

INERTIA

(According to “Hypothesis on MATTER”)

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Abstract: Inertia is a phenomenon, which causes all macro bodies to respond sluggishly to external moving efforts. Matter bodies are inert and they have no ability to act or oppose external moving efforts. However, since no other entity that can prevent instantaneous effects on matter body by external effort is known, the phenomenon of inertia is attributed to matter itself, in negative sense. Phenomenon of inertia rightly belongs to the universal medium, which encompasses all 3D matter bodies in the entire universe. Only when the mechanisms of (action of force and) motion of matter bodies are understood, nature of inertia will be clear. All actions in nature are understood by inertial motions of 3D matter bodies. Motion is the result of work-done about a body. Force is the rate of work-done. Force being a mathematical concept, all natural forces are similar. Classifying natural forces, according to their manifestations, should not make any difference in their nature or actions.

Keywords: Inertia, universal medium, force, photon.

Introduction:

“Hypothesis on MATTER” advances a revolutionary new concept, which explains all physical phenomena based on just one type of (postulated) basic particle - the Quantum of matter. These particles form latticework structures called ‘2D Energy Fields’. 2D energy fields extend in all directions to fill the entire space and thus creating an all-encompassing universal medium. Author explains wide array of physical phenomena in the book; from the mechanism of actions to inertia, from the origin of 3D matter to gravity and from subatomic interactions to cosmological events, based on the simple mechanical interactions of quanta of matter. There is no more any need to envisage ‘actions at a distance’ or to invoke irrational assumptions like diversity of forces, mass-energy equivalence, constancy of light's speed, dual nature of electric charge, singularities, big bang, etc. This new concept will radically alter our understanding of the physical universe and at the same time, explain complex physical phenomena with simple ‘Cause and Effect’ relationships.

All conclusions, expressed in this article, are taken from the “Hypothesis on MATTER” [1]. For details, kindly refer to the same.

Inertia:

By the law of inertia, deduced from his experiments with balls rolling down inclined planes, Galileo was able to explain how it is possible that if the Earth is really spinning on its axis and orbiting (*about*) the Sun, we do not sense that motion. Since we are in motion together with the Earth, and our natural tendency is to retain that motion, the Earth appears to us to be at rest. Newton's first law is known as the principle of inertia. According to this law, depending on its initial state of motion ‘a body with no net force acting on it will either remain at rest or continue to move with uniform speed in a straight line’. Distinction between

states of rest and uniform motion in a straight line is only superficial. They may be regarded as the same state of motion seen by different observers; one moving at the same velocity as the moving body, the other moving at constant velocity with respect to the moving body. [No body can remain static in space]. We may historically consider that this principle of inertia is the starting point and a fundamental assumption of classical mechanics. No logical cause or mechanism of action could be provided for this peculiar behavior of matter bodies. Hence, this behavior was simply assumed to be a property of the most obvious entity that could be observed – the matter.

Inertia is an observed tendency of matter bodies. Matter bodies appear not to respond instantaneously to the action of an external effort. This delay is not necessarily due to any property of matter body. However, since no other entity that can cause a delay in the action of an effort on a matter body is observed, the property of inertia is attributed to matter body without any logical basis. While considering motion in a circular path, the pseudo centrifugal force is often thought as caused by inertia of the moving body. In some other cases, it is proposed that gravity and inertia are always working simultaneously against each other, and in proportion to an object's mass. Einstein reinforced the relationship between gravity and inertia by declaring their equivalence.

The word ‘inertia’ is related to word ‘inert’, which means ‘*without inherent power of action, motion, or resistance*’. In physics inertia is the ‘*property of matter by which it continues in its existing state of rest or motion unless an external force is applied*’. Inertia is characterized by heaviness or lethargy to move. This is not a property of matter but it is only an attributed property of matter; because matter cannot act itself. All matter bodies are inert. Hence, it is incorrect to assume matter bodies interact between themselves. Every action has to have a cause. Motion of a matter body is an action and it has to have a cause. Since matter is inert, a matter body cannot be the cause of its own motion or the inertia associated with it. Matter bodies need an agency to act on them or to produce apparent interactions between them. This agency is external to the matter bodies and acts as an intermediary agency between the apparently interacting bodies. In fact, the intermediary agency acts on each of the matter bodies and the result of simultaneous actions on different bodies, when considered together, appear as interaction between the matter bodies.

An entity may have number of properties or qualities. One or more of its properties or qualities may describe this entity. However, an entity may also be indicated by a quality/property it has not. A quality or attribute is a functional character, any entity has. A character that is absent from an entity is not one of its quality. Inability to move or act is not a characteristic property. Hence, inertia, taken in the above given sense, is not a property of an entity. It describes some property the entity does not have. It is describing a property in negative sense. We have seen that an external agency is required to move a matter body. If this agency has an ability to move matter bodies, property to cause delayed action is one of external agency’s qualities. A property of matter body, expressed in negative sense, can mean a property of the external agency, expressed in positive sense. Thus, inertia can mean the property of external agency to cause delay in motion or change the rate of motion of a matter body.

In physics, quantitative measure of inertia is considered as a fundamental property of all matter. It is so, by virtue of which a matter body opposes any agency that attempts to put it in motion or, if it is already moving, to change the magnitude or direction of its linear or rotational velocity. Inertia is a passive property that does not enable a body to do anything except oppose such external active agents. Inertia is the resistance that a body of matter appears to offer to a change in its speed or position upon the application of an effort (force). Even though, the matter body does not or cannot do anything to offer or change this resistance, this behavior observed with respect to its motion is attributed to the matter body for lack of another observed external agency.

Depending on the type of a body’s motion (linear or angular), inertia is numerically determined in two measurements. Inertia of a matter body, in relation to its linear motion, is the body’s ‘mass’. Mass of a body is its resistance to the action (of a force). Inertia of a matter body, in relation to its rotational motion, is its ‘moment of inertia’ about a specified axis. Moment of inertia is a matter body’s resistance to the action of a torque about certain axis. This axis could be through within or without the rotating body. The greater the mass or moment of inertia of a body, smaller is the change produced by an action (by applied force). Here, mass is assumed to represent the matter content of the matter body. Note that mass and force are defined on the basis of each other – by circular logic.

A moving matter body moves at a constant linear speed not because of its inertia but only because of the absence of action by an external agency to slow it down, change its course, or speed it up. Therefore, in order to understand the nature of inertia, it is necessary to understand the cause and mechanism of motion of a matter body. Mechanism of motion of a body includes the mechanism of action (application) of force (work). Mechanism of motion of a body was always a mystery. By logical consideration, no body can move on its own. It was also not logical to consider that a body can affect state of motion of another body, without making direct contact. Yet in nature, action at a distance is observed and forces appear to act on bodies. Only logical conclusion is that there is an unobservable intermediary between the (apparently) interacting bodies. In the past, many intermediary media like, different types of aethers, diverse fields, etc. were proposed by number of scientists. Being very vague, none of them stood scrutiny for long time. Although each of them had characteristic properties to suit the theories mathematically, for which it was proposed, none of them had a rational constituents or logical structure. Since no external agency could be theorized, so far, mechanism of action always remained a mystery. Therefore, we were compelled to assign a property (inertia) of the unobservable external agency to observable matter bodies in negative sense.

The concept, put forward in ‘Hypothesis on MATTER’, proposes a universal medium that fulfils all requirements, needed in various theories. It has only one type of (postulated) real matter particles as its constituents. Inherent properties of these ‘quanta of matter’ helps them to logically structure themselves into a universal medium that fills the entire universe, outside 3D matter particles. This medium, called 2D energy fields, together with 3D matter particles in it, behaves like a single body of highest matter density. All actions are results of inherent property of 2D energy fields to attain homogeneity and serenity. Acceptance of a universal medium can remove all mysteries, present in science today.

Inertia is caused by time delay, required for stabilization of distortions in the 2D energy fields. Work-done about a matter body is the ‘distortions’ in the universal medium around the body. Gravitational attraction is caused by the difference between the extent of 2D energy fields in between and on the outer sides of two matter bodies. Outward displacement of a body, moving in circular path, away from the centre of circular path due to outward deflection of direction of inertial motion of a body from the tangent to the circular path is assumed as the displacement caused by centrifugal force. All these three phenomena are related to the actions of 2D energy fields. Hence, they may sometimes overlap or appear simultaneously about a matter body.

Inertial motion:

Displacement of a matter body that gives rise to the phenomenon of inertia is envisaged as ‘inertial motion’. Result of action of an effort on a matter body is the work-done about the body. Mathematical relationship between variation in the rate of change of displacement (acceleration) and the matter content of a body (represented by body’s mass) is force. Hence, the action of an effort (or force) is the changes in or creation/development of work about a matter body.

Causes and mechanisms of motions of matter bodies have logical explanations. ‘2D energy fields’ is the moving-agency of a matter body and the mechanism of motion is entirely a part of 2D energy fields’ inherent property to strive towards absolute homogeneity. A deformation or transfer of distortions in the 2D energy fields is bound to displace a matter body, floating in it. When the mechanism of motion is considered as fully contained in the 2D energy fields, inertia becomes a property of this external agency. Once, inertia is considered as a property of the 2D energy fields, mass of a body becomes the measure of ability of the 2D energy fields to cause motion or change of rate of motion of a matter body. Since the measure of this ability is related to the matter content of a body, it can be considered to represent amount of (material) matter contained in the matter body, under static conditions.

It is an inherent property (derived from the properties of its constituents) of 2D energy fields to strive towards homogeneity and serenity. Hence, no distortion in 2D energy fields can remain localised. Any distortion in 2D energy fields will tend to either spread out or move in the linear direction of its introduction. During creation of basic 3D matter particles (from disturbance in the 2D energy fields), 2D energy fields is distorted by gravitational actions. Shape of the basic 3D matter particle, created by gravitational actions, cause differences in the distortion-density in the 2D energy fields, on different sides of the basic 3D matter particle. 2D energy fields tend to equalise the distortion-densities by transferring distortions from high distortion-density region to lower distortion-density region. During the transfer of

distortions, 3D matter particle in the region is also moved along with the distortions. This type of actions in the 2D energy field causes basic 3D matter particles to move linearly at the highest possible speed. This is the speed of light. The basic 3D matter particle, created by gravitational actions of 2D energy fields, and the associated distortions around the matter core of the basic 3D matter particle, together, form a corpuscle of light – a photon.

Basic 3D matter particles (photons) are moved by the 2D energy fields, at the highest possible linear speed. This linear speed is limited by the ability of 2D energy fields to move its constituent quanta of matter, without structural breakdown. Since it is the 2D energy fields, which cause and limit the speed of light, critical speed of light depends on the nature of 2D energy fields. Hence, constancy of speed of light is not universal. Photons, being the basic 3D matter particles, form all other superior 3D matter bodies found in nature. While they are part of superior 3D bodies, photons are confined to move in circular paths, within the corresponding primary/fundamental particles. Critical linear speeds of photons are maintained even when they are part of fundamental particles/macro bodies. When the photons constitute fundamental particles/macro bodies, their paths are curved and confined within the primary particles.

Within primary particles, 2D energy fields (by gravitational actions) produce motion of photons at constant linear speed along their curved paths. Depending on the distortion-density on either side of line of its linear motion, a photon may also be simultaneously moved sideways. Actions of field forces cause macro body's motion by displacing constituent photons of primary particles sideways, in their curved paths and without affecting their critical linear speeds. Sideways displacements of superior particles moves whole of the macro body. This is the mechanism of motion under field forces (produced by the interaction between electric, magnetic and nuclear fields). Sideways motion of constituent photons causes fundamental particles/macro bodies to displace themselves towards the region of lower distortion-density in the 2D energy fields. This phenomenon causes apparent attraction or apparent repulsion between different 3D matter bodies. Since we do not appreciate the presence of 2D energy fields, matter bodies appears to move towards (attract) or move away from (repel) each other.

Sideways displacements of a photon, along with superior matter particles, are bound to produce its own distortions in the surrounding 2D energy fields, which correspond to the displacement of macro body. These distortions, once produced, tend to be transferred in a straight line, indefinitely at constant velocity through the 2D energy fields. As these distortions are being transferred they carry all 3D matter particles of the macro body along with them. This process of motion will continue until the distortions surrounding the macro body are removed or varied in magnitude by another set of distortions in the 2D energy fields.

Development of distortions in the 2D energy fields necessitates displacements of constituent matter particles of the 2D energy fields. Displacements of any matter body are work-done. Hence, development of distortions in 2D energy fields is work. Rate of this work, being developed in the 2D energy fields about a 3D matter body (with respect to distance moved) is the force. Displacements of constituents of 2D energy fields and production of distortions in it (about a body) take time to accomplish. Hence, a work is done gradually by an effort. Work-done about a body needs some time to rearrange and stabilise structural deformation in 2D energy fields about the body. During this time, the 3D matter body is under acceleration/deceleration stage. By the time, work about the 3D matter body (in the 2D energy fields) is stabilized; 3D matter body's acceleration/deceleration period is over. [The fact that the requirement of acceleration/deceleration period is essential for the work to be stabilised, irrespective of the continued action of external effort, is often overlooked]. Thereafter, the 3D matter body will be carried at a constant linear velocity by the distortions being transferred through the 2D energy fields.

Distortions in the 2D energy fields, required to move a macro body, can also be supplied by inertial action of another macro body. Let us consider a moving macro body 'A' making contact with another static (or slower moving) macro body 'B'. Body 'B' restricts the free motion of body 'A' as dictated by moving distortions in the 2D energy fields associated with that body. However, matter particles of body 'B' cannot restrict the 2D energy field-distortions in the region of body 'A', from encroaching into its own space. Part or full of 2D energy fields-distortions associated with macro body 'A' advances into the space occupied by macro body 'B'. As the distortions continue to be transferred through the space occupied by body 'B', its matter particles will also be carried along with the distortions. Motion of body 'A' is now transferred to body 'B' partially or in full. If whole of distortions in 2D energy fields associated with body 'A' is transferred into space occupied by the body 'B', body 'B' will start moving at a speed corresponding

to the work (energy) it received from body 'A' and body 'A' will come to a stand still. If the transfer of distortions is partial, both bodies will continue to move at speeds corresponding to work (energy) associated with them. Work (energy) lost by body 'A' will be equal to work (energy) gained by body 'B'.

For the transfer of inertial motion from one macro body to another, it is essential that the force-receiving body be moving at a slower speed compared to the force-applying body. If the force-receiving body is already moving at the highest possible linear speed through the universal medium, no 2D energy field-distortions in the direction of its motion can be transferred into the region of the body. This is because the speed of 2D energy field-distortions cannot exceed the highest speed. Requirement of lower linear speed restricts the efficiency of applied force on a body, in the direction of its linear motion and causes the phenomenon of 'relativistic mass'.

Should the direction of transfer of distortions (action of field forces) and the direction of motion of a moving body are not co-linear, transfer of distortions can affect the moving body only as long as the body is in the path of the moving distortions. Thus, planetary bodies moving in orbital paths about a central body experiences higher central force towards their rear end compared to their forward end. Centre of gravity of a free orbiting body shifts to the rear. This phenomenon causes spin motion of planetary bodies in the plane of their orbital path.

Irrespective of their nature of action (electric, magnetic, nuclear, mechanical, etc.), all actions are understood by inertial motions of 3D matter bodies, they produce. Displacements of macro bodies, which give rise to the phenomenon of inertia, are inertial motions. Inertial motions are due to work-done about a body. Work done about a body is equal to the magnitude of force multiplied by the magnitude of distance moved by the body during its accelerating/decelerating stage. Force, being the (mathematical) relation between rest mass of a body and rate of change of its speed (due to the force), is identical in all cases of actions. Hence, there is no meaning in differentiating forces into different categories, depending on the phenomena producing them. All forces and their actions in nature are similar. Only differences are in the phenomena producing them. Hence, fundamentally, there is only one type of natural force.

Conclusion:

Inertia is caused by the time delay required, during the action of an effort (force), for stabilization of distortions in the all-encompassing universal medium - the 2D energy fields. Hence, inertia is a property of 2D energy fields rather than that of matter. Inherent character of 2D energy fields to strive towards absolute homogeneity is the cause of all actions and inertia. Structure of 2D energy fields produces its mechanism of action.

References:

- [1] Nainan K. Varghese, *Hypothesis on MATTER* (second edition), (2003), <http://www.booksurge.com/Hypothesis-on-MATTER-Second-Edition/A/1419689789.htm>
- [2] Nainan. K. Varghese, ARTICLES, <http://wbabin.net/papers.htm#Varghese>

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