

HOMOGENEITY AND ANISOTROPY OF UNIVERSAL MEDIUM

According to 'MATTER (Re-examined)'

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Abstract: Matter is the only substance that can provide objective reality and positive existence in space. A (real) universal medium should be made of matter. It should be homogeneous and fill the entire space, outside 3D matter-particles, without any voids (empty space). At the same time, it should be flexible enough to have the properties of a perfect fluid. The anisotropic nature, which allows relative motions within, requires that the universal medium be structured by sub-particles, and each of its constituent matter-particles has a lot of (apparently) vacant space around it, allowing for relative movements. This article attempts to describe how these contradicting properties are simultaneously achieved in the universal medium, proposed in an alternative concept, presented in the book, 'MATTER (Re-examined)'.

Keywords: Universal medium, quantum of matter, 2D energy-field.

Matter and universal medium:

Matter is the only substance in nature. It provides objective reality and positive existence in space to all real entities. Matter exists in the form of tiny unstructured particles – the quanta of matter. Quanta of matter, in various combinations, form all other real entities in nature, including the all-encompassing universal medium. The existence of a universal medium does away with the illogical assumption of 'actions at a distance through empty space'. To act and to be acted upon, the universal medium has to be a real entity; like all other real entities, it should be made of matter. It also has to fill the entire space and encompass all 3D matter-particles in nature. Therefore, this concept conceives a universal medium, formed by quanta of matter, and that fills the entire space outside 3D matter-particles.

The constituents, mechanism of development, structure, properties, and actions of the universal medium are explained in the book. In this concept, the universal medium consists of an infinite number of 2D latticework-formations, called '2D energy-fields', by quanta of matter. Each plane in space has one 2D energy-field, extending infinitely in all directions. 2D energy-fields in all possible planes in space, together, form a universal medium. The nature of the universal medium and its suitability for actions in the 3D world, in terms of the point of view of 3D rational beings, are briefly discussed in this article.

A 2D energy-field is never destroyed, nor is any new 2D energy-field ever developed. They are perpetual and sustain the eternal universe. However, local breakdowns and reconstructions in their structures are very common due to various reasons. The universal medium creates, sustains, and destroys parts of the 3D world in a cyclic manner.

Spatial dimensions:

Space, an imaginary entity, is presupposed by rational beings whenever material objects are envisaged. In this concept, the universal medium and 3D matter-particles, together, fill the entire space. Hence, the universal medium substitutes for the imaginary space. The universal medium acts as a container of all material objects. Space and the universal medium become the same.

Two separate 3D matter-particles cannot simultaneously exist in the same location in space. Space, being a container of all material objects, different 3D matter-particles in it occupy different locations. To locate different 3D matter-particles in space, a reference is required. To create reference systems, space is partitioned in various ways. In a convenient and widely used method, the space (about a point of origin) is divided into eight

parts by three mutually perpendicular planes. This method gives us a three-dimensional spatial system. In this system, we measure distances in different co-ordinate planes (passing through a reference point in space) to determine the length, breadth, and depth (thickness) of an object.

Every real object has positive existence in space. Hence, it is imperative that it exists in all three spatial dimensions. Matter particles, being real objects, exist in all three spatial dimensions. In nature, there are enormous differences in size between different material objects. Some are extremely large, and some are extremely small. We, the rational beings, are macrobodies, made of numerous 3D matter-particles. Usually, we deal with macrobodies, whose sizes (though they vary widely) are within our understanding. Various instruments expand our intellectual capacity to comprehend wider differences in the sizes of 3D material bodies.

However, there is a limit (which is constantly being increased by newer instruments) to measure small distances in any spatial dimension. A distance that is absolutely intangible by our 3D standards could be counted only as negligible or functional, without real meaning in the sense of measurement of distance. Although it is incorrect by absolute standards, we are bound to ignore such measurements or consider them nonexistent. If one spatial measurement of a material body is in this category, we are bound to consider it a 2D material body that has its tangible dimensions only in a 2D spatial system. It, for all practical purposes, is treated as a 2D material body. If two spatial measurements of a material body are in this category, we are bound to consider it as a 1D material body that has its tangible dimension only in a 1D spatial system. For all practical purposes, it is treated as a 1D material body. However, it is clear that both 1D and 2D material bodies exist in all three spatial dimensions, like any other 3D material body.

Homogeneity of universal medium:

Universal medium, in this concept, is structured by quanta of matter. In a 3D world view, no two independent 3D material bodies can simultaneously occupy the same location in space. Hence, it appears that, however close constituent quanta of matter of the universal medium are packed, there are bound to be gaps between them. This cannot be tolerated in a homogeneous universal medium. Matter-density of the universal medium should be identical everywhere in space, a requirement that precludes gaps. This conundrum is overcome by its structure by quanta of matter in their lower spatial dimensional states. In these states, two quanta of matter in different spatial dimensions are able to coexist, simultaneously, in the same location in space without interfering. This phenomenon prevents the existence of a gap between quanta of matter, forming the universal medium.

Being capable of coexistence, quanta of matter in different directions are able to fill the entire space (outside 3D matter-particles) to form a homogeneous universal medium. 3D matter-particles are formed by quanta of matter in their 3D states. Matter-densities of quanta of matter are the same, irrespective of their spatial states. Therefore, matter-densities of 3D matter-particles and the universal medium are the same. Matter-density is equal everywhere in space (in 3D matter-particles as well as in the universal medium). With respect to the matter-density, the whole matter in the universe (in different spatial dimensions) exists as a single block of matter of uniform consistency.

Quantum of matter:

A quantum of matter is the only postulated entity, derived from the basic assumption in this concept. Diverse material bodies, different properties, and all other physical phenomena develop from quanta of matter, which fill the entire universe. A quantum of matter has certain matter-content that is continuous and incompressible. [This is only a general statement. Minute relative motions, transmissions of effort, or deformations within its spatial dimensions that can be neglected for practical purposes, may be tolerated within its matter-content]. Unstructured matter has a property of self-adhesion, within a quantum of matter and between quanta of matter, which are in direct physical contact. Since the matter is its substance, irrespective of its negligible measurement(s) in any spatial dimension(s), a quantum of matter has objective (real) existence in 3D space.

A quantum of matter can express its individuality only in the spatial dimension(s) of its existence. No two real entities can simultaneously exist in the same volumetric space. Therefore, no two quanta of matter can exist in the same spatial dimension(s) in space. However, the quanta of matter in different spatial dimensions but passing through the same point, in space, are able to coexist at the point.

Practically, a quantum of matter (in any spatial dimension) exists in all three spatial dimensions. When the body measurement of a quantum of matter in any one spatial dimension is too small to be intelligibly measured by 3D beings, we must say that the quantum of matter exists only in two spatial dimensions. It is qualified as a two-dimensional object. Similarly, when its body measurements in any two spatial dimensions are too small to be intelligibly measured by 3D beings, we must say that it exists only in one spatial dimension. It is qualified as a single-dimensional object. General actions on or by the quanta of matter are limited to the spatial dimensions of their existence. However, very minute and intangible actions, limited to their (apparently) non-existent spatial dimensions, are also logically possible.

Due to the self-adhesion of unstructured matter, it is the inherent nature of a free quantum of matter to grow and exist only in one spatial dimension. External pressure from ends of a 1D quantum of matter can reduce its body measurement in the first spatial dimension and make its body grow into the second spatial dimension (width), until its body shape becomes a perfect circle in a plane and becomes a 2D quantum of matter. Further, if identical external pressure is applied all around the periphery of a 2D quantum of matter (in its second spatial dimension), its body is compelled to grow into the third spatial dimension, while reducing measurements in the other two spatial dimensions. Growth into the third spatial dimension (thickness) continues until its body becomes a perfect sphere. As soon as a quantum of matter grows into the third spatial dimension, it becomes a 3D material body. This is the creation of 3D matter in nature. We, as 3D beings, can associate only with 3D matter. Additional pressure applied all around the volumetric periphery of a 3D quantum of matter may reduce its volume and compel it to grow into a fourth spatial dimension, if any, about which we know nothing.

Since a quantum of matter has objective existence in its spatial dimension, no other quantum of matter can occupy its space, whichever spatial-dimensional status it may be. However, two quanta of matter in different spatial dimensions have objective reality in different spatial dimensions. Hence, each of them should be able to have objective reality at the point occupied by both of them, simultaneously. That is, quanta of matter, in different spatial dimensions, are able to co-exist at the point occupied by both of them. As long as its own dimensional space is not occupied, a quantum of matter is able to co-exist with other quanta of matter at a point in space.

Matter in the quanta of matter has no substructures. It is homogeneous and isotropic. Two 1D quanta of matter occupying the same point in space, essentially, have to be at an angle to each other. Their negligible widths (when developed) have to be in different planes. Since they are 1D objects, they cannot extend into each other's spatial dimension so as to create discontinuity for others' existence. Since two quanta of matter are in different planes and crossing each other at a point in space (they are in different spatial dimensions), they do not intrude into each other's spatial dimensions. Due to a lack of substructures, matter at the point of their crossing is able to be part of both quanta of matter, simultaneously. Similarly, a quantum of matter can also co-exist with a 2D material body (its thickness is zero) in different planes. However, as all spatial dimensions are occupied by a 3D material body, a quantum of matter is unable to coexist with a 3D quantum of matter in space. It remains outside the 3D material-body.

Interactions are possible only between quanta of matter, existing in the same spatial dimension(s) and in direct contact with each other. Property of self-adhesion in unstructured matter, across the point of contact between two quanta of matter, encourages their matter-contents to merge and form a single quantum of matter, with greater matter-content. The concept, presented in this concept, envisages that due to various reasons, the point of contact between two quanta of matter is never steady and therefore, the magnitude of adhesion between the matter-contents of two separate quanta of matter (which are in direct physical contact) through the point of contact is less than the magnitude of adhesion between the nearest points within the matter-content of individual quantum of matter. The difference in the magnitudes of adhesion prevents the merger of matter-contents from different quanta of matter, while preserving the integrity of matter-content of individual quanta of matter. As there are no free quanta of matter, even when two quanta of matter in different spatial dimensions co-exist at a point in space, their point of contact continuously changes. Incessant changes in the point of contact reduce the magnitude of (average) adhesion between the matter-contents of quanta of matter in contact to less than the adhesion within the matter-contents of individual quantum of matter and thus prevent the merger of their matter-contents. This phenomenon prevents matter-contents of intersecting quanta of matter (in different spatial dimensions) from merging their matter-contents.

Coexistence of matter-particles:

Consider water contained in a vessel whose horizontal cross-section is shaped as a cross. Water in the vessel may be regarded in five separate parts, one part each in the arms and another part at the centre of vessel. Let the water contained in each set of arms, in a straight line, be represented as separate 3D material bodies. Part of the water, at the centre of the vessel, belongs to 3D material bodies in both sets of arms. In terms of macrobodies, we may consider 3D material bodies (in straight arms) that co-exist at the centre of the vessel. This is because water in the centre part of the vessel can act as parts of both 3D material bodies.

Now, reduce the widths of the vessel's arms. Water in the central part of the vessel continues as parts of 3D matter-bodies in both sets of arms, until the width of one or both sets of arms is reduced to the size of a water molecule. If the width of one or both sets of arms is reduced further, the water molecule at the centre of the vessel is unable to simultaneously be part of both 3D material bodies, contained in the straight-line sets of arms of the vessel. It will be part of either of the 3D material bodies. At this stage, 3D material bodies in both sets of arms are unable to co-exist. The inability of these 3D material bodies to co-exist is due to the substructure of water molecules. Sub-structures of molecules or atoms demand that each molecule/atom can have only particular formations with its neighbours. If this particular type of formation can be preserved by a molecule/atom at an intersection, any number of 3D material bodies can co-exist in space. However, as each type of atom/molecule is unique, this is not practical in cases where the thickness of 3D material bodies approaches very small values. Hence, it is impossible for two 3D material bodies to co-exist at a point in space.

Let us consider two (hypothetical) free 1D quanta of matter, in different spatial dimensions, and whose matter-contents pass through a point in space, as shown in Figure 1. Spatial dimensions of quanta of matter in width and thickness are at their minimum possible values. Self-constriction of matter-content in both spatial dimensions of its negligible existence has reduced to zero value (by 3D standard). Therefore, these quanta of matter have no effective borders (perimeters shown in dotted lines) in these spatial dimensions.

In Figure 1, the sizes of quanta of matter are highly exaggerated, and only small parts of quanta of matter at the point of intersection are represented. Alternate points in their matter-contents are shaded. Each quantum of matter exists in its own spatial dimension. Since a quantum of matter has no substructure, matter-content at the point of intersection is able to act as parts of both quanta of matter. The quanta of matter are not overlapping, but they co-exist at the point of intersection. Matter-content in one quantum of matter is not superimposed on the other. Consistency of matter and its density at the intersection is the same as it is for the rest of quanta of matter.

1D quanta of matter, shown in Figure 1, together define a plane. If one of the quanta of matter, due to an external effort applied inwards at its ends, grows in this plane into its second spatial dimension, both of them would be occupying the same spatial dimensions. They cannot continue to co-exist at their point of intersection. As soon as one of the quanta of matter, A, grows into a second spatial dimension, self-constriction in its matter-content develops against the external pressure at its ends. These inward efforts (towards the major axis of matter-content) give the quantum of matter, A, a definite border (as shown in figure 2 by bold curved lines), to become a 2D quantum of matter. As both quanta of matter occupy the same spatial dimension, during its development into the second spatial dimension, the quantum of matter, A, tends to divide the 1D quantum of matter, B, into two. But the borders of 2D quantum of matter, A, now provide anchoring points for self-adhesion of quantum of matter, B, to withdraw all its matter-content to one side and exit from the space occupied by the quantum of matter, A, which has developed into a second spatial dimension. Similar actions take place during changes of a 2D quantum of matter into a 3D entity.

Figure 3 shows a representation of two intersecting quanta of matter. Quantum of matter, B, is in 1D spatial status. Its matter-content cannot be compressed anymore in width and thickness. Its upper end (as shown in the figure beyond the quantum of matter, A) is much longer than the lower end. Quantum of matter,

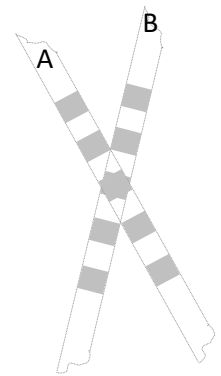


Figure 1

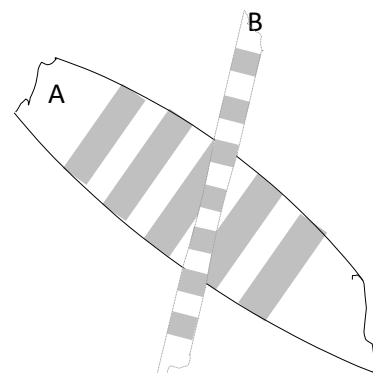


Figure 2

A, is at the instant of conversion of its spatial status from 1D to 2D in the plane of paper. As the external pressure on the quantum of matter, A, overcomes self-elongation, it increases in width. An increase in the self-constriction of its matter-content forms a definite border around the quantum of matter, A, except where the quantum of matter, B, exists. As the quantum of matter, B, is already in its 1D status, its size in the plane of the quantum of matter, A, cannot reduce further. A reduction in width, shown in the figure, is symbolic and highly exaggerated. It, more or less, indicates directions of effort transmitted to quantum of matter, B, (shown by thin arrows) through quantum of matter, A, from external pressure at ends of quantum of matter, A.

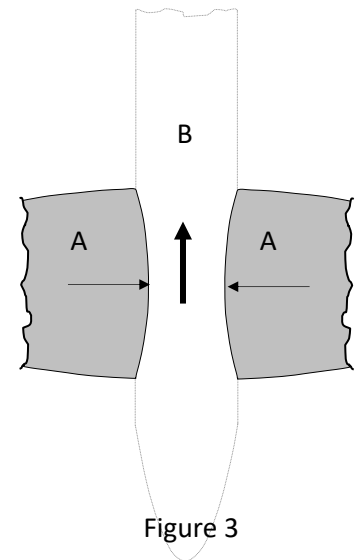


Figure 3

External effort, transmitted through the quantum of matter, A, to the quantum of matter, B, creates internal pressure within the matter-content of quantum, B. Since the matter in quantum of matter, B, cannot be compressed any further in this spatial dimension, effort generated produces translational motion of the quantum of matter, B. [Like a slippery incompressible object pressed between two objects is jettisoned away]. Minute curvatures, produced at the site of compression, help to convert the compression into translational motion. The resultant of translational efforts on the upper and lower parts of the quantum of matter, B, pushes out its matter-content away from the quantum of matter, A. Due to the self-adhesion of matter-content, continuity of matter in the spatial dimension of quantum of matter, B, is not broken. Since the matter-content of quantum of matter, B, is continuous in its dimensional space, the whole matter-content of quantum of matter, B, moves in the resultant direction of translational efforts on it, shown by a thick arrow. Action will continue until any one end of the quantum of matter, B, moves out of the matter-content of quantum of matter, A. Matter-content, outside the quantum of matter, A, in 1D spatial dimension, will now form an independent quantum of matter, B.

Direction of resultant translational effort on the quantum of matter, B, depends on the curvatures formed by the matter-content of quantum of matter, A, about the matter-content of quantum of matter, B, and the internal pressure formed in its matter-content. For the same effort, the development of internal pressure in a larger volumetric space is slower than in a smaller volumetric space. Hence, the matter-content in the larger end of the quantum of matter, B, has lower internal pressure during its development. This encourages the matter-content of the quantum of matter, B, to move towards the longer end.

Formation of a partition, slightly away from the center point of the quantum of matter, B, with uneven curvature, produces an imbalance in self-constriction and self-elongation efforts within the 1D quantum of matter, B. The longer part has higher self-elongation effort with lower self-constriction, and the shorter part has lower self-elongating effort with higher self-constriction. Partition, at the instant of its formation, provides an anchoring point for these efforts. As a result, 1D quantum of matter, B, as a whole, experiences resultant effort to move its matter-content towards the part with higher resultant effort. Thus, 1D quantum of matter, B, withdraws itself (whole of its matter-content) towards the side with higher effort before partition can be completed by the formation of a 2D/3D object in its spatial dimension.

External pressure, at the ends of a quantum of matter, A, affects its matter-content at every point and induces it to expand in the second spatial dimension and shrink in the first spatial dimension. Points in matter-contents, common to both quanta of matter and existing at their intersection, are also affected. A certain part of their expansion in the second spatial dimension of quantum, A, may coincide with the translational motion of matter-content in quantum of matter, B. Matter-contents of both quanta of matter, A and B, coexisted at their intersection, when they were in different spatial dimensions. As soon as they tend to occupy the same spatial dimension(s), their matter-contents separate into independent status to form quanta of matter in their respective spatial dimensions and outside each other's matter-content.

Let an external pressure act all around the perimeter of a 2D quantum of matter, A, such as to convert it into a 3D status. The existence of a 3D material body at the point of intersection with a 1D quantum of matter tends to part it into two parts. However, by the quantum of matter's inherent nature, it is unusual for the matter-content of a quantum of matter to be cut into two or made smaller by reducing its matter-content. At the instant of conversion of a 2D quantum of matter, A, into a 3D object, a partition tends to develop at the point of intersection of a 1D quantum of matter and a 3D object. Self-elongating efforts, within the 1D quantum of matter, B, on either side of this partition are proportional to the curvature and length of the parts forming,

as explained with respect to figure 4. [If a 1D quantum of matter is already a part of a quanta-chain, attraction to its neighbours also is proportional to the lengths of parts of the 1D quantum of matter, B, being formed.] The thickness of the 2D quantum of matter, A, at the instant of its conversion to a 3D object corresponds to the thickness of a plane in the 3D spatial system. Thickness below this limit is functional or non-existent.

It is highly improbable for a partition to form exactly at the center of a 1D quantum of matter, B, with even curvatures. Even so, a slight motion of either 2D quantum of matter, A, or 1D quantum of matter, B, will offset the center point. The development of a 3D object, in thickness, is also not similar in both directions from the center point. This can also offset any centralized formation of a partition. Hence, we can say that the formation of a partition, exactly at the center point of a 1D quantum of matter, with even curvature, is unlikely. Therefore, it is very unusual to find that a quantum of matter is bifurcated.

In Figure 4, 'B' represents part of a 1D quantum of matter. 'A' represents part of a 2D quantum of matter or part of a 3D matter-particle, intruding into the spatial dimension of 1D quantum of matter, B. YY is perpendicular to the tangent on the perimeter of 2D/3D material body, parallel to the body of 1D quantum of matter. Curvatures of the perimeter on either side of the line, YY, are considered different. Arrows RP and ED represent directions of self-constriction in the matter-content of the quantum of matter, B. Due to the curvature of perimeters at parts of 1D quantum of matter, directions of self-constriction are not even on either side of the line, YY. Horizontal components of self-constriction of either side of the line, YY, are in opposite directions. Magnitudes of their resultants on either side of the line, YY, depend on the curvature of the intruding part of the 2D quantum of matter. The difference in the resultant effort compels the matter-content of 1D quantum of matter, B, to move towards the part that has a higher resultant effort. Usually, the whole matter-content of the 1D quantum of matter should move to one side of the intruding entity before the intrusion can divide it into two independent 1D quanta of matter.

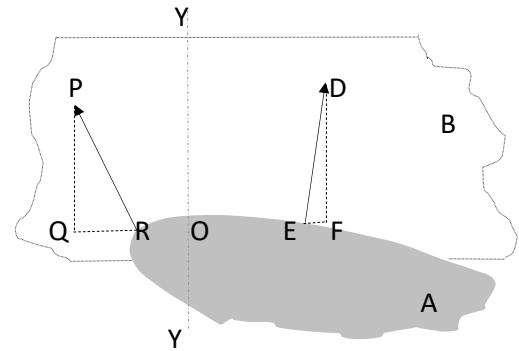


Figure 4

It can (generally) be said that quanta of matter preserve their individuality under all circumstances. However, in exceptional circumstances, nothing prevents a quantum of matter from parting into two independent quanta of matter or the amalgamation of matter-contents from two quanta of matter to form a single quantum of matter. If an attempt to part a quantum of matter into two may develop and persist for a longer time at exactly at its geometrical centre with even curvature, it may part into two individual quanta of matter. Another possibility is that of a quantum of matter with exceptionally large matter-content. The time required for it to move its whole matter-content to the side with higher resultant effort may be too long to prevent division of its matter-content into two separate quanta of matter.

1D quantum of matter exists only in its own one-dimensional spatial system. Hence, 1D quantum of matter is able to coexist with another 1D quantum of matter in all spatial dimensions other than its own. 2D quantum of matter exists in a plane. 1D or 2D quantum of matter is able to coexist with it, in all spatial planes other than in the plane of the 2D quantum of matter. If located in the plane of the 2D quantum of matter, a 1D quantum of matter maintains its individuality and independence as a separate entity, even if it is a component of a 2D material body, constituted by one or more 2D quanta of matter, without gaps between neighbouring quanta of matter. A 3D material body exists in all spatial planes passing through it. 1D quantum of matter is unable to coexist with a 3D matter-body or any of its constituent quanta of matter, in any of these planes. Even if it is a constituent part of a 3D material body, it keeps its independence and integrity as a separate entity, within the 3D material body, without gaps between the neighbouring quanta of matter.

Universal medium (in this concept) is a combination of 2D energy-fields in all possible planes in space. 2D energy-field is a latticework structure by quanta of matter, formed by grids in geometrical shapes of squares [like a grid formed by sets of parallel straight lines, perpendicular to each other]. Each side of a square is provided by a quantum of matter. As a result of the latticework structure, in each plane, the space within a latticework square is free from matter in that plane. However, such gaps in the plane (or any probable gap between two quanta of matter in the same spatial dimension) are occupied by quanta of matter in other spatial dimensions. This arrangement leaves no room for voids or empty gaps. The entire space is occupied by matter. At the same time, no overlapping or superimposing of matter contents of different quanta of matter in the

same spatial dimension takes place. Thus, the matter-density of the entire space (including that of 3D matter-particles) is the same as the matter-density of a quantum of matter or that of a basic 3D matter-particle. This matter-density is constant throughout the universal medium (space). Consequently, the universal medium is homogeneous in its consistency. Due to the 2D latticework structures of the universal medium, the existence of matter, if considered separately for any plane, shows much larger gaps between the quanta of matter in that plane (spatial dimension).

Anisotropy of universal medium:

Universal medium (structured by quanta of matter), in its stable state, is homogeneous, isotropic, and serene. A homogeneous universal medium that has isotropic properties can neither deform nor have relative movements within. If the universal medium cannot have relative displacement of its parts, it can neither act nor be acted upon on/by other entities. Therefore, it is imperative that the structure of the universal medium (which has isotropic properties in its stable state) should be able to cater for anisotropic properties during its unstable conditions, while remaining homogeneous. For a detailed description of the structure and properties of the universal medium, see the reference.

Relative motion within universal medium:

Space, outside 3D matter-particles, is filled entirely by an all-encompassing universal medium of constant matter-density. It is of homogeneous consistency. Since 3D matter-particles are also of the same matter-density, the whole space is filled with a combination of entities of constant matter-density. In our 3D world, displacement of an object or its part takes place only to another location where there is no other 3D object present (or where matter-density is lower). Thus, it seems that relative motion and deformations in the universal medium are impossible objectives to achieve.

In each plane, latticework structures of 2D energy-fields leave a lot of space around their constituent quanta of matter for relative displacements. At the same time, bonds between quanta of matter in latticework structures of 2D energy-fields in the universal medium are weak enough to allow angular displacement or departure between quanta of matter at junction points. This facilitates relative angular displacement between the quanta of matter in 2D energy-fields. Latticework structures may be deformed and/or parted to facilitate the motion and passage of 3D matter-particles through them. Latticework structures enable the universal medium to transfer deformations in it, even without the presence of 3D matter-particles. Simultaneous actions or deformations in all 2D energy-fields about a point/object in space appear as an action in the 3D spatial system. This arrangement of the 2D energy-fields distributes matter evenly throughout the entire space and, at the same time, enables them to deform without damaging the universal medium's homogeneity (constant matter-density). Displacements of one or more quanta of matter (in any spatial dimensions) do not leave the space occupied by them empty. As the same space is simultaneously occupied by quanta of matter in other spatial dimensions, no empty space or void appears in these places.

Initiation of motion:

Relative motions of quanta of matter (which in turn move 3D matter-particles/objects) in the universal medium may be initiated by various means, a few of which are given below.

Quanta of matter – the smallest matter-particles in nature – are of different matter-contents. Quanta of matter with somewhat equal matter-contents form stable 2D energy-fields, which are inherently under a compressed state. An entity, within the 2D energy-fields and breaking the continuity of their latticework structures, is under external pressure, produced by the compressive state of 2D energy-fields. This phenomenon is 'gravitation'. Due to the latticework structure of the 2D energy-fields, gravitational efforts are applicable only on the curved perimeters of 2D or 3D matter-particles. The magnitude of gravitational effort at a point is proportional to the extent of 2D energy field(s), applying the compression.

Inclusion of a quantum of matter that has (much) higher or lower matter-content, in the latticework structure causes imbalance and deformation that makes a 2D energy-field unstable. A stabilizing act, inherent in the 2D energy-field, tends to move distortions in the latticework structure away from the present location and gradually group them together. Excessive deformation in a region in the latticework structure either produces circular 2D matter-particles by combining and compressing the offending quanta of matter or causes a local breakdown of the latticework structures of 2D energy-fields.

Every 2D energy-field extends to infinity in all directions in its plane. If there are two 2D matter-particles in a 2D energy-field, the extent of latticework structure between them is always less than the extent of latticework structure on their outer sides. The magnitude of gravitational effort is proportional to the extent of the 2D energy-field (which is producing the effort). Therefore, the magnitudes of gravitational efforts applied by a smaller extent of 2D energy-field between two 2D matter-particles are lesser than the magnitudes of gravitational efforts applied by the infinite extent of 2D energy-field on their outer sides. Consequently, these 2D matter-particles are pushed towards each other. This phenomenon is the (apparent) 'attraction due to gravitation'. As and when structural deformations in the 2D energy-field and the resultant gravitational effort by the 2D energy-field about the 2D matter-particles are large enough, structural distortions in the latticework structure move the 2D matter-particles towards each other by parting the latticework structure between them. It is the structural distortions in the 2D energy field that are transferred. 2D matter-particles are carried by the structural distortions along with them. Similar actions also take place in the cases of the 3D matter-particles.

Excessive or sudden deformation in any part of the 2D energy-fields may cause a breakdown of their latticework structures and release many quanta of matter free into the gap. 2D energy-fields, all around the gap, rush in to gather the freed quanta of matter and compress them into a single 3D matter-particle. The volumetric shape of this 3D matter-particle induces surrounding 2D energy-fields to assume appropriate deformations to reshape the gathered quanta of matter into a basic 3D matter-particle and move it linearly and angularly at a characteristic and constant velocity through the universal medium. It is the universal medium that is moving the 3D matter-particle, by transferring the structural deformations within its latticework structures. This basic 3D matter-particle, together with associated structural deformations in the surrounding 2D energy-fields is a 'photon'. Photons, with their characteristic properties, from their 3D matter-cores and associated structural deformations in the universal medium, form the basis of all physical structures in our 3D world. Structural distortions in the 2D energy-fields, in association with one macrobody, may be transferred to the 2D energy-fields in association with another macrobody to transfer kinetic energy from one macrobody to another.

Conclusion:

Universal medium, presented in the book 'MATTER (Re-examined)', has all the required properties of an ideal aether, in 'aether theories'. It is made of matter. It is a real entity. It encompasses all 3D matter-particles. It fills the entire space outside the most basic 3D matter-particles. It extends infinitely in all directions. It is homogeneous with a constant matter-density everywhere. It becomes anisotropic in an unstable (deformed) state, without losing its homogeneity to facilitate relative motions by material entities. In its stable state, the universal medium is homogeneous, isotropic, and serene. Individual 2D latticework structures by the quanta of matter (which may co-exist in space) for each plane of the universal medium enable it to be homogeneous and anisotropic at the same time.

Reference:

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

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