

COPLANAR FORCES

(According to 'MATTER (Re-examined)')

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Abstract: All actions in nature are caused, initiated, and accomplished by work. The relation between the magnitude of 'work-done' about a macrobody and the macrobody's displacement during the work is the 'force'. Hence, 'force' is a mathematical aspect related to work, which is a real entity. However, the term 'force' is usually understood as a 'cause' or 'effort' required for an action. Actions are effects of efforts due to causes. Action by an effort result in a definite effect on or about a material body. To perform an action, a certain mechanism is essential. Generally, all physical actions are understood in terms of the displacement (motion) of macrobodies in space. 'Action at a distance through empty space', to accomplish the movement of a macrobody, is an impossible proposition. To accomplish motion in space, four things are essential. They are: a macrobody that is being moved, an entity that is instrumental to the motion, a mechanism of motion, and a reason or cause for the motion. Although the mechanism of motion is essentially the same in all conditions, there are slight differences in its actions when the causes of motion are in different relative directions or in different planes. This article briefly describes the mechanism of motion [3] (by a universal medium that is instrumental to the motion of a macrobody), when causes in the same plane are involved.

Keywords: Force, Effort, Work, Energy, Quantum of matter, 2D energy field, Inertia, universal medium.

Introduction:

Motion or rest of a material body is understood as its state. Change of state (of motion or rest) is an action. An action is the result of a certain magnitude of work done on a material body. Usually, a change in the state (of motion or rest) of a material body neither causes a change in its matter content nor changes the relative arrangements of its constituent three-dimensional matter-particles. Therefore, it is logical to conclude that work done about a macrobody exists outside the 3D matter content of the body but in close association with it. A real entity that exists outside 3D matter-particles of a macrobody, but enclosing the whole body is the all-encompassing universal medium. Hence, the universal medium about a material body is the logical place for the work to exist.

'Force' is usually considered as an influence that causes a material body to undergo a change in its state of motion (including rest) or shape. It is the result of a physical effort. 'Standard Model' of physics considers that exchange of (undefined) particles called 'gauge bosons' through empty space is the fundamental means by which 'forces' are emitted and absorbed by macrobodies. This ascribes certain physical and mystical qualities to 'force' that make it a real entity with magical properties. 'Quantum field theory' considers 'force' as a redundant notion,

resulting from the momentum of virtual particles. Virtual particles can exist and act only in rational minds. They cannot share in any physical action. 'General relativity theory' considers 'force' as a superfluous entity arising from conservation of momentum, which may be derived from properties of space. In both these theories, the idea of 'momentum' is usually considered more fundamental than the concept of a 'force'. Thus, 'force' is better understood as a sort of 'interaction'.

However, it may be noticed that in 'classical (Newtonian) physics':

'Force' is defined as a product of (constant) mass of a body multiplied by its acceleration. ($F=ma$). It is a mathematical relation between two functional entities. Even while a physical effort on a material body exists, the magnitude of force may reduce to zero by the absence of either mass or acceleration of the material body. 'Force' appears to be a mathematical relation between two properties of a material body, which may vary between positive values and zero. A mathematical relation is a functional entity.

'Force' is also defined as the rate of work done on (energy transferred to) a material body with respect to its displacement. ($F=W/d$). It is the space derivative of energy. Here, even while a physical effort on a material body exists, the magnitude of force, depending on the magnitudes of work done on and the displacement of the material body, may vary between zero and infinity. A rate is a mathematical relation, and hence a functional entity. Functional entities cannot perform physical actions.

All actions in nature are caused, initiated, and accomplished by work. As given above, the mathematical relation between the magnitude of 'work-done' about a macrobody and its displacement in absolute terms, during the work is being accomplished, is the 'force'. ($F=W/d$). Work, being a physical change in the universal medium about a material body, is tangible and hence a physical entity. Physical entities are real, and they can accomplish real action on material bodies. Therefore, it is logical to consider 'work' as the real and primary entity and 'force' as one of its aspects.

However, the term 'force' is often used in this article in its general sense to mean 'the cause or effort' required for an action. Actions are the effects of causes. To perform an action that results in a definite effect, besides a cause, a certain mechanism of action is also essential.

A pulling effort (force) is a logically impossible suggestion. When we consider the action of an effort, such as pulling, in reality, its mechanism of action pushes at the 'force-receiving body' to make the action possible. During pull-action by a rope tied to a macrobody, the inner part of the knot actually pushes on the part of the macrobody that is in direct contact with the inner part of the knot. Therefore, the character of all efforts (natural forces like gravity, electromagnetic, nuclear, etc.) in nature is of push. All efforts are activated by pushing action on 3D matter-particles by the universal medium, which is in direct contact with every 3D matter-particle in the universe.

Generally, all physical actions are understood by the displacement (motion) of macrobodies in space. Action at a distance, currently assumed to accomplish movements of a macrobody through empty space, is an impossible proposition. A material body can affect another material body only through direct contact, either directly between the material bodies or through an intermediary entity, which is in direct contact with both macrobodies. To accomplish motion in space, four things are essential. They are 1) a macrobody that is being moved, 2) an entity that is instrumental to the motion, 3) a logical mechanism of motion, and 4) a reason or cause for the motion.

Mechanism of motion is provided by natural actions of an all-encompassing universal medium, which is an intermediary between all 3D matter particles in nature and acts as instrumental to all types of motions in the universe. The cause or reason for the universal medium to act and cause the movements of material bodies is relative changes in its consistency, about a material body, due to various reasons. Although the mechanism of motion is basically the same in all conditions, due to the peculiar structure of the universal medium, there are slight differences in its actions when the causes of motion are in different directions or in different planes. The cause for the displacement of a macrobody in space is the stabilising actions of the universal medium to sustain its homogeneous nature. The working of the mechanism of motion, when causes that are instrumental to the motion of a macrobody are in the same plane, is briefly described in this article.

An alternative concept:

An alternative concept is presented in the book 'MATTER (Re-examined)'. In it: matter content of a macrobody and energy about the body are distinctly separate. Matter content of a macrobody is the total sum

of three-dimensional matter in it. The energy of a macrobody is the stress developed in the universal medium in and about the macrobody due to 'structural distortions' in the natural arrangements of 'quanta of matter' in the universal medium. Matter-content and energy content of a macrobody cause and support each other for their existence and stability. Matter being a real entity and energy being a functional entity, they are not convertible into each other.

The entire space is filled with '2D energy fields', two-dimensional latticework structures by 1D quanta of matter. 2D energy fields, in all possible spatial planes (directions), together form an all-encompassing universal medium. Two 2D energy fields crossing at a point co-exist at the junction. In a stable state of a 2D energy field, every quantum of matter, in the latticework structure, forms a side of a square. Hence, part of a 2D energy field, comprising four quanta of matter forming the sides of a square, may be called a 2D energy field square. Parts of 2D energy fields, within the body dimensions of a macrobody, contain sufficient structural distortions to sustain the integrity and stability of the macrobody, in its current state. This part of 2D energy fields is the 'matter-field' of the macrobody. The structurally distorted region in 2D energy fields about a 3D matter-particle in a macrobody is the matter particle's 'distortion-field'. 2D energy fields may be deformed against their inherent property to remain isotropic and homogeneous. The magnitude of structural distortions in a matter field, associated with a 3D material body, is the magnitude of 'work' associated with that 3D material body. Magnitude of structural distortions in a macrobody's matter-field, when it is at rest with respect to an absolute reference (the universal medium), is the 'intrinsic work', associated with the macrobody. 'Additional structural distortions' in its matter field (over and above those required to maintain integrity of the macrobody) are 'additional work' existing in association with the macrobody, and it determines the state of (motion of) the macrobody.

2D energy fields fill the entire space to form an all-encompassing universal medium. It is an aether-like entity, but a real entity with definite structure and properties. It is reasonably static and homogeneous to provide an absolute reference frame for all apparent interactions between 3D material bodies. Matter is inert and incapable of any actions or movements on its own. It is the 'inertial actions' (actions which invoke the property of inertia) of the 2D energy fields about a 3D material body, which move it. All apparent interactions between 3D matter particles/material bodies take place through the medium of 2D energy fields, which are in direct contact with every 3D matter particle in the universe. This avoids the illogical assumption of 'actions at a distance through empty space'.

Displacements of quanta of matter (including changes in their spatial dimensions) in the universal medium are tangible in a 2D spatial system. They constitute 'work-done' about a macrobody. Stress, produced in the latticework structure of 2D energy fields, by their deformations, is the 'energy' associated with the work done. Energy as such has no independent existence in any form. Rates of structural distortions (work), being introduced into a 2D energy field latticework, are the 'force' or 'power'. Ultimately, displacements of 3D material bodies in space (2D energy fields) are produced by the transfer of latticework distortions (while the 2D energy fields stay in the same place) from a higher distortion-density region to a lower distortion-density region in the 2D energy fields. 3D matter-particles of a macrobody are carried by structural distortions, being transferred, to create the motion of a macrobody.

Mechanical re-arrangement of quanta of matter in the 2D energy fields is an action (of an effort). Whichever is the manifestation of effort (gravitational, electromagnetic, nuclear, inertial, etc.), they all have only one type of mechanism and act in a similar manner. Thus, fundamentally, there is only one type of effort (natural force) in nature with different causes associated with each phenomenon. Force, due to the action of an effort on a 3D material body, is the rate of mechanical rearrangement of quanta of matter in the 2D energy fields, in and about a macrobody, with respect to the distance moved by the body during the action.

Fictitious forces (like centrifugal force, etc., currently called as inertial forces), invoked by an observer to maintain the validity of present theories and apparent forces related to different frames of reference, are not considered as real forces, in this concept. They serve for easier but irrational explanations and understanding of various phenomena.

Generally, 2D energy fields, which are real entities with objective existence in space, are steady and homogeneous in space. They can provide an absolute reference to any action in the universe. All explanations given below are related to actions in the absolute reference frame. All conclusions expressed in this article are taken from the book, 'MATTER (Re-examined)'. For details, kindly refer to the same.

Mechanism of inertial action:

The term 'inertial' is used to indicate a function that invokes the phenomenon of 'inertia'. Although 'force' is the rate of work, being introduced in association with a material body, it is used here in its general meaning as an effort or the cause of an action. Action of a force always presupposes the ability of the 'force-applying body' to move faster than the 'force-receiving body', in the direction of the force. In case the speed of the 'force-receiving body', in the direction of force, equals or exceeds the speed of the 'force-applying body', external force will not subsist anymore.

In a 3D spatial system, an effort (force) is recognized only by its inertial action on a 3D material body. Displacements of 3D matter-particles in space are necessary to create inertial actions. 'Inertial forces' are applied from outside a 3D material body. Structural distortions in the 2D energy field, produced by inertial efforts in and about a 3D material body, are invested from external sources, either by 'field-forces', by 'gravitational forces,' or by motion of external 3D material bodies towards it.

We shall consider the action of an inertial force on a 'force-receiving body' by a 'force-applying body'. 'Force-applying body' is assumed to be capable of moving faster than 'force-receiving body'. A direct interaction between two efforts in one plane is described in this article. Work done, about a macrobody, is the magnitude of additional structural distortions developed (in the two-dimensional entities of 2D energy fields) about the macrobody, and the force is the rate of its development. Work done, in each plane, can interact (directly) only with other work done in the same plane. Hence, efforts interact separately in each plane in the 3D spatial system.

As a 'force-applying body' approaches a 'force-receiving body', distortion-fields about the nearest 3D matter particles in both these bodies come within their interacting distance. 3D matter-particles of macrobodies tend to keep their relative distance between them. In the process, the 3D matter particles of the 'force-receiving body' are pushed away from the 3D matter-particles of the approaching 'force-applying body'. Movements of 3D matter-particles in the 'force-receiving body' create additional structural distortions in the matter-field of the 'force-receiving body'. Additional structural distortions received into the matter-field of the 'force-receiving body' are transferred in the direction of (approach of the 'force-applying body) application of the effort/force.

The speed of transmission of additional structural distortions (within a macrobody's matter field) depends on the rate of magnitude of additional structural distortions invested into the matter-field. In the 3D spatial system, only the inertial nature of the efforts can transfer tangible work from (the matter-field of) one macrobody to (the matter-field of) another. Inertial efforts may be transmitted at any speed (directly proportional to the magnitude of the effort) but at speeds less than the speed of light. The highest possible absolute speed in space is limited by the ability of macrobody's 3D matter-particles to maintain their integrity by avoiding local breakdown of the 2D energy field's latticework structure. Action of an inertial effort transfers additional structural distortions from the (matter-field of) 'force-applying body' to the (matter-field of) 'force-receiving body'. As there can never be a point-direct effort (because the matter-field of any 3D material body is extremely large compared to a latticework square of a 2D energy field), the explanation in the following section is only a hypothetical case where a point effort is considered to bear upon one or a few of the latticework squares of a matter-field.

Matter-fields of two macrobodies are differentiated by their locations, magnitudes, and directions of their individual 2D energy field-distortions, within their body dimensions. Taking a plane, passing through both macrobodies, it is the same 2D energy field through both macrobodies in this plane. Nevertheless, parts of this 2D energy field, within the confines of the border of each macrobody, are structurally distorted appropriately for the nature of each macrobody and its current state (of motion) and are parts of their matter-fields. Therefore, when it is said that a macrobody is under the action of an effort by another macrobody, it means that the additional structural distortions in the matter-field of the 'force-applying body' are brought to bear upon the additional structural distortions of the matter-field of another (force-receiving) macrobody. In the process, both matter-fields try to modify each other. They, being part of the same latticework structure in a plane, tend to share total additional structural distortions by mutual influence. When a macrobody is said to meet or collide with another macrobody, it is their matter-fields that meet or collide. 3D matter-particles or any material components of these macrobodies do not touch each other. Matter-field represents additional structural distortions in the 2D energy fields within and about a macrobody. A collision between matter-fields, depending on the strength of the collision between the macrobodies, transfers part of the additional structural distortions

in them to each other. Since no transfer of matter takes place, macrobodies' matter contents are not (usually) affected.

Intrinsic work in the matter-field of a macrobody consists of all structural distortions in the 2D energy field, required to sustain the integrity and stability of its 3D matter-particles and the macrobody as a whole. Additional work in its matter-field maintains the macrobody in its current and constant state (of motion). Macrobody's state (of motion) may be changed by introducing additional structural distortions into its matter-field from an external source. In this article, we shall ignore all structural distortions in the 2D energy fields required to maintain the integrity, stability, and current state of motion of the macrobody. We shall consider only those additional structural distortions in the 2D energy field, introduced by external sources to cause changes in the state (of motion) of the 'force-receiving macrobody'.

Every latticework square in a matter-field is deformed to the extent that is required for the stable existence of the macrobody. Introducing additional structural distortions from external sources changes the deformations already existing in the matter-field, correspondingly. Stress, developed in the arms of one latticework square of the 2D energy field, due to its deformation, transfers part of the deformation to the next square in front of it (in the direction of the effort). Similar actions are repeated forward, in sequence.

Because of the latticework structure of the matter-field, no single latticework square can be deformed or strained in isolation. Due to the interlinking nature of the construction of squares in the 2D energy field latticework, structural distortion in a latticework square is automatically transferred and shared by the neighboring latticework squares in the same plane. Additional structural distortions, introduced by an effort acting on any part of the 2D energy field, are progressively absorbed by the latticework squares of the macrobody's matter-field, allowing them to be strained and distorted. Latticework square, nearest to the point of application of the effort, is distorted by the highest magnitude, latticework square next in front is distorted to a lesser degree, latticework square next in front is distorted to still lesser degree, and so on. This is how a distortion-field, created by an inertial effort, is transmitted through a 2D energy field. Relative displacements of quanta of matter in a 2D energy field deform its latticework structure. In fact, it is the structural distortions in the 2D energy field, containing the additional work, that are transmitted, and not the 2D energy field latticework square itself. A latticework square moves only so much as required to store the additional work of its share. The rest of the additional work is transferred to the next latticework square in front and so on. During the transmission of a distortion-field, each square of a 2D energy field latticework absorbs part of the additional work done by remaining in a structurally distorted condition to a certain degree and passing on the rest of the structural distortion to subsequent latticework squares. They become free to return to their stable condition only on the removal of the 'force-applying mechanism' (or its action). As the additional structural distortions (received by a matter-field) progress in the direction of effort, the 2D energy field and its latticework squares remain in place in space. Although a macrobody is displaced with respect to the absolutely steady 2D energy fields, there is no relative motion between them that may produce resistance to the macrobody's motion. This is because 2D energy fields themselves are instrumental to the macrobody's displacement. In this article, wherever transmission of effort is mentioned, it is to be understood in these terms.

Since a 2D energy field extends only in one plane, no distortion-field can be transmitted directly into the third dimension of the 3D spatial system. Transmission of a distortion-field is restricted to the plane of the corresponding 2D energy field. A 3D matter-particle simultaneously occupies gaps in many 2D energy fields (3D space) in the same location. A distortion-field, acting on a 3D macrobody in a plane, moves its 3D matter-particles. The 3D material body (being three-dimensional) produces structural distortions during its motion in all 2D energy fields occupied by it. In this way, a distortion-field in one 2D energy field may be transferred or transmitted to other 2D energy fields, indirectly. An effort (presumably) acting, through the medium of 2D energy fields, on a 3D matter-particle has its components in one or more of 2D energy fields in planes occupied by the particle. Each 2D energy field transmits a distortion-field only in its plane. Such actions by various 2D energy fields, occupied by the 3D matter-particle, together, produce a straight-line transmission of distortion-fields (associated with 3D material bodies) in the 3D spatial system.

Consider an example of a moving macrobody 'A' coming in contact with a static macrobody 'B'. It is their matter-fields, which are contacting and not their 3D matter-particles. The matter-field of a macrobody has enough and the required additional structural distortions in it, to maintain its current state of motion, in addition to the distortion-fields required to maintain stability and integrity of its 3D matter-particles and the macrobody as a whole. Motion of macrobody 'A', as a whole, is produced by the additional structural distortions in its matter-

field, introduced by an external effort. Additional structural distortions, which produce a macrobody's motion, are over and above the natural (intrinsic) distortion-fields existing in its matter-field. These additional structural distortions are transferred at a constant speed through the matter-field of the macrobody, thereby transferring the matter-field itself through the 2D energy fields in space. As these additional structural distortions are transferred through the space, the macrobody bearing them in its matter-field achieves translational motion in the same direction.

As soon as the moving macrobody 'A' encounters a static macrobody 'B', 3D matter-particles of macrobody 'A' experience restriction for their forward motion. However, additional structural distortions in the matter-field of macrobody 'A' (in 2D energy fields) tend to move at the original constant speed of the moving macrobody 'A'. Parts of additional structural distortions, in line with the 3D matter-particles of macrobody 'B,' are prevented from moving at the original speed by the necessity to carry the 3D matter-particles with them. Due to the latticework structure of 2D energy fields, additional structural distortions, which are in line with the inter-particles space, are also held back by the additional structural distortions, which are required to carry the 3D matter-particles. There is no other restriction for the motion or transfer of the additional structural distortions (in 2D energy fields) in the macrobody 'A' to move into the macrobody 'B'. Thus, depending on various other factors, the whole or part of the additional structural distortions in the matter-field of the macrobody 'A' are transferred into the matter-field of macrobody 'B'. The rate of this transfer depends on the ability of the macrobody 'B' to move at a linear speed corresponding to the additional structural distortions transferred into its matter-field.

If the whole of the additional structural distortions in the matter-field of macrobody 'A' are transferred into the matter-field of macrobody 'B', macrobody 'A' will come to a halt, and the macrobody 'B' will start to move, carrying the additional structural distortions with it. Whole of (kinetic) energy (stress), due to the additional structural distortions, that produced the motion of macrobody 'A', is now transferred to the matter-field of macrobody 'B'. Assuming the 3D matter contents of both macrobodies are equal, the matter-field of macrobody 'B' will gradually stabilise to move the macrobody 'B' at a constant speed, which is equal to the original linear speed of macrobody 'A'. For partial transfer of the additional structural distortions (or for macrobodies of different 3D matter contents), both the macrobodies will behave correspondingly. Here, the macrobody 'A' is the 'force-applying body' and the macrobody 'B' is the 'force-receiving body'.

If the effort from a 'force-applying body' is able to act on a 'force-receiving body', both of their matter-fields are modified. Normally, we consider only those modifications in the matter-field of the 'force-receiving body' unless we are taking the reaction also into deliberation. In case macrobody 'B' produces certain changes in the magnitude of additional structural distortions in the matter-field of macrobody 'A' due to their relative speed, macrobody 'A' also starts to move. If such a motion is in the opposite direction, it is considered to be due to a reaction to the original effort. The reaction, corresponding to the action of effort and responsible for this motion, is called a reactive effort/force.

Additional structural distortions (strain), received into the matter-field of the 'force-receiving body', are 'work-done,' and the stress developed due to the strain is the energy received. Reduction in the additional structural distortions in the matter-field of the 'force-applying body' is 'work undone,' and the stress reduced in its matter-field is the energy lost. 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 usually equal in magnitude. In normal cases, the energy lost by the 'force-applying body' is equal to the energy gained by the 'force-receiving body'. Work done in the matter-field of the 'force-receiving body' is due to the action of an 'applied effort', and alteration in the matter-field of the 'force-applying body' is due to the action of the 'reaction'. 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, the action is equal to the reaction. The direction of resultant additional structural distortions in the matter-field of 'force-receiving body' and the body's inertial displacement is along the direction of the original effort. The direction of resultant additional structural distortions in the matter-field of the 'force-applying body' is opposite to the direction of the original effort. Here, a change of direction indicates a reduction in the magnitude of the original additional structural distortions.

State (of motion) of a macrobody depends on the distortion-density of the additional structural distortions (other than those 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 additional structural distortions from an external source into a matter-field and their stabilization within the matter-field of a macrobody takes time. This time delay and the ability of additional structural distortions to maintain constant speed of a macrobody give rise to the property of 'inertia', which is presently attributed to the body's mass (representing its 3D matter content). Inertia is a property of the associated matter-field of a macrobody (2D energy fields). The 3D matter content of a body is inert. It is the associated 2D energy fields that produce all apparent actions/interactions, presently attributed to 3D material bodies.

Once a certain magnitude of additional structural distortions is introduced into the matter-field of a macrobody, it remains permanently within the matter-field and continues to keep the macrobody in its current state (of constant motion) indefinitely, until the additional structural distortions are lost or removed (neutralized by additional structural distortions in the opposite direction) by an external effort. Since additional structural distortions (introduced by an external source and moving 3D matter-particles) in a matter-field are associated with 3D matter-particles, the speed of their transfer is limited by the magnitude of additional structural distortions. Hence, a macrobody may move at any speed, lower than the maximum permitted speed by 2D energy fields (less than the speed of light). As the speed of a macrobody approaches the speed of light, constituent 3D matter-particles of the macrobody break down to inferior particles, until the speed reaches the speed of light. At the speed of light, only photons (from the macrobody) can survive. Beyond this speed, no 3D matter-particle can be moved. This limits the speed of 3D material bodies in space to less than the speed of light. Gradually, even the photons revert to quanta of matter in the 2D energy fields. Continuous recycling of matter between 3D macrobodies (where the entropy increases) and 2D energy fields (where high order is maintained) keeps the entropy of the universe within limits. The total magnitude of matter, in the form of 3D macrobodies in the universe, varies cyclically.

Additional structural distortions in the matter-field of a 'force-receiving body' deform the latticework squares of its matter-field in the direction of the effort. As additional structural distortions, causing a macrobody's constant linear motion, are stored permanently in its matter-field, the matter-field as a whole is effectively compressed and deformed. Space, occupied by the macrobody's matter-field, in the direction of linear motion of the macrobody, shortens with corresponding enlargements in planes perpendicular to the direction of the macrobody's linear motion. Hence, a macrobody contracts in the direction of its linear motion (similar to 'Lorentz contraction' of a moving body) and expands in planes perpendicular to the direction of its linear motion. The magnitudes of changes in the macrobody's dimensions are proportional to its linear speed.

Inertia is a property of 2D energy fields, produced due to their latticework structure. Apparent attraction due to gravitation is the product of the difference in the extents of 2D energy fields on opposite sides of 3D material bodies in a pair. Both these phenomena have nothing to do with the mass of a macrobody, which is a mathematical relation between an external effort on a macrobody and its acceleration. Hence, differentiation into gravitational mass and inertial mass is arbitrary.

Forces are mathematical relations between work, introduced into a macrobody's matter field, and the macrobody's linear displacement in space, during the action of effort. Forces, being functional entities, cannot interact. Interaction between two forces means superimposition of additional work, introduced by one effort in a macrobody's matter-field, on the additional work, introduced by another effort or additional work, already existing in association with the macrobody. Work done is nothing but additional structural distortions introduced into the matter-field of a macrobody. Hence, interaction between two efforts indicates modifications to the additional structural distortions in a macrobody's matter-field and corresponding changes in their inertial properties, both in magnitude and direction. Since a 2D energy field is confined to its plane, the action of an effort in each plane is confined to the plane of the 2D energy field. Additional structural distortions (work) introduced by two or more efforts in the same plane may produce a resultant work.

A macrobody exists in a three-dimensional spatial system. Actions of efforts in each of the planes, passing through the macrobody, are separate and independent of their actions in other planes. The resultant of inertial actions on a macrobody in different planes depends on the combination of all actions in different planes. Linear efforts, acting in different directions on a macrobody, not only produce linear motions of the macrobody, but they also may cause couples of forces, causing torque on the macrobody. Therefore, we shall consider interactions between two coplanar concurrent linear efforts, acting on a macrobody in two separate cases. In

one case, the linear efforts are coplanar and act along the same straight line (co-linear). We shall analyse additional structural distortions in the (matter-field) 2D energy field of the plane of action. In the second case, linear efforts are coplanar but act in different directions. For convenience, we shall resolve one or both of these efforts with respect to a reference and consider the resolved parts of the efforts as acting in perpendicular directions in the same plane. Separate inertial actions on 3D matter-particles of the macrobody, in perpendicular directions in the same plane, combine to produce resultant inertial motion of the macrobody.

Coplanar ‘forces’:

The thickness of a plane in a 3D spatial system is so minute that it cannot be represented in three-dimensional measurements. Efforts act through 2D energy fields, which are two-dimensional. Hence, it is practically impossible for a 2D effort to be represented in a 3D spatial system. An effort in a 3D spatial system is a combination of efforts in many planes, simultaneously acting in as many 2D energy fields. In this paragraph, we shall deal with components of efforts in one plane only. Depending on the angular difference between directions of actions, coplanar concurrent efforts or their resolved components may be further classified into three classes: unidirectional efforts, opposing efforts, and efforts in perpendicular directions.

Unidirectional ‘forces’:

‘Unidirectional efforts’ include efforts or their resolved parts, applied in the same direction. Usually, the magnitudes of two external unidirectional efforts, acting on a macrobody, are algebraically added to find their resultant. However, this gives the correct results only in a few cases. The magnitudes of efforts depend on their ability to cause acceleration of identical macrobodies. A greater effort relates to a higher magnitude of work and a greater speed of the ‘force-applying body’. This will correspond to a higher magnitude of additional structural distortions introduced into the matter-field of a macrobody and a greater speed of their transfer.

Let there be two external unidirectional efforts applied to a macrobody. Both of them tend to introduce corresponding additional structural distortions into the macrobody’s matter-field. The larger of the two efforts introduces greater and faster-moving additional structural distortions. These additional structural distortions push the macrobody’s 3D matter-particles to move the macrobody at an acceleration provided by the greater external effort. A smaller external effort also tries to introduce additional structural distortions into the matter-field of the macrobody. However, additional structural distortions by the smaller external effort are unable to form in the matter-field, because of the faster motion of additional distortions in the matter-field’s latticework structure, already developed by the greater external effort. Thus, in cases where two co-linear efforts are simultaneously applied to a macrobody, only the greater effort is able to act on the macrobody.

The only condition under which both of the two co-linear, unidirectional, external efforts can act on a macrobody is when they are exactly of equal magnitude in the same direction. This is possible only when both ‘force-applying’ bodies are moving at the same linear speed, in the direction of the efforts. ‘Force-applying’ bodies share total effort on the ‘force-receiving’ macrobody. Equal magnitudes of structural distortions are invested by both efforts. The action of an effort is related to the speed of the ‘force-applying mechanism’. In order to apply equal efforts, their ‘force-applying mechanisms’ have to move at equal speeds. It is like two horses pulling a cart. The effort to pull the cart is shared equally by the horses only when they are moving at the same speed and in the same direction. There can be no relative motion between the horses. Should they differ in their speeds of motion, a relative motion between the horses develops, and the whole of the effort to pull the cart is taken up by the faster-moving horse. The result is that though both horses are applied to the cart, only the faster-moving horse is acting to pull the cart. Effort, put in by the faster-moving horse, is used to do the work, and the slower-moving horse does not put in any work.

The highest possible speed of movements of quanta of matter in a 2D energy-field latticework structure corresponds to the critical linear speed of a photon (light). Hence, the highest linear speed at which 2D energy-field distortions can be transferred in a linear direction is the linear speed of light. This linear speed, V_{\max} , corresponds to the highest linear speed at which a 3D material body can be moved through space. If a 3D material body is already moving at linear speed V_{\max} , no external effort in the direction of its linear motion can act on it. For an external effort to be fully effective, the 3D material body has to be (absolutely) static in space and with respect to the ‘force-applying mechanism’.

Knowing the magnitude and direction of an external effort, acting on a 3D material body, alone is not sufficient to find the ‘resultant magnitude’ of additional work invested in its matter-field (resultant effort acting

on the body). Linear speed of ‘force-receiving body’ with respect to absolute reference (universal medium) is also required to be taken into consideration. The efficiency of action of an effort, h , depends on the highest possible speed, V_{\max} , in the universal medium and the present absolute linear speed, V , of the ‘force-receiving body’.

$$\text{Efficiency of an effort, } \eta = \frac{(V_{\max} - V) \times 100}{V_{\max}} \%$$

The speed or ability of the ‘force-applying mechanisms’ to act on the ‘force-receiving body’ also needs to be considered. An effort can exist only when the ‘force-applying body’ is capable of moving faster than the ‘force-receiving body’.

The efficiency of an external effort is highest (100%) when the absolute linear speed of the ‘force-receiving body’ in the direction of effort is zero. The efficiency of an external effort is zero, or it is unable to act on the ‘force-receiving body’, when the absolute linear speed of the ‘force-receiving body’ in the direction of effort becomes equal to the highest possible speed (in the direction of motion) in the universal medium. This fact gives rise to the phenomenon of relativistic mass. As the absolute linear speed of the ‘force-receiving body’ approaches the linear speed of light, in the direction of effort, the efficiency of external effort to act on a 3D material body is greatly reduced. This reality is misinterpreted to show that energy (an undefined functional entity) presumably invested by the ‘force-applying body’ is converted into mass (a functional entity, defined as a mathematical relation between eternal force and acceleration of a 3D material body), which represents matter content of the 3D material body. This assumption justifies the disproportionate acceleration of a 3D material body, moving at a very high linear speed, due to an external effort. That is, an external effort cannot accelerate a 3D material body according to the mathematical equation that describes the relation between external effort and acceleration at the 3D material body’s low linear speeds.

The relative speed between the ‘force-applying body’ and ‘force-receiving body’ also affects the efficiency of the external effort. Usually, the ability of the ‘force-applying mechanism’ to move faster than the ‘force-receiving body’ is always presupposed. Inability of ‘force-applying mechanism’ to move faster than ‘force-receiving body’ greatly reduces the efficiency of the external force on a 3D material body. Only a faster-moving ‘force-applying mechanism’ can distort latticework squares of matter-field of ‘force-receiving body’ and thus invest work into its matter-field. A ‘force-applying mechanism’ is able to act on a ‘force-receiving body’ only until its ability to move equals the linear speed of the ‘force-receiving body’. Even if both ‘force-receiving body’ and ‘force-applying body’ move at the same linear speed (zero relative speed) during the action of external effort, the ‘force-applying mechanism’ is capable of pressing into the ‘force-receiving body’ without causing any change in the linear speed of the ‘force-receiving body’. Since ‘force’ is the rate of work done, as and when the ‘force-applying mechanism’ becomes incapable of doing work, external force does not exist anymore.

Opposing ‘forces’:

‘Opposing efforts’ include efforts or their resolved parts, applied in the opposite directions on a 3D material body. This condition develops when a macrobody is acted upon by two equal but opposite external (inertial) sources. In case their magnitudes are unequal, actions of equal components of both inertial actions constitute ‘opposing efforts’ and act as given below. Surplus magnitude of one of the inertial actions can be considered as an independent action of an effort, acting/applied on the macrobody.

Equal and opposite components of both the external efforts act on the macrobody to introduce equal magnitudes of additional structural distortions into the matter-field of the macrobody. External efforts, being in opposite directions, introduce additional structural distortions into the macrobody’s matter-field, which are also in opposite directions. Both sets of additional structural distortions overlap each other, and being equal and opposite, neutralize their translational actions on each other, within the matter-field. Additional translational structural distortions introduced in one direction are nullified by additional translational structural distortions introduced in the opposite direction. This phenomenon is the neutralization of ‘forces’. This does not mean that the structural distortions or the energy developed by them are nullified. Latticework squares of the macrobody’s matter-field are compressed, against reaction from within, from both sides, to distort them. Latticework squares change shapes to parallelograms. Additional structural distortions, in the latticework squares, store energy in the form of (compressive) pressure energy within the macrobody’s matter-field. Total additional structural distortions in the matter-field are not translational, but they become compressive. This does not change the state

(of motion) of the macrobody, and the macrobody maintains its state of rest or constant motion, irrespective of the stored pressure energy.

Additional structural distortions in the macrobody's matter-field, introduced from opposite directions, tend to compound each other. Additional structural distortions in each plane, containing the directions of efforts, increase. The macrobody suffers a reduction in its length in the directions of efforts, and the macrobody enlarges in directions perpendicular to the directions of efforts. Should the expansion of the macrobody in the perpendicular direction be restricted for any reason, external efforts are unable to structurally distort the latticework squares of the macrobody's matter-field, as required. Instead of creating angular structural distortions of quanta of matter in their respective 2D energy field, additional work appears in the form of compression of quanta of matter (in the latticework structure of matter-field) to reduce their lengths against their inherent nature to lengthen outward. Thus, effort is now utilized to store work within the quanta of matter in the form of pressure energy. The macrobody develops internal pressure within the quanta of matter as well as in the latticework structure by quanta of matter in inter-particle spaces. A macrobody may develop internal pressure only when its expansion due to opposing external efforts (in the direction perpendicular to the direction of the external efforts) is restricted by any means. This phenomenon is the 'compression' of a macrobody.

In case of mutual neutralization of translational motions by opposing efforts, while they are continuously and simultaneously acting on a macrobody, opposing efforts cease inertial actions on the macrobody, after its matter-field develops sufficient reaction to oppose both external efforts. External efforts are no longer able to introduce additional structural distortions into the macrobody's matter-field after sufficient reaction has developed during the initial stage. External forces (rates of work done) on the macrobody cease to exist, despite continuous action by external efforts. External efforts continue to act against the reaction from the macrobody's matter-field to sustain compression of the macrobody. Hence, no displacement of the macrobody or quanta of matter in its matter-field can be produced after the initial period of development of reaction within the macrobody's matter-field. Additional work done, transferred into the macrobody's matter-field during the initial stage of action, is stored within the matter-field, and it is exhibited as internal pressure of the macrobody and associated pressure energy. The matter-field of the macrobody remains additionally (structurally) distorted as if compressed by the external efforts. Hence, two equal and opposite external efforts applied to a macrobody are able to compress the macrobody, rather than producing linear inertial motion of the macrobody. Under these conditions, no force is generated from efforts after the initial stage. However, work done and corresponding energy remain stored in the macrobody's matter-field, even without the macrobody's translational motion in space.

Length of a compressed macrobody, in the direction of opposing external efforts, is reduced. Since no force is generated after the initial period of stabilisation, we may say that external efforts on the macrobody remain 'being applied' and they are inactive after the initial period of compression. This state of the macrobody may be considered as a neutral state (of motion) for the efforts. Forces may develop, or efforts may act to do additional work on the macrobody again, only when the internal pressure within the matter-field is varied for any reason, and deformation of the matter-field's latticework is permitted again. Though efforts applied to the macrobody seem to neutralize each other, as long as they are applied, the macrobody is in a different state of internal pressure. This is not a usually accepted change in the state of the body. Hence, only further actions of the efforts are considered neutralized. The work already put into compressing the body remains within the macrobody's matter-field.

However, compression of a macrobody causes some other changes in its constitution other than changes in its volumetric dimensions. During compression of a macrobody, its constituent atoms/molecules are pushed nearer. The density of inter-atomic/molecular distortions in the macrobody's matter-field increases. An increase in distortion-density in the inter-atomic/molecular space in a macrobody is experienced by every 3D primary matter particle ('biton') of the macrobody as external pressure on it. External pressure on a 3D primary matter particle causes its volumetric expansion. Volumetric expansion of 3D primary matter particles in a macrobody enhances internal pressure within the macrobody's matter-field and causes 3D primary matter particles to discard constituent quanta of matter from their photons' 3D matter-cores. If discarded quanta of matter are freed at an adequate rate and in sufficient quantity, they form photons, to be radiated from the region of their creation, in the form of heat or light radiation. The macrobody appears to be heated up during its compression. This phenomenon is the basis of radiation from very large cosmic bodies under gravitational collapse. Assumed nuclear fusion on these bodies is unnecessary for radiation from them. As and when compression of a macrobody

is relieved, its 3D primary matter particles will return to their original sizes by accepting quanta of matter from the surrounding 2D energy fields. This process is the cooling.

If the magnitudes of inertial efforts, acting on a macrobody in opposite directions in the same straight line, are different, the resultant inertial effort on the macrobody that may produce its translational motion is equal to the algebraic sum of the efforts, and its direction is the same as that of the greater effort. The resultant effort will produce appropriate force on the macrobody.

‘Forces’ in perpendicular directions:

Generally, different efforts applied at a point on a macrobody may have an angular difference between their directions. In order to find their resultant action, it is convenient to resolve forces generated by them into perpendicular components with respect to a common reference. For example, we may analyse two concurrent coplanar efforts acting in perpendicular directions with respect to each other.

Due to the latticework structure of 2D energy fields, a distortion-field in it, even if it is of angular (or radial) nature, is transmitted only in a straight-line direction. If there is more than one external effort acting on a macrobody, additional structural distortions invested by each of them are transmitted in the direction of the force generated. The macrobody is moved in the resultant direction of the forces due to the combination of additional structural distortions. Motion of the macrobody in the resultant direction necessitates that the macrobody move in a different direction from the directions of all external efforts on it. Additional structural distortions introduced into the macrobody’s matter-field cannot change their directions of transfer. Additional structural distortions due to the external efforts and the macrobody move in different directions. Hence, as and when the macrobody moves out of line with the direction of transfer of additional structural distortions by external efforts, the corresponding magnitude of additional structural distortions is lost from the matter-field of the macrobody, into the space. Additional structural distortions, remaining in the matter-field of the macrobody, are only those required for the macrobody’s steady state of motion in the resultant direction. These are composed of residue from the additional structural distortions invested by the efforts and/or additional structural distortions created by the displacements of macrobody’s 3D matter-particles in the resultant direction. This is the reason why the momentum of a macrobody, moving in a circular path, is maintained constant irrespective of the constant action of an external (centripetal) effort on it. This phenomenon also helps to move a planetary body at a constant radial velocity (in addition to its linear velocity), irrespective of its continuous and constant radial acceleration (in the case of circular orbits) under a ‘central force’.

Consider a macrobody moving in a straight line at a constant linear speed. It is moving under the inertial actions by 2D energy fields. Macrobody will continue to move at its (steady) state of motion until acted upon by an external effort. Let an external effort act on the macrobody in a direction other than its direction of motion. External force, generated, may be resolved (analytically) into two components. A component of external force, in direct assistance or opposition to the inertial actions of the macrobody’s matter-field, modifies the macrobody’s (linear) inertial actions.

Component of the external force, in perpendicular direction to the inertial motion of the body, has no effect on the present (linear) inertial action of the macrobody’s matter-field. However, it will introduce its own inertial actions in the macrobody’s matter-field by investing additional structural distortions, at right angles to the present (linear) inertial action. Additional structural distortions, introduced by the (component of) external effort in perpendicular direction, modify additional structural distortions already existing in the matter-field of the macrobody. 3D matter-particles of the macrobody modify their direction of motion corresponding to the present status of the additional structural distortions. The macrobody modifies its course of motion to the resultant of these two inertial actions.

Resolution of a force into components at right angles to each other is a mathematical operation. In actual cases, this does not happen. Each force introduces its own inertial actions into the matter-field of a macrobody, in its own direction. 3D matter-particles of the macrobody are susceptible to the additional structural distortions from both sources (forces). Initially, 3D matter-particles and the macrobody tend to move as dictated by both efforts. Before long, as the macrobody shifts away from its original line of motion, it loses additional structural distortions in its matter field that are producing the inertial actions from both efforts. From then onwards, 3D matter-particles of the macrobody are influenced by the resultant additional structural distortions generated and contained within its matter-field due to the displacements of 3D matter-particles in

the resultant direction. As the line of motion of the macrobody moves away from the directions of action of external efforts, additional work (structural distortions) introduced due to the efforts, to move the macrobody in the original directions, are gradually lost from the macrobody's matter-field into space (universal medium). Appropriate additional structural distortions in its matter-field are being re-created to provide inertial actions to the matter-field of the macrobody in its new (resultant) direction.

Additional work invested in the matter-field of a macrobody takes a certain time (inertial delay) to stabilize itself and provide the macrobody with a constant linear speed. This is true even after the external effort is terminated. Additional work, introduced in the matter-field of the macrobody and not yet stabilized before the termination of external effort, continues the stabilization in the normal course of time. In other words, a macrobody remains under the action of an external effort (acceleration/deceleration) even after the effort (producing the external force) is removed until the inertial delay period is completed. The acceleration/deceleration stage will continue until all additional work (introduced due to external force) has stabilised in its matter field and the macrobody has attained its final constant linear velocity.

Let us consider a linearly moving macrobody under the action by an effort of a constant magnitude in a perpendicular direction to the macrobody's linear motion. External effort introduces additional structural distortions into the macrobody's matter-field at a constant rate. Force (rate of resulting additional work introduced into the macrobody's matter-field) is of constant magnitude. Because of this additional work, the macrobody's direction of motion is changed at a constant rate. At any instant, due to a change in the macrobody's direction of motion, a certain part of the original additional structural distortions (producing the macrobody's linear motion) is lost from the macrobody's matter-field. Simultaneously, additional structural distortions are introduced into the macrobody's matter-field at a constant rate due to the external effort. However, as the macrobody moves forward, these additional structural distortions, which are moving in a perpendicular direction, are soon lost from the macrobody's matter-field. Additional structural distortions due to the external effort affect the displacement of the macrobody only during their presence within the matter-field of the macrobody. Every instant, new additional work is invested into the matter-field of the macrobody, and an equal magnitude of additional work is lost from the matter-field of the macrobody. Hence, the linearly moving macrobody will accelerate in a perpendicular direction at a constant rate and simultaneously move at a constant velocity in a perpendicular direction. Irrespective of the macrobody's constant acceleration in a perpendicular direction, it also has a constant velocity, over and above its constant linear velocity.

Let the perpendicular external effort on a linearly moving macrobody cover the whole of its area (in the direction of effort) rather than act on a point on the macrobody. (e.g., an effort like gravitational attraction). Since the macrobody is moving at a constant linear speed, the magnitudes of additional structural distortions present in any plane perpendicular to the line of its motion will be different. Let us consider the macrobody as a combination of a great many slices in as many planes perpendicular to the line of its motion. Each slice contains parts of 3D matter particles in that plane.

At any instant, the matter-field in the most forward plane, perpendicular to the line of the macrobody's motion, will receive new additional structural distortions. Forward displacement of the macrobody carries its 3D matter-particles, but structural distortions of the matter-field remain in the same plane. As soon as 3D matter-particles in this plane move forward, they lose actions due to all the freshly introduced additional structural distortions in the plane of their previous existence. In the next instant, the plane of their current existence will receive fresh additional structural distortions. The plane behind the forward-most plane will also receive an equal magnitude of new additional structural distortions. However, this plane already has additional structural distortions received during the previous instant in the forward-most plane. In this way, magnitudes of additional structural distortions in each plane of the macrobody's matter-field gradually increase towards its rear end. Hence, the density of additional structural distortion, in any plane containing the direction of linear motion, will be greater towards the rear of the macrobody.

A gradual increase in additional work in planes perpendicular to the line of the macrobody's motion, towards the rear end of the macrobody, causes a corresponding increase in the displacement of 3D matter-particles associated with these planes. In other words, in the same period, displacements of 3D matter-particles in different planes of the macrobody (towards its rear) increase. These uneven displacements amount to a shift in the centre of action of the effort (and centre of gravity/centre of mass of the macrobody) to the rear. Part of an effort, acting away from the centre of gravity of a free body, forms a couple about the body's centre of gravity. Shift in the centre of action of the effort to the rear tends to rotate the macrobody about its

centre of 3D matter content (geometrical centre, in case of homogeneous macrobody), in addition to its linear motion. This phenomenon is the cause of spin motions of celestial bodies in many-body systems.

Rotary motion:

Structural distortions in 2D energy fields move in straight lines, separately in each of the spatial planes. Rotary motion of a macrobody is produced by linear motions of body parts in different directions at different linear speeds. If constituent 3D matter-particles of a macrobody are moved away (by another external effort) from the linearly moving additional structural distortions in its matter-field, linearly moving additional structural distortions will be lost from the macrobody's matter-field into space, and the macrobody will stop responding to the lost additional structural distortions.

The ability of 3D matter-particles in a macrobody to keep their relative positions, while having their natural motions unhindered, determines the macrobody's physical state and integrity. In an integral solid macrobody, all constituent 3D matter-particles tend to keep their relative positions. If a certain point in a solid macrobody is held static (in any reference frame), that point becomes a fulcrum or a reference point for all external efforts on the macrobody (in that reference frame). An external effort on the macrobody, whose direction of action is displaced (perpendicularly away) from a static reference point in the macrobody, forms a couple about the reference point. The action of the effort introduces linearly moving additional structural distortions into the macrobody's matter-field. 3D matter-particles in the macrobody, which are in line with the moving additional structural distortions in the matter-field, tend to be carried along with the moving additional structural distortions until additional structural distortions leave the border of the macrobody.

Due to the integrity of the macrobody, these 3D matter-particles are unable to have relative motion with respect to other 3D matter-particles of the macrobody, which are situated away from the moving additional structural distortions. Displacement of 3D matter-particles in the region of the moving additional structural distortions is possible only with certain displacements of other 3D matter-particles, situated away from the region of the moving additional structural distortions. Inter-atomic/molecular adhesion between 3D matter-particles of the macrobody helps them to have identical motion with respect to a static reference point. While doing so, it becomes necessary for all 3D matter-particles to maintain their distance from the static point of reference in the macrobody and remain constant in relation to each other. This creates a rotary motion of the macrobody about the static reference point. Displacements of 3D matter-particles in the macrobody create fresh additional structural distortions in its matter-field to maintain the rotary motion of the macrobody, even after the loss of original additional structural distortions, which initiated the rotary motion.

In a free macrobody, its centre of 3D matter content (centre of rest mass) acts as a fulcrum for all external effort on it, whose direction of action is displaced perpendicularly from its centre of 3D matter content. These external efforts produce both linear and rotary motions of the macrobody.

Conclusion:

The action of an effort is a simple mechanical rearrangement of quanta of matter in a macrobody's matter-field. The magnitude of structural distortions in a macrobody's matter-field is the work associated with the macrobody. The (rate of) additional work done, with respect to the displacement of the body during an action, is the force. All efforts, irrespective of their origin, are recognized by inertial action on 3D material bodies in the 3D spatial system. 2D energy fields, being two-dimensional, the actions of efforts in each 2D energy field are independent of their actions in other planes.

Variation in the efficiency of an external effort to accelerate a linearly moving macrobody, as its linear speed approaches the speed of light, causes 'relativistic mass'. Actions of opposing external efforts on a macrobody, whose matter-field is restricted from expansion in a perpendicular direction to the external efforts, compress the macrobody. During compression of a macrobody, its 3D matter-particles discard quanta of matter from the 3D matter-core of their constituent photons. This process is the heating. Discarded quanta of matter form new photons to be radiated away. This mechanism produces heat, light, and other radiation from stars during gravitational collapse. During the decompression of a macrobody, its constituent photons accept quanta of matter from the surrounding universal medium. This process is cooling.

Two efforts with an angular difference, acting in the same plane on a macrobody, produce the macrobody's inertial straight-line motion in the resultant direction by creating an appropriate magnitude of additional

structural distortions in the resultant direction. A perpendicular force of constant magnitude on a linearly moving macrobody simultaneously produces constant acceleration and constant velocity of the macrobody in a perpendicular direction, irrespective of the macrobody's constant linear motion. Momentum of a macrobody, moving in a circular path, is kept constant (irrespective of continuous action by the centripetal effort) due to loss of work from the matter-field of the macrobody at a constant rate.

Uneven distribution of work done by an external effort, in perpendicular direction, on a linearly moving free macrobody causes the macrobody's spin motion in addition to its linear displacement in perpendicular direction. This phenomenon causes the planetary spin.

Inertial delay is applicable even during the termination of external effort on a macrobody.

References:

References are self-published by the author. They are neither reviewed nor edited.

[1] Nainan K. Varghese: *MATTER (Re-examined)*,

Vol I - <https://www.amazon.com/dp/1492241865> ,

Vol II - <https://www.amazon.com/dp/1492241881> .

[2] Nainan K. Varghese: *ARTICLES*, <http://www.matterdoc.in/articles/>

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