MECHANISM OF MOTION

According to 'MATTER (Re-examined)'

Nainan K. Varghese, matterdoc@gmail.com
https://www.matterdoc.in/

Abstract: Most physical actions in three-dimensional world are recognized by displacements of 3D material bodies in space. In these cases, mechanisms of action and motion are synonymous. As 3D matter is inert, all actions and apparent interactions (attributed to 3D material bodies) are mediated by an all-encompassing universal medium that fills the entire space, outside basic 3D matter-particles. Action of effort invests additional work in the universal medium within and surrounding a macrobody. Additional work, in the universal medium, moves at a linear speed corresponding to the external effort. As they move, all enclosed basic 3D matter-particles (of the macrobody) are carried along. Additional work, associated with a macrobody, determines its state of motion.

Keywords: Effort, Force, Work, Inertia, Motion.

Introduction:

All actions are recognized by motion or deformation of macrobodies. Motion is the displacement of 3D material bodies in space. Deformation is the displacement of parts of a macrobody with respect to other parts of the same macrobody. True actions (linear motion, rotational motion, etc.) can be understood only with respect to an absolute reference. Universal medium (combination of latticework structures of 2D energy-fields), envisaged in the alternative concept presented in the book 'MATTER (Re-examined)', is reasonably isotropic, homogeneous, static, and extends infinitely to provide an absolute reference. All actions related to the motion of 3D material bodies are mediated by the universal medium.

2D energy-fields are latticework structures formed by quanta of matter. They are in direct contact with every basic 3D matter-particle in the universe. All apparent interactions between 3D matter-particles are through 2D energy-fields. This avoids the assumption of 'actions at a distance through empty space'. All possible planes in space have one 2D energy-field, each. They fill the entire space, outside basic 3D matter-particles. Together they form an all-encompassing universal medium.

Displacements of quanta of matter in the 2D energy-field, with respect to each other, create structural distortions in its latticework structure. Structural distortions in 2D energy-fields, in and about a 3D material body, are the work done. Intrinsic work in and about a macrobody forms its structure, sustains the integrity and physical state of the macrobody, and all its constituent 3D matter-particles. The region in the universal medium, where structural distortions (work) about a macrobody are situated, is its 'matter-field'. The action of external effort on a macrobody is to introduce additional structural distortions into its matter-field. All conclusions, expressed in this article, are from the book, 'MATTER (Re-examined)' [1]. For details, kindly refer to the same.

Motion:

Motion is the process of displacing a material object from one location to another in space. A macrobody is a combination of several basic 3D matter-particles. Basic 3D matter-particles exist in gaps in the universal medium. Transfer of structural distortions in the surrounding universal medium moves basic 3D matter-particles of a macrobody. As and when exertion from the rear of a basic 3D matter-particle is sufficient, latticework structures of 2D energy-fields in front, part to provide passage for it. As soon as it passes, continuity of the latticework structures is restored at the rear. The difference between structural distortion-densities at the rear and front of a 3D matter-particle maintains a push-effort from the rear the object will continue to move. In this way, gaps in the universal medium, along with 3D matter-particles within, move through the latticework structures of the universal medium. Displacements of constituent basic 3D matter-particles move a macrobody.

A 3D material body cannot simultaneously exist in two places. There has to be an interval between its appearance in one location and its subsequent appearance in another place. This interval gives rise to a functional entity, called time. Locations, where a 3D material body is before and after its motion, are situated in space. To distinguish these positions from each other, it is essential that they are separated by a distance. If the separation between present and past locations is related to one of the locations, the resulting displacement of the 3D material body denotes its 'absolute motion', in space. If separation between present and past locations is related to any other reference, the resulting displacement of a 3D material body denotes its 'relative motion'.

State of motion of a macrobody is determined by the additional work (more than that required to maintain stability and integrity of the macrobody and its constituent 3D matter-particles), with respect to an external reference. The time required for the distribution and stabilization of additional structural distortions (work) in the macrobody's matter-field is the inertial delay. Inertial delay is the interval between the instant of commencement (or cessation) of action by an external effort on a macrobody and the instant at which all 3D matter-particles of the macrobody have completed their response to the action of effort, at which the macrobody attains a steady state of its motion corresponding to the action.

Due to inertial delay, it takes certain time after the commencement of an action of an effort on a macrobody to stabilize its speed and reach a steady state of motion. Similarly, it takes certain time for the macrobody, after the termination of an action of an external effort on it to stabilize its speed and reach a steady state of motion. Unfortunately, the second part mentioned is usually ignored. After stabilization of a macrobody's state of motion, additional structural distortions in the macrobody's matter-field continue to be transferred through the universal medium at a steady speed. Transfer of structural distortions in the universal medium moves the 3D matter-particles of the macrobody. Resultant of intrinsic and additional structural distortions, in the matter-field, travel in straight lines in their own planes in the universal medium. Hence, the paths of inertial motions of all material bodies in space are inherently in straight lines. Rotational motion of a macrobody is a combination of straight-line motions of its numerous constituent 3D matter-particles in as many directions.

Relative motion:

The relative motion of a macrobody indicates its displacement with respect to another macrobody or a point in space. Relative motion of part of a macrobody, during its deformation, is with respect to a reference outside the deformed part. These are not its real displacements, corresponding to the additional work (energy) associated with it. Depending on the parameters of the reference macrobody, magnitudes and directions of relative motions vary. They depend not only on the magnitude and direction of the macrobody's displacement, but also on the magnitude and direction of the reference macrobody's displacement, in the same interval of time. Hence, the magnitude and direction of motion given by relative motion are apparent parameters. They can at most suggest the correct relative position of the macrobody in relation to the reference macrobody. Relative motion cannot describe the correct parameters of a moving macrobody or its correct path in space. Since the parameters of these motions are not true, no physical laws should be based on them.

Absolute motion:

No macrobody can exist without motion. In fact, basic 3D matter-particles are sustained due to their steady motion. 3D matter is inert. It can only provide a platform for actions, i.e., a 3D material body can be moved linearly or angularly at different accelerations or speeds in different directions. Universal medium moves 3D material bodies through itself. Universal medium is in direct contact with every basic 3D matter-particle (of macrobodies. The transfer of structural distortions in the universal medium carries the associated basic 3D matter-particles along with the distortions. Combined displacements of all constituent 3D matter-particles displace the macrobody.

Universal medium, provided by the 2D energy-fields in all possible planes, is reasonably steady in space. Therefore, the universal medium or any point in it can provide an absolute (steady) reference in nature. Motion with respect to an absolute reference is absolute motion. Only absolute motion can determine the real parameters of a moving macrobody and the shape of its path. To obtain the relative positions of two macrobodies, it is necessary to consider the absolute motions of both macrobodies. For practical purposes, this may be more complicated than using a relative reference frame, with either of the macrobodies as a static reference.

In nature, all macrobodies are in continuous motion, and the universal medium is hidden from our view. Hence, it is very difficult to ascertain an absolute reference. It may be realised from inertial actions on 3D material bodies or derived by other means. All real actions and resulting parameters of 3D material bodies depend on the magnitudes of absolute motions. Development of a macrobody and the sustenance of its integrity require a certain magnitude of associated work. This is the intrinsic work (energy) associated with it. Additional work (energy) associated with a macrobody determines its state (of motion). Magnitude and direction of absolute motion are in relation to any reference point in the universal medium. True parameters and shape of the macrobody's path depend on its absolute motion.

Mechanism of motion:

We shall consider the action of a linear inertial effort on a 'force-receiving body' by an approaching 'force-applying body'. [Adjective 'inertial' is used with phenomena that invoke the property of inertia]. To invoke direct action, both of them have to make contact. During a collision, the approaching 'force-applying body' applies an effort on the 'force-receiving body'. Matter-fields of both the 'force-applying' and the 'force-receiving' bodies are compressed on impact, against their inherent stability. Subsequent decompression of matter-fields causes acceleration or deceleration of 3D matter-particles in them due to reinstatement to stable configurations.

As the 'force-applying body' approaches the 'force-receiving body', structural distortions in the matter-fields about the nearest 3D matter-particles in both macrobodies come within interacting distances. 3D matter-particles of macrobodies tend to keep a stable relative distance between them. In the process of collision, 3D matter-particles of the 'force-applying body' move towards those of the 'force-receiving body', which are reluctant to move away, due to inertia. Distances between 3D matter-particles in both macrobodies decrease. In doing so, the latticework structures in the matter-fields between these 3D matter-particles are squashed in the direction of effort. Compressed latticework structure of the matter-field, by its inherent properties, tends to regain its natural state by expanding outwards. This reaction continues as long as the 'force-applying body' has relative displacement towards the 'force-receiving body'. Meanwhile, expansions of the latticework structures in the matter-fields, after initial compression, produce inertial actions on the 3D matter-particles of both macrobodies. Their movements create additional structural distortions in both matter-fields. Additional structural distortions accelerate or decelerate 3D matter-particles within corresponding matter-fields.

Consider a macrobody whose matter-field can absorb additional structural distortions introduced by an external effort by the deformation of very few of the latticework squares. Let the 'force-applying body' become free after the action of effort and cease to apply further effort. As soon as the matter-field (macrobody) is relieved from the action of 'force-applying body', deformed latticework-squares in it commence returning to their original shape and place. In doing so, they shall apply a reaction on the 'force-applying body'. Latticework squares in the matter-field of 'force-receiving body', while returning to their original shape, push the 'force-applying body' back. Reaction, by the matter-field of the 'force-receiving body' on the 'force-applying body', is equal but opposite in direction to the original action of effort. Thus, the (temporary) work done in the matter-field of 'force-receiving body' is released, and the effort used for that work is now returned to the 'force-applying body'. If the 'force-applying body' is absent, the structural distortions corresponding to the (temporary) work are transferred out of the matter-field of the 'force-receiving body', into space. No additional work is retained with the matter-field of 'force-receiving body'. This phenomenon is a 'fully elastic collision'.

Although there are no rigid bodies in this concept, to make the explanation simpler to understand (for the time being), we may assume both the force-applying' and the 'force-receiving' bodies are rigid and of similar parameters. Inertial actions between colliding rigid macrobodies take place during the time when the 'force-receiving body' and 'force-applying body' are in direct contact. Part (or full) of additional structural distortions in the matter-field of 'force-applying body' is transferred into the matter-field of 'force-receiving body' through latticework structures of 2D energy-fields in common planes. This is an inertial action, which changes the states of whole-body motions of both 'force-applying' and 'force-receiving' bodies.

We shall consider the impact between two rigid macrobodies, where after the impact, the 'force-applying body' comes to a stop and the 'force-receiving body' commences to move away with appropriate velocity. Due to its motion at a higher (relative) velocity, the 'force-applying body' has a higher density of additional structural distortions in its matter-field. Rigidity of macrobodies prevents compression of their matter-fields during the impact between them. Since the 'force-receiving body' can be moved only during an inertial action, the 'force-applying body' is stopped on its path by the 'force-receiving body'. Although 3D matter-particles of the 'force-applying body' are stopped in their paths, additional structural distortions in its matter-field continue to be transferred through the universal medium at its original (constant) linear speed. Whole of additional structural distortions in the matter-field of 'force-applying body' moves forward and away from its 3D matter-particles.

3D matter-particles of the 'force-applying body' lose their momentum. Additional structural distortions, which left the matter-field of 'force-applying body', move forward through the universal medium into the space of the matter-field of 'force-receiving body'.

As and when additional structural distortions reach the 'force-receiving body', its matter-field is modified. Its 3D matter-particles gradually develop motion corresponding to the additional structural distortions received by the matter-field, in addition to their original motion, if any. The whole momentum of the 'force-applying body' is transferred to the 'force-receiving body'. After the stabilization period, the 'force-receiving body' attains constant linear motion corresponding to the total additional structural distortions its matter-field now has. If the parameters of the 'force-applying' and 'force-receiving' bodies are identical and the 'force-receiving body' is in a static condition (with respect to the 'force-applying body') during impact, the 'force-applying body' will halt and the 'force-receiving body' will move at the same constant linear speed as the original linear speed of the 'force-applying body'. Differences in the parameters of 'force-applying' and 'force-receiving' bodies will correspond to the changes in magnitudes of momentum transferred between them. Transfer of additional structural distortions between the 'force-applying' and 'force-receiving' bodies continues only as long as they are in contact and the linear speed of the 'force-applying body' exceeds the linear speed of the 'force-receiving body', in the same direction. As and when the linear speed of the 'force-receiving body' equals or exceeds that of the 'force-applying body', interactions between their matter-fields terminate.

When the effort from the 'force-applying body' acts on the 'force-receiving body', both of their matter-fields are simultaneously modified. Normally, we consider modifications only in the matter-field of the 'force-receiving body', unless we are taking the reaction also into consideration. In case the 'force-receiving body' produces certain changes in additional structural distortions in the matter-field of the 'force-applying body', due to their relative speed, the 'force-applying body' will start to move in the opposite direction. Such motion is considered due to a reaction to the original effort. Action, corresponding to effort and responsible for this rebound of the 'force-applying body', is reactive effort. This phenomenon produces elastic collisions.

When external effort causes additional structural distortions (work) in the matter-field of the 'force-receiving body,' and it returns less additional work to the matter-field of the 'force-applying body', a collision between them is not fully elastic. Part of the additional work, in the matter-field of 'force-receiving body', is retained. That is, the matter-field of 'force-receiving body' is modified permanently with additional structural distortions, received. There are no changes in its 3D matter-content. Change of state of (motion of) macrobody, due to an external effort, does not affect its 3D matter-content, but affects only its matter-field. However, in certain conditions, a change of state of the matter-field may change the 3D matter-content of macrobody, indirectly.

Consider a greater external effort, acting directly on a macrobody, for a longer time, and the 'force-applying body' remains stopped in position, relative to the 'force-receiving body', after its action. Every (additionally) deformed lattice square in the matter-field of 'force-receiving body' now strains against each other to regain its original shape. As the 'force-applying body' is not free and stays in its relative position, strained lattice squares cannot regain their original shapes by moving backward and return the additional work to the 'force-applying body'. They can regain their original shapes only by passing on the additional structural distortions they received, in the same direction as the external effort. Each latticework-square of matter-field passes on its additional structural distortion to the latticework-square in front of it.

Additional structural distortions, received from the rear, are over and above the additional structural distortions the latticework square received during the action of effort. Transferred additional structural distortions are part of the original additional structural distortions absorbed by the lattice square at the rear. By transferring all additional structural distortions, gained during the action of external effort, latticework-squares nearest to the ' force-applying body' regain their stable state first, followed by subsequent latticework-squares. Thus, the whole matter-field of the 'force-receiving body' moves forward by a distance equal to the distance penetrated by the 'force-applying body' into its matter-field. Only the additional structural distortions in the latticework structure are transferred; latticework-squares of 2D energy-fields themselves remain in their relative positions. Basic 3D matter-particles, situated within the matter-field, are also carried forward along with the structural distortions by parting the latticework structures in front.

Let the first latticework square, immediately next to the 'force-applying body', fully regain its original shape by transferring all its additional structural distortions to the latticework square in front. That is, the 'force-receiving body' (its matter-field) has moved away from the 'force-applying body' by a distance equal to the penetration by the 'force-applying body'. All of the additional structural distortions introduced into the matter-field of the 'force-receiving body' by external effort are now contained within its matter-field. These additional structural distortions continue to be transferred in the forward direction. Thus, the whole of its matter-field continues to move in the forward direction at linear speed, at which the additional structural distortions are transferred into it. 3D matter-particles of the 'force-receiving body' are carried along with its matter-field. 'Force-applying body' acted on 'force-receiving body' to produce its linear motion. Motion of the 'force-receiving body' will continue as long as the effects of this action, in the form of moving additional structural distortions, remain within its matter-field.

As soon as the 'force-receiving body' starts to move (or when its linear speed exceeds the linear speed of the 'force-applying body') in the direction of external effort, it may sever its contact with the 'force-applying body'. External effort is not acting on latticework-squares of its matter-field anymore, and they are not restricted from regaining their stable and original shape, by expanding in the opposite direction (rearward) towards the original effort) also. This is done, and the additional structural distortions introduced into the matter-field are now transferred not only in the forward direction but in the backward direction as well. Additional structural distortions, introduced by the external effort, are now fully contained within the matter-field of the moving macrobody. They are being transferred in both directions, forward and backward, so that the latticework-squares of 2D energy-fields, outside the matter-field, are able to regain their original stable states.

However, the matter-field as a whole (and along with 3D matter-particles in it) is moving at a certain linear speed in the forward direction. When the linear speed of the matter-field is equal to the linear speed at which part of the additional structural distortions in the matter-field are transferred in the backward direction, all latticework squares leaving the limit of the matter-field to the rear would have regained their stable/undistorted state. In addition, all latticework-squares entering the limit of the matter-field from the front would gain equal magnitude of additional structural distortions as is being lost from the latticework squares leaving the matter-field to the rear.

Total additional structural distortions, introduced by the external effort, are now confined within macrobody's matter-field. They are distributed within the matter-field, such that the latticework squares towards the middle part of the matter-field have a higher density of additional structural distortions, and latticework squares, towards the limits of the matter-field in forward and rearward directions, have a gradually diminishing density of additional structural distortions until there are no additional structural distortions in the latticework-squares just outside the limits of the matter-field, in front and rear. Linear speed of macrobody, at which this stable condition is reached, is the linear speed (modified or) imparted to it by the external effort. Hence, as long as the additional structural distortions remain within its matter-field, the macrobody continues to move in a straight line at a constant velocity.

Once this process has started, there is nothing in the matter-field or outside it that can reduce or stop the linear motion of the macrobody. To arrest macrobody's motion or modify its linear speed, it is necessary to remove or modify (the magnitude of) additional structural distortions in its matter-field. This may be done by introducing additional structural distortions of equal or different magnitudes in an appropriate direction (by external effort of equal or appropriate magnitude and direction) into the macrobody's matter-field to neutralize or modify the magnitude of additional structural distortions.

Consider a 'force-receiving body' as an immovable macrobody (extremely large and dense compared to a 'force-applying body'). On impact, the matter-field of the 'force-applying body' transfers the whole of the additional structural distortions in its matter-field to the matter-field of the 'force-receiving body' and comes to a halt, near or inside the matter-field of the 'force-receiving body'. Additional structural distortions, transferred into the matter-field of the 'force-receiving body', try in vain to move the 'force-receiving body'. Initially, additional structural distortions enter the matter-field of the 'force-receiving body' by compressing the latticework squares in its matter-field. However, since additional structural distortions are unable to move the 3D matter-particles of the 'force-receiving body', latticework squares in its matter-field tend to regain their stable states by decompression (expanding in the opposite direction).

In this process, the whole of the additional structural distortions transferred into the matter-field of the 'force-receiving body' are returned in the opposite direction and out of the spatial limits of the 'force-receiving body'. If the 'force-applying body' (or any other macrobody) is in the path of return, it will receive the additional structural distortions into its matter-field and develop linear motion in the opposite direction to its original motion. If the 'force-applying body' is not present to receive the rebounded additional structural distortions, they will be lost into space. Normally, the time required for the return of additional structural distortions from immovable macrobody's matter-field is so little that rebounding additional structural distortions will find the 'force-applying body' in their path.

Since there are no rigid or immovable macrobodies in nature, the transfer of inertial actions from one macrobody to another is a combination of the cases explained above. Additional structural distortions received into the matter-field of the 'force-receiving body' distribute and stabilise during the inertial period (time delay). Macrobody accelerates or decelerates during this time. Changes or reduction in magnitude of additional structural distortions in the matter-field of 'force-applying body' also require re-distribution and stabilisation. This is also an inertial action.

The magnitude of additional structural distortions, produced in the matter-field of the 'force-receiving body', is work done, and the additional stress developed during deformation is the energy received. Reduction in the magnitude of additional structural distortions in the matter-field of the 'force-applying body' is the work undone, and the magnitude of stress reduced in its matter-field is the energy given away. In a case where the action of one macrobody changes the state (of motion) of another macrobody, the magnitude of additional structural distortions in the matter-field of the 'force-applying body' is reduced, and the magnitude of additional structural distortions in the matter-field of the 'force-receiving body' is increased. That is to say, that work is undone in the 'force-applying body,' and work is done on the 'force-receiving body'. Work done and work undone are equal in magnitude. This gives rise to the phenomenon of 'conservation of momentum'. Energy lost by the 'force-applying body' is equal to the energy gained by the 'force-receiving body'. Energy is not transferred from one macrobody to another, but work is.

Work done in the matter-field of the 'force-receiving body' is due to a (direct) 'force', and alteration to the matter-field of the 'force-applying body' is due to (reactive) 'force'. The magnitude of additional structural distortions received by the 'force-receiving body' is the same as the magnitude of additional structural distortions lost by the 'force-applying body'. Hence, numerically, action is equal to its reaction. The direction of resultant structural distortions in the matter-field of the 'force-receiving body' and its inertial displacement is along the direction of the original effort. The direction of resultant structural distortions in the matter-field of the 'force-applying body' is opposite to the direction of the original effort.

Resultant of two motions:

If there are two (or more) external efforts acting simultaneously on a macrobody in different directions, each of them introduces its own additional structural distortions in the corresponding directions into the macrobody's matter-field. Each set of additional structural distortions tends to move 3D matter-particles of the macrobody in its own direction of transfer. Macrobody tends to move simultaneously in more than one direction, with its 3D matter-particles moving in the resultant direction. As the macrobody moves in the resultant direction, its 3D matter-particles are displaced away from paths of both sets of additional structural distortions, introduced by external efforts. Additional structural distortions, introduced by external efforts, move straight out of macrobody's matter-field (each set in its own direction), and they will be lost into space. They can affect the 3D matter-particles only as long as the 3D matter-particles are on their way. However, in the meantime, the motion of 3D matter-particles of the macrobody, in the resultant direction of external efforts, creates fresh additional structural distortions in the macrobody's matter-field. These additional structural distortions, though created by the motion of 3D matter-particles, move at the same speed as 3D matter-particles. They tend to maintain the linear motion of the macrobody and its 3D matter-particles.

Only gravitational efforts act evenly on a macrobody. Field efforts and inertial efforts usually act evenly on a macrobody in cases where the 'force-applying body' is much larger than the 'force-receiving body'. In other cases, external efforts are applied to only a part of the 'force-receiving body'. Additional structural distortions are passed on into a limited region in its matter-field. 3D matter-particles in this region attain motion corresponding to the additional work gained by the 'force-receiving body'. Due to the integrity of the 'force-receiving body', relative motion of its parts is restricted by the viscosity of the body material. Field efforts, developed between 'moving' and 'non-moving' parts, tend to persuade the 'non-moving' part to move along with the 'moving' part. In this case, field efforts tend to oppose the action of additional structural distortions received by the 'force-receiving body'. The whole of the 'force-receiving body' adjusts the magnitude of its motion to correspond to the total additional structural distortions received.

However, 3D matter-particles in the region of the matter-field that was acted upon by the external effort do not move at a linear speed corresponding to the additional structural distortions they received. Part of the additional structural distortions in the region is utilised to overcome resistance by field efforts towards the 'non-moving' part of the 'force-receiving body'. The magnitude of additional structural distortions in the 'force-receiving body' is lower. But every 3D matter-particle in the whole of the 'force-receiving body' is now moving at the same linear speed. Original 'non-moving' 3D matter-particles (of the 'force-receiving body') produce additional structural distortions, corresponding to their linear speed in the matter-field. Additional structural distortions in the matter-field are eventually stabilised at a uniform magnitude, corresponding to the current linear speed of the 'force-receiving body'.

The action of an external effort on a macrobody is to introduce additional structural distortions into its matter-field. The magnitude of additional structural distortions in the matter-field of a macrobody is the magnitude of additional work done about that macrobody as a whole. Newly introduced additional structural distortions in the matter-field;

(1) If they are in the same direction as the additional structural distortions, already present and maintaining the inertial motion of the macrobody, they add together to accelerate the macrobody and enhance its speed.

(2) If they are in opposite directions to additional structural distortions, already present and maintaining the inertial motion of the macrobody, subtract from each other to decelerate the macrobody and reduce its speed.

(3) If they are in other directions, they accelerate the macrobody in their respective directions and deflect the macrobody's direction of resultant motion.

Additional structural distortions in a macrobody's matter-field travel only in straight lines, thus directing steady-state motions of all its constituent 3D matter-particles in straight lines. As long as the magnitude (and direction) of additional structural distortions (additional work) in the matter-field remains constant, the macrobody continues to move at constant linear speed (in a straight line). A change in the magnitude (or direction) of additional structural distortions produces instability in the macrobody's state of motion. It will take some time for the additional structural distortions to stabilise. This is an accelerating/decelerating period of macrobody.

If an external effort acts in a direction deflected from its line of motion, it introduces additional structural distortions into the macrobody's matter-field in its own direction. They form another set of additional structural distortions in addition to the original additional structural distortions, which are already moving the macrobody at constant linear speed. Additional displacement of constituent 3D matter-particles of the macrobody deflects the whole macrobody from its original direction of motion. As the macrobody deflects away from the direction of its original constant linear motion, 3D matter-particles in the part of the macrobody move away from the path of moving structural distortions in its matter-field. Irrespective of the displacement of constituent 3D matter-particles, the travelling structural distortions in the macrobody's matter-field continue to be transferred in the same direction and are lost from the macrobody's matter-field into the universal medium outside. Total additional work in the direction of macrobody's original linear motion is reduced.

In the meantime, due to its linear motion, the macrobody is also moving away from the direction of additional structural distortions due to the external effort. If the action of external effort is only for a limited time, the macrobody is gradually carried away from the influence of additional structural distortions due to the external effort, and these additional structural distortions escape into space outside the macrobody. If the external effort on the macrobody is maintained continuously, as in the case of motion in a circular path, the introduction of additional structural distortions into the macrobody's matter-field continues at a constant rate, the same as the rate at which additional structural distortions are lost from the macrobody's matter-field. Due to the continued renewal of additional structural distortions by external effort, the macrobody accelerates continuously at a constant rate. At the same time, as the magnitude of newly introduced additional structural distortions and the additional structural distortions lost from matter-field are equal, the total magnitude of additional structural distortions, in its matter-field, remains constant. The constant magnitude of additional structural distortions in the macrobody's matter-field moves it at a constant speed. Due to this fact, even though the macrobody (moving in a circular path) is accelerating continuously at a constant rate towards the centre of curvature of its path, its (radial) speed remains constant.

During macrobody's displacement towards the centre of curvature of its path, certain part of additional work (producing its motion in a straight-line path) is lost from its matter-field, and certain part of additional work (producing its motion towards the centre of curvature) is stored within its matter-field. These additional structural distortions, together, form resultant additional structural distortions in the matter-field to produce the macrobody's motion in the resultant direction of both motions. Instantaneous changes in the resultant direction of the macrobody's motion cause curvature of its path.

Since the direction of macrobody's motion changes continuously, additional structural distortions due to original inertial motion and additional structural distortions due to the action of external effort (which are transferred in corresponding straight-line directions) are continuously modified. Current additional structural distortions in macrobody's matter-field, at any instant, are compatible with the present motions of its constituent 3D matter-particles. The magnitude and direction of their linear speeds depend on the magnitude of the resultant linear (instantaneous) speed of the macrobody.

Conclusion:

The transfer of structural distortions in latticework structures of 2D energy-fields in the universal medium forms the basis of the mechanism of motion of physical objects in space. Magnitude and direction of additional structural distortions (additional work) in the matter-field of a macrobody determine its state of motion. The action of an external effort ('force') is to introduce or modify additional structural distortions in the matter-field of a macrobody.

Reference:

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

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