroyed or created. Different quanta of matter may contain different quantities of matter. The majority of quanta of matter in nature have (somewhat) equal matter-contents. The entire space is filled with quanta of matter in definite structural formations.

Nearest points within the matter-content of a quantum of matter or between quanta of matter in direct contact, in the same spatial dimension, have an adhesive property (tendency to merge) so that the matter-content of a quantum of matter maintains its integrity under all conditions. Due to the adhesive property of its matter content, a free quantum of matter tends to grow in one spatial dimension while reducing its measurements in other spatial dimensions. Even though measurements of a quantum of matter in spatial dimensions, other than its single spatial dimension, are negligibly small, it has positive existence in all three spatial dimensions. Thus, a free quantum of matter is a 1D material body with positive existence in all spatial dimensions. A quantum of matter has a natural tendency to grow in its own single spatial dimension. Reducing the length of a free quantum of matter by external means compels it to grow into a second spatial dimension. Similarly, reducing the area of a 2D quantum of matter in its spatial plane compels it to grow into the third spatial dimension. If left free, in free space, a quantum of matter (theoretically) grows in length, indefinitely.

During the lengthening process of a quantum of matter, its ends may come in contact with others, which happen to be in its spatial dimension. Under such conditions, the lengthening process of the quantum of matter is restricted. Matter-contents of quanta of matter, in contact in the same spatial dimension, interact to move both of them towards each other's ends to form a junction point and turn so that both of them (their 1D bodies) align in a straight line. In this manner, free quanta of matter in space tend to form 1D quanta-chains. Due to frequent

breakdowns of quanta-chains and the availability of free quanta of matter to migrate into them, there are far too many quanta of matter in any quanta-chain. Due to the excess number of quanta of matter, forming a quanta-chain, they are held at reduced lengths in their 1D status. The tendency of quanta of matter in quanta-chains to grow in length keeps all quanta of matter in it under compression from their ends. Normally, quanta of matter in a quanta-chain are maintained at the brink of their growth into a second spatial dimension. If a quantum of matter encounters quanta of matter in other spatial dimensions during its lengthening process, it is not restricted in its growth. The quanta of matter in different spatial dimensions but passing through the same point in space coexist at the point. The quanta of matter can express individuality only in the spatial dimension(s) of its existence.

Although quanta of matter in their 1D status are real material bodies, as 3D beings, we are unable to appreciate their real existence in our 3D spatial system. Because of this difficulty, we may consider the quanta of matter in their 1D and 2D states as functional entities.

Universal medium:

junction-point may be formed by any number of quanta of matter (whose second spatial dimension is) in the same plane. Quanta of matter, forming a junction-point, settle (radially) around the junction-point, in the same plane, with equal angular differences between neighbouring quanta of matter. However, junction-points with four quanta of matter (neighbouring quanta of matter perpendicular to each other) provide the most stable configuration. For this, the quanta-chains settle perpendicular to each other and cross at junction points to form separate latticework structures in each plane. Each quantum of matter occupies one side of a latticework-square formed by four quanta of matter. Only the quanta of matter of (somewhat) equal matter-contents make a stable latticework structure. Latticework structure, formed by quanta of matter, is a 2D energy-field. A 2D energy-field extends infinitely in its plane, in all directions.

Although a 2D energy-field is made of rigid quanta of matter, the latticework structure formed by them is very flexible in its plane. Structural distortions of limited magnitude are tolerated within the latticework structure of a 2D energy-field. During structural distortions: (1) Quanta of matter at the junction points are angularly deflected from their stable alignment with respect to each other and/or (2). Depending on the variation of compression from their ends, the quanta of matter in the quanta chains vary their length.

Angular displacements of quanta of matter at a junction point invoke a reaction on them to return to their stable positions. Similarly, changes in the lengths of quanta of matter invoke a reaction in the 2D energy-field to restore its stable configuration. Structural distortions in the 2D energy-field are opposed by reaction. Reaction tends to restore the stability and serenity of the 2D energy-field. Thus, it becomes an inherent property of 2D energy-field to strive towards its stable state. In its stable state, a 2D energy-field is isotropic, homogeneous and serene. Every plane in space contains a 2D energy-field. 2D energy-fields in different planes, passing through a point, coexist at that point. 2D energy-fields in all possible planes in space together form the universal medium. Universal medium, as a whole, is steady in space. Small local structural distortions in a 2D energy-field may be transferred within its plane. The universal medium can provide an absolute reference in space.

Due to the latticework structures of the universal medium and its inherent property of stabilisation, structural distortions in it cannot be contained in a locality. Any structural distortion is bound to spread out in the latticework structures. If there is an external cause, structural distortions tend to be transferred in the direction of the cause. Sequential spread of structural distortion, from one latticework-square to next, introduces a delay in the development and transfer of structural distortions. As soon as the cause is removed, the latticework structure tends to regain its stability. However, structural distortions contained in the latticework structure continue to spread in their original direction unless they are removed by an external agency (by introducing structural distortions of equal magnitude in the opposite direction in the latticework structure). This property of delay during the development and transfer of structural distortions and constant speed of their transfer through the universal medium gives rise to the property of inertia, which is presently attributed to 3D material bodies. A deformed region of the universal medium is a distortion-field. Due to the latticework structures of the universal medium, structural distortions in it can exist only in closed-loop arrangements.

Displacements of quanta of matter (including changes in their lengths) are tangible strain in the 2D spatial system. They constitute 'work'. Stress, produced in latticework structures by the structural distortions, is the 'energy' associated with the work. Rates of structural distortions (work), being introduced into the latticework structures of the universal medium, are the 'force and power'. Ultimately, displacements of 3D material bodies in the universal medium are produced by the transfer of structural distortions from a higher structural distortion-density region to a lower structural distortion-density region. This is an action of an effort. Whichever is the manifestation of effort ('natural forces', like gravitational, electromagnetic, nuclear, inertial, etc.), they all act in a similar manner. Thus, fundamentally, there is only one type of effort ('natural force') in nature. Force is generally associated with the displacement of a 3D material body, and it simply means the rate of work, irrespective of the nature of work or its source.

Universal medium fills the entire space. It replaces the functional entity of space with a real entity. Due to the filling of volumetric spaces by universal medium, the entire volume of space is occupied by quanta of matter. Total matter-content, within this volume of space, is comparable to a 3D matter-particle occupying the same volume of space. Since constituent 2D energy-fields of universal medium cannot act between themselves, matter-content enclosed within a volume of space (in the form of latticework-structures) cannot express itself to 3D beings. However, when a 3D matter-particle of the same volume is acted upon by 2D energy-fields, the universal medium is able to express itself to the observer. We recognise 3D material bodies by their expression to an observer. Therefore, even though the matter-content in a volumetric space in the universal medium remains hidden from the observers, a 3D matter-particle of the same volume in the universal medium is observable. This is why 3D matter is considered real matter, and 2D and 1D matter may be considered as functional matter. This hidden part of matter in the universe could be the theoretical 'dark matter'.

3D matter:

Constituent quanta of matter in the universal medium are held under compression from both their ends. Should there be a local breakdown in the latticework structures, a gap is created in the universal medium. The quanta of matter in each plane, which occupied the region of the gap as part of a latticework structure, are released to float freely within the gap. As soon as quanta of matter become free, they start to grow in their single spatial dimension and increase their lengths, while attempting to regain positions in the latticework structures. In the meantime, due to compression in quanta-chains, they grow into and reduce the area of the gap. As a result, many of the free quanta of matter in the gap are not able to migrate back into the latticework structure in the corresponding planes.

Quanta-chains encroaching into the gap gather the free quanta of matter in the gap, which are unable to gain positions in latticework structures. Universal medium compresses the gathered free quanta of matter, in each plane, until the combined entity of free quanta of matter becomes a circular 2D disturbance within the 2D energy-field.

This gives rise to the property of 2D energy-fields to reduce any disturbance in them to a minimum magnitude. The magnitude of a disturbance is the length of its perimeter in contact with the latticework structure of the 2D energy-field. The tendency of 2D energy-field to grow into a gap in it is gravitation. Gravitational pressure (effort) is so strong that it can compress 1D quanta of matter into higher spatial dimensions.

If the matter-content of a 2D disturbance is more than a certain limit, compression on the disturbance by gravitation compels the constituent quanta of matter in the disturbance to grow into their third spatial dimension. A disturbance growing into the third spatial dimension creates 3D matter. In our sense, this is the creation of real matter from the postulated 1D matter-particles (functional entities with respect to 3D beings). A reverse process is the reversion of real matter into its functional state.

Gravitational effort is by the latticework structure of a 2D energy-field in the direction away from quanta-chains, which are exerting the effort. It is of a push nature. Gravitational effort can act only on the curved perimeter (surface) of a disturbance. All 3D matter-particles are disturbances with respect to the universal medium. If distortion-densities on opposite sides of a 3D matter-particle are different, the structural distortions tend to

redistribute by transferring towards the region of lower structural distortion-density. While doing so, they carry the 3D matter-particle along with them to displace the 3D matter-particle in space.

If there is more than one disturbance in a 2D energy-field, the extent of latticework structure on their outer sides is greater than the extent of latticework structure between them. The magnitude of gravitational effort is proportional to the extent of 2D energy-field that is applying the effort. Hence, these disturbances experience greater gravitational efforts on their outer sides compared to the gravitational efforts on their inner sides. Relative differences between the gravitational efforts on either side of disturbances produce resultant efforts that tend to move them towards each other. This phenomenon is the attraction due to gravity. Moving two disturbances, by attraction due to gravity, to combine with each other and form a larger disturbance is another manifestation of 2D energy-field's property to reduce disturbances in it to a minimum. All higher dimensional matter-bodies are disturbances with respect to 2D energy fields (universal medium).

Universal medium acts on each disturbance separately. Simultaneous actions on two or more disturbances (3D matter-bodies), considered together, appear as an interaction between them. Since the apparent attraction between two disturbances is the resultant of differences in gravitational actions on them, it appears very feeble compared to other forms of 'natural forces'.

The action of gravitational effort on each 3D material body is independent of all other 3D material bodies. The development of structural distortions in the universal medium, about a 3D material body, produces gravitational actions on it, which is an inertial action (an action that produces the property of inertia). This takes place during the development of basic 3D matter-particle. Thereafter, apparent interactions between 3D material bodies, due to gravity, are instantaneous. Hence, changes in magnitude and action of apparent attraction due to gravity takes place instantaneously on the change of parameters or constitution of 3D material bodies. Changes in the parameters or constitution of a 3D material body are accomplished simultaneously by the changes during this development. This causes instantaneous changes in gravitational attraction between two 3D material bodies, on changes of their parameters. No transfer of imaginary particles/energy from one 3D material body to another is required to produce the changes in attraction due to gravity between two 3D material bodies. However, their inertial motions, under attraction due to gravity, are again subject to inertial delay.

Photon:

Larger 2D disturbances are further compressed into 3D states by the universal medium to form 3D disturbances, which later become 3D matter-cores of basic 3D matter-particles. During the creation of a 3D disturbance, unevenness of gravitational action on its surface ejects it (in full or in part) from the 2D energyfields, where it was originally located. 2D energy-fields are everywhere in space. Ejected 3D disturbance can never escape from being in 2D energy-fields. Therefore, ejection of 3D disturbance from the 2D energyfields of its existence is a continuous process. Hence, the 3D matter-core of a basic 3D matter-particle has the inherent property of linear motion in the universal medium. It is shaped as a disc, and its radial size is maintained at a critical value, which is common to 3D matter-cores of all basic 3D matter-particles.

Asymmetry of ejection on a 3D disturbance initiates spin motion of its 3D matter-core about one of its diameters. Eventually, gravitational actions on the 3D disturbance move it at constant (the highest possible) linear speed and spin it at an angular speed proportional to its 3D matter-content.

The universal medium exerts gravitational effort by creating structural distortions in the region surrounding the 3D disturbance. All work (energy) required for its creation and motion is stored in the associated structural distortions in the universal medium. As the structural distortions are transferred through the universal medium at the highest possible linear speed, the 3D disturbance is also carried with them at the same linear speed. This 3D disturbance (disc-shaped 3D matter-core, moving at a constant linear speed and spinning at an angular speed proportional to its 3D matter-content) and the associated structural distortions in the universal medium together form a 'photon'.

A photon is a corpuscle of radiation (infrared, light, X-rays, etc.). It has a 3D matter-core and structural distortions (inertial-pocket) in the surrounding universal medium. Inertial-pocket, about a photon's 3D matter-core in any plane, has many similarities with electromagnetic waves. 3D matter-core and the surrounding inertial-pocket

give a photon its dual nature. The 3D matter-core provides the corpuscular nature, and the inertial-pocket provides the electromagnetic wave nature.

Photon moves through the universal medium. Moving structural distortions in the universal medium (inertial-pocket) carry the 3D matter-core of the photon. The motion of a photon relative to the universal medium produces resistance to its motion. However, at any instant, sufficient ejection-effort is produced by the inertial-pocket to overcome this resistance. Since both the resistance and the ejection-effort are produced by the universal medium, drag on the photon is effectively reduced to nil value. It becomes an inherent property of the universal medium to move all photons (even in the form of superior 3D matter-particles) at the highest possible linear speed. The ability of the ejection effort to overcome the resistance determines the highest possible linear speed, which we observe as the critical constant linear speed of light. The highest possible linear speed that can be provided by any region of universal medium (space) is constant.

Linear and angular speeds of a photon are with respect to the universal medium. Its linear speed is a critical constant, because that is the highest possible linear speed at which it can be moved by the transfer of structural distortions in the universal medium, without causing the breakdown of its own latticework structures. A photon traverses the same number of latticework-squares in the universal medium in the same interval of time. (Note that the scale of time and distance is defined in terms of the observed linear speed of light). Spin speed or frequency of a photon is proportional to its 3D matter-content.

An attempt to increase a photon's linear speed tends to increase its 3D matter-content (by assimilating quanta of matter from the surrounding universal medium) with a corresponding increase in its frequency rather than increasing its linear speed. Similarly, an attempt to reduce a photon's linear speed tends to reduce its 3D matter-content (by discarding quanta of matter into the surrounding universal medium) with a corresponding reduction in its frequency rather than in its linear speed. Hence, the linear speed of light in any region of space, in any direction, is a critical constant.

Usually, the observer is also located in the region of the universal medium, where the linear speed of light is considered. Under such conditions, the linear speed of light with respect to the observer is identical in all directions, irrespective of the motion of the observer. This is because the linear speed of the observer with respect to the surrounding universal medium is negligible when compared to the linear speed of light with respect to the surrounding universal medium. If the observer is small enough to move with considerable linear speed with respect to the surrounding universal medium, the linear speed of light in the region obeys all physical rules of relative motion, as does the motion of any other macrobody. Discrepancies appear only when linear speeds of light in different regions of space (with different structural distortion status in the universal medium) are compared. This is how we came to regard the linear speed of light as variable when it is inside a medium within the region of the observer, and time as variable when it is outside the region of the observer.

The shape of the 3D matter-core of a stable photon is segmented, spherical with convex curvature at the rear of each segment. Curvatures on the surface of a photon's 3D matter-core vary continuously to provide the required ejection and spinning efforts. Photon is the basic 3D matter-particle, and there are no other types of basic 3D matter-particles. All superior 3D material bodies are made of photons, in various combinations.

Macrobodies:

Two (complimentary) photons of high 3D matter-content, under suitable conditions, combine like a binary unit of spinning 3D matter-particles (spinning about a common axis) moving in a circular path about a common centre. This unit is a primary 3D matter-particle called biton. Bitons, in turn, combine to form fundamental particles, atoms, molecules, etc., to form macrobodies. Each superior 3D matter-particle of a macrobody has its constituent photons and associated inertial-pockets. Due to the curved paths of photons in the bitons, their inertial-pockets are permanently unstable. Structural distortions in the universal medium from unstable inertial-pockets of constituent photons form the distortion-field of a biton. Distortion-fields of all 3D matter-particles in a macrobody, together, form the macrobody's matter-field.

The matter-field of a macrobody contains enough structural distortions in it to sustain the stability and integrity of its 3D matter-particles and the combined macrobody in its current state. Due to the latticework

structures of the universal medium, the matter-field of a macrobody extends outside its periphery. The magnitude of extension depends on the size of the macrobody and the distortion-density of its matter-field. Distortion-density in the matter-field gradually reduces from the macrobody's perimeter until all structural distortions are lost and latticework-squares in the universal medium become undistorted.

Additional structural distortions, introduced into the macrobody's matter-field from an external source, induce the macrobody's whole-body motion. 3D matter-particles of the macrobody move with respect to the universal medium. Although the universal medium is steady in space, it is the moving structural distortions in it which move the 3D matter-particles of the macrobody. Because of this arrangement, even though the 3D matter-particles are moving with respect to the static universal medium, no resistance is offered to the motion of 3D matter-particles. A macrobody, moving through the universal medium, does not suffer drag from the medium.

Additional structural distortions in the universal medium move in straight lines, separately in each plane. Rotary motion of a macrobody is produced by linear motions of its 3D matter-particles in different directions at different linear speeds. If the constituent 3D matter-particles of a macrobody are moved away (by another effort) from the linearly moving structural distortions in the matter-field of a macrobody, part of the original linearly moving structural distortions are lost into space, and the macrobody stops responding to the lost structural distortions. The state (of motion) of the macrobody depends on the distortion-density of additional structural distortions (other than the structural distortions required to sustain the integrity and stability of the macrobody and its constituent 3D matter-particles) and the distribution of additional structural distortions in its matter-field.

Introduction of structural distortions from an external source and their stabilisation (within a macrobody's matterfield) take time. This delay gives rise to inertia, which is presently attributed to the 'body mass'. Inertia is a property of the associated matter-field (universal medium) of the macrobody. 3D matter-content of the macrobody is inert. It is the associated universal medium that produces all apparent actions/interactions, presently attributed directly to the material bodies. Once a certain magnitude of additional structural distortions is introduced into the matter-field of a macrobody, it remains permanently within it and continues to keep the macrobody indefinitely in its current state, until additional structural distortions are added, lost or removed (neutralised by structural distortions in the opposite direction) by an external effort.

Since the additional structural distortions (introduced by an external source and moving the 3D matter-particles) in the matter-field are associated with 3D matter particles of the macrobody, the speed of their transfer is limited by the magnitude of the structural distortions. Hence, a macrobody may move at any speed lower than the highest permitted speed by the universal medium (less than the speed of light). As the linear speed of macrobody approaches the linear speed of light, its constituent fundamental particles break down to inferior 3D matter-particles until its linear speed reaches the linear speed of light. At the linear speed of light, only photons from the macrobody survive. Beyond this linear speed, no 3D matter-particle can move. This limits the linear speed of macrobodies in space to less than the speed of light. Gradually, even the 3D matter-contents of photons revert back to quanta of matter in the universal medium. Continuous recycling of matter between the macrobodies (where entropy increases) and the universal medium (where high order is maintained) keeps the entropy of the universe within limits. The total magnitude of 3D matter, in the form of macrobodies in the universe, varies cyclically.

Inertia is a property of the universal medium, produced by its latticework structures. Attraction due to gravity is the product of the difference in the extent of universal medium on opposite sides of basic 3D matter-particles of a macrobody. Both these phenomena have nothing to do with the mass of a macrobody, which is a mathematical relation between the force due to an external effort on a macrobody and its acceleration. Hence, differentiation into gravitational mass and inertial mass is arbitrary.

Distortion-fields:

The application of gravitation, essentially, requires gaps in the universal medium, which are filled with 3D matter. Universal medium applies gravitation on a disturbance (even if it is in the form of a 3D matter-particle) within gaps in it. Gravitation is applied to a disturbance as long as it is in existence in the universal medium. Due to continuous application of gravitation, the latticework-squares of the surrounding 2D energy-fields remain distorted as long as the disturbance is in existence. Directions of structural distortions are inward from the (curved) perimeter

of the disturbance, towards the centre of curvature (of its perimeter). This part of the structural distortion-field may be called the gravitational field.

A material body is moved by the transfer of structural distortions in the universal medium. Conversely, the movement of a 3D matter-particle through a 2D energy-field can be considered to produce structural distortions in the universal medium. Two sets of structural distortions, transferred in different directions, tend to move a 3D matter-particle in the resultant direction. Displacement of 3D matter-particle in the resultant direction produces structural distortions in the 2D energy-fields in the direction of its motion, while the original structural distortions, which caused its resultant motion, are lost to the 3D matter-particle due to its displacement from the direction of transfer of the structural distortions. The state of its motion in a new direction is maintained by the structural distortions caused by its displacement in the resultant direction. 3D matter-particle, moving under more than one set of structural distortions, produces an independent set of structural distortions in the surrounding universal medium, corresponding to its current direction of motion.

Constituent (two) photons of bitons move in a circular path. They are under constant action by the structural distortions, causing their linear and spin speeds at the critical values and the structural distortions produced due to the attraction due to gravity between them. Motions of these photons in the resultant circular path create new sets of structural distortions in the universal medium. They constitute the distortion-field of biton, which is angular in nature, around the biton. Number of bitons combine to form superior 3D matter-particles. Distortion-field of a superior 3D matter-particle is the resultant of distortion-fields of all its constituent bitons.

Distortion-field of a 3D matter-particle is a local region in the universal medium outside its border. It does not require discontinuity in the universal medium. Due to the latticework structure of the 2D energy-field, structural distortions in it have to form a closed loop. If structural distortions start at a point, it has to spread through the 2D energy-field and return to the starting point, so that there is no discontinuity in the latticework structure. The development of a distortion-field is an inertial action. Unlike structural distortions, which act on the disturbances due to gravitation, structural distortions in the distortion-fields cannot act on 3D matter-bodies, because certain actions of the same 3D material bodies are their cause. A distortion-field has no ends at the border of 3D material bodies.

Two overlapping distortion-fields change the distortion-densities on either side of a 3D material body. The tendency of the universal medium to achieve homogeneity tends to transfer the structural distortions from a region of higher distortion-density to a region of lower distortion-density. Transfer of structural distortions in the universal medium carries the 3D matter-particles, which are producing the overlapping distortion-fields, to move them in space (which appears as attraction or repulsion between them). Displacement of a 3D material body is an inertial action. During this motion, additional structural distortions are created within its matter-field to change its state (of motion).

In order to simplify the explanations, the complicated nature of structural distortions in a distortion-field (in a plane) may be resolved by the nature of structural distortions in the latticework structure of a 2D energy field into various components. There are three possible varieties of structural distortions – linear, angular and radial. The direction of the component of a distortion-field is indicated by imaginary lines of force. If the (linear) directions of two interacting components of distortion-fields are in opposite directions, they tend to inactivate each other. If the (linear) directions of two interacting components of distortion-fields are in the same direction, they tend to enhance each other.

Linear distortions:

For the linear structural distortion, the latticework-squares of a 2D energy-field are compressed or expanded in the same linear direction. This gives rise to magnetic nature of the distortion-field. Since there are no 3D material bodies, which produce linear distortion-fields, the magnetic nature of distortion-field can be produced only by arranging a number of bitons, which have angular distortion-fields, in a suitable array. The end of a linear distortion-field, from where the lines of force appear to come out (of the 3D material body, producing the distortion-field), is the North magnetic pole, and the end of a distortion-field, to which the lines of force appear to enter, is the South magnetic pole. A small part of a curved line of force acts as a linear line of force. Hence, an angular distortion-field,

where the lines of force have less than a certain magnitude of curvature, acts as a linear distortion-field (magnetic field).

Angular distortions:

For angular structural distortions, the latticework-squares of a 2D energy-field are deformed in an angular direction. Lines of force are curved lines with arrows in a clockwise or anti-clockwise direction. This gives rise to the electric nature of distortion-field. Photons in bitons move in circular paths. Hence, all bitons and superior 3D matter-particles (they are unions of bitons) have electric fields. Due to the angular nature of the electric field, its lines of force are circular lines in the resultant direction of motion of photons in the bitons. Looking from one side, the lines of force appear clockwise. This side of an electric field is the positive electric charge. Looking from the opposite side, the lines of force appear anti-clockwise. This side of an electric field is the negative electric charge. Electric charges are relative directions of an electric field. Since they are relative directions, the electric charge of an electric field depends on the reference used. Electric charges have no independent existence as is believed today. Every electric field has both positive and negative electric charges. Both electrons and positrons have similar electric fields and electric charges.

Field-efforts or inertial action on corresponding 3D material bodies, produced by the interaction between electric fields, not only depend on the type of electric charges but also on the distance between them. At a certain distance (zilch-effort distance) between two electric fields, interaction between them produces no field efforts or inertial motions of corresponding 3D material bodies. Beyond zilch-effort distance, due to lower curvature of lines of force, the magnetic nature of distortion-fields dominates and electric fields behave like magnetic fields. The electric nature of distortion-fields (during interaction between two angular distortion-fields) is exhibited only when the distance between them is less than the zilch-effort distance, where the lines of force have greater curvatures.

Radial distortions:

For radial structural distortion, the latticework-squares of a 2D energy-field are deformed in linear directions, radially towards or away from a central point. This type of structural distortions gives rise to a nuclear field. If structural distortions are directed outwards from a central point, they produce a repulsive nuclear field. Fundamental particles, associated with a repulsive nuclear field (electrons), apparently repel all other primary and fundamental particles. If structural distortions are directed inward towards a central point, they produce an attractive nuclear field. Fundamental particles, associated with attractive nuclear fields (positrons), apparently attract all other primary and fundamental particles.

Properties of universal medium:

A 2D energy-field is a two-dimensional entity. It has only length and breadth as its fundamental spatial dimensions. A real entity in space essentially exists in all spatial dimensions. Hence, however small dimensional measurement may be, a 2D energy-field also exists in the third spatial dimension. A volumetric space is made of a great many parallel planes, in contact. If the thickness of a plane is considered as nil or zero, any number of parallel planes cannot constitute a volumetric space. Therefore, parameters of a 2D energy field or other 2D disturbances can be accurately determined only after evolving a mathematical system that can measure the thickness of a plane or the breadth and thickness of a straight line.

2D energy-fields in the universal medium have the following inherent properties:

1. Inherent properties of the universal medium are derived from inherent properties of its constituent quanta of matter and the mechanical structure of latticework formations.

2. 2D energy-fields are two-dimensional material entities made of single-dimensional quanta of matter. Each 2D energy-field exists and acts in its own plane. Only one 2D energy-field exists in any one plane and all planes in all directions in 3D space contain one 2D energy-field each.

3. 2D energy-fields in different planes, passing through the same point in space, co-exist at the point.

4. Quanta of matter in a 2D energy-field (in perpendicular quanta-chains, crossing at junction points) are held under compression from their ends.

5. In the stable state of a 2D energy-field, constituent quanta of matter form sides of perfect squares in the latticework structure. Instability produces a restoring reaction in the latticework structure.

6. 2D energy-fields (and hence the universal medium) are self-sustaining entities. They strive to sustain their integrity, stability, homogeneity, isotropy and serenity.

7. The tendency of the universal medium to close-in any gap in the latticework structure produces gravitation.

8. Universal medium fills the entire space outside the basic 3D matter-particles. Each 2D energy field extends indefinitely in all directions in its plane. No 3D matter-particles can exist outside the universal medium.

9. All higher-dimensional matter-particles are disturbances with respect to the universal medium.

10. Universal medium tends to reduce disturbances in it to a minimum either by reducing their sizes by shaping them circular (or spherical) and compressing to a smaller size or by ejecting them out of itself.

11. All 3D matter-particles are created from, sustained by and reverted back into the universal medium.

12. Universal medium provides an all-encompassing medium for all apparent interactions between 3D material bodies.

13. On the whole, the universal medium is perpetual and steady in space. No new 2D energy field is ever produced. Universal medium provides an absolute reference.

14. Region of universal medium, about a 3D material body, stores work in the form of structural distortions (energy in the form of stress due to the structural distortions) to sustain its integrity, stability and state (of motion).

15. Structural distortions in two 2D energy-fields cannot interact. Transfer of structural distortions or interactions between structural distortion-fields is limited to the plane of each 2D energy field. Simultaneous actions in many planes appear as actions in 3D space.

16. 3D matter-particles are displaced in space by the transfer of structural distortions in a steady universal medium. Absolute motions of 3D material bodies are with respect to a steady universal medium.

17. 3D material bodies are moved by the universal medium rather than moving through the universal medium.

18. Latticework structures of 2D energy-fields cause sequential development of structural distortions in the neighbouring latticework-squares. Structural distortions, once developed, remain permanently within the 2D energy-field, unless removed by external action. This gives rise to the property of inertia.

Aether drag:

It was the absence of an assumed aether drag on Earth's motion through space that ended the progress in the search for an all-encompassing universal medium. This was unnecessary because the assumption of 'aether drag' itself is unwarranted. In the above explanations, it is shown that every photon is moved by the universal medium at the highest possible linear speed. Photons, constituting primary particles, fundamental particles and superior 3D material bodies, have curved paths limited within the bitons. A macrobody consists of millions of photons moving in circular paths within it. Simple displacements/deflections of circular paths of constituent photons displace a macrobody. It is the universal medium that is affecting such motion. Matter has no ability to move on its own. Since the universal medium is the entity which displaces a macrobody, there is no relative motion or friction between them. Action is limited to the universal medium within and in the immediate neighbourhood of the macrobody.

Motion of a macrobody, through the universal medium, is like the motion of a floating body in a narrow ocean current. The ocean current carries the floating body along with it, and there is no relative motion between the floating body and the surrounding water. However, a floating body has a clear relative motion with respect to the vast ocean. Similarly, it is the moving structural distortions in the universal medium that are moving a macrobody. This part of the universal medium is a local region in and about the macrobody. Structural distortions carry the macrobody along with them, and there is no relative motion or friction between them. However, with respect to the vast universal medium, the macrobody has relative displacement.

Photons, during their motion through the universal medium, experience resistance. Photon's ejection (moving) effort is also caused by the universal medium. The linear speed of a photon is determined by the resultant of these efforts. This linear speed is the highest possible linear speed through the universal medium that can be sustained without breakdown. Since resistance from the universal medium is already accounted for in the motion of photons, resistance is not carried further into the motion of macrobodies. Therefore, macrobodies do not experience drag in their motion through the universal medium (space).

We are 3D beings. All our actions and observations are limited to 3D matter-bodies. Hence, it is impossible for us to observe or act on the universal medium directly. This does not preclude the existence of the universal medium or its actions on 3D material bodies.

Conclusion:

2D energy-fields in all possible directions, extending infinitely and filling entire space provides an all-encompassing universal medium for creation, sustenance and apparent interactions of the 3D material bodies. This avoids the assumption of 'action at a distance through empty space'. Actions by universal medium are the result of mechanical movements of its constituent quanta of matter, within latticework structures. Since structural distortions in the universal medium are the cause of all actions, fundamentally, there is only one type of 'natural force' in nature. The nature of structural distortions in the universal medium determines the type of interactions and field-efforts, manifested. Inertia is a property of the universal medium. Perpetuity of the universal medium bestows the universe with its steady state of existence.

Reference:

[1] Nainan K. Varghese, *MATTER (Re-examined),* https://www.matterdoc.in

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