PLANETARY MAGNETISM

(According to "*Hypothesis on* MATTER")

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Abstract: Linear and rotary motions of a macro body are entirely separate. Each of them is produced by separate set of work-done on a macro body. However, each matter particle of a linearly moving, rotating macro body has its own path of resultant motion. Its motion and path appear to be resultant of linear and rotary motions of the macro body. With respect to an absolute reference (about which all real actions on/about a macro body takes place) resultant motion of a constituent matter particle of a planetary body is along a wavy path in space. Since linear speed of a spinning planetary body is much greater than linear motion of its constituent matter particles due to planetary body's spin speed, every matter particle in the spinning planetary body always moves in the same direction in space. Spin motion of a planetary body is an illusion and it is valid only for considerations with respect to static reference of planetary body's spin axis. As real motion of all matter particles of a spinning planetary body (with respect to absolute reference) is always in the same linear direction, swirling motion of a planetary body's interior is a myth.

Natural association of matter particles is to form an electro-magnetically neutral body. All planetary bodies are initially electromagnetically neutral bodies. It is the acquired parameters of these bodies, which produce their magnetism. Apparent spin motion of a planetary body does not cause interior matter to swirl around its axis of spin. To consider this imaginary swirling motion of a planetary body's magma, as the cause of planetary magnetism is not tenable.

Cause and nature of planetary magnetism is described here on the basis of a radically different concept, put forward in '*Hypothesis* on MATTER'. Planetary magnetic field is produced by directional alignment of free floating atoms in relatively calm fluids on or near the surface of a spinning planet and it is sustained by induced magnetism of the body's ferrous core. Alignment of free floating atoms and hence the strength of planetary magnetism depends on absolute linear speed of the planetary body and quantity of fluid matter on it. Planetary magnetism is created by linear speed of the planet and sustained by apparent spin motion of a planet that has ferrous matter as its core. Magnets formed about either hemisphere of a planet (about its equator) are independent of each other. Natural upheavals or gradual re-distribution of ocean water on earth, affect the strength and direction of terrestrial magnetism.

Keywords: Relative motion, Secondary electric field, planetary magnetism, terrestrial magnetism, solar system, cosmology, Hypothesis on MATTER.

Introduction:

'*Hypothesis on* MATTER' describes an alternative concept. All properties of matter bodies have to be derived from basic nature of matter. Matter is the substance that gives an entity; its objective reality and positive existence in space. Matter has only two properties. It has certain quantity of substance and it is in the nature of matter to coagulate. All properties of entities made of matter have to be extension of these basic properties. Whole matter in universe is in the form of 'quanta of matter'. Quantity of matter in a 'three-dimensional' macro body is determined by total sum of matter in its constituent quanta of matter in the form of 3D matter particles. All other properties of 3D macro bodies are determined by arrangements of quanta of matter in space about 3D macro bodies and relative arrangements of 3D matter particles within the macro body. Stable structures by quanta of matter in space provide an all-encompassing universal medium, which fills the entire space, outside 3D matter particles.

All actions on and by 3D matter particles are caused and performed by and through the universal medium. This avoids assumption of 'actions at a distance', while considering actions or forces. Matter content of a 3D macro body and energy about it are distinctly separate. Matter content is the total sum of three-dimensional matter (particles) in a macro body. Energy is the stress developed due to 'distortions' in universal medium about the macro body. Matter content and energy content of a 3D matter body cause and support each other for their existence and stability. They are not convertible into each other.

Distortions in universal medium, depending on their nature may be classified into various types of (energy) fields, including electric and magnetic fields. This provides definite structure to (presently) imaginary fields and logical basis for their creations and interactions.

Many of the celestial bodies are found to have magnetic properties. Currently, this phenomenon is attributed to 'dynamo' actions provided by swirling magma of spinning celestial bodies. Even for dynamo effect to occur, a primary source of magnetism is required, which is absent in this case. This article shows that assumption of dynamo effect is based on imaginary conditions. All conclusions expressed in this article are taken from the book '*Hypothesis on* MATTER' [1]. For details, kindly refer to the same. A free body is that macro body, which is free from all external influences other than efforts/actions considered. All movements are considered with respect to absolute reference (a static point in universal medium). Figures are drawn not to scale. They are intended to depict actions described. Adjective 'inertial' means an action related to motion of 3D matter bodies.

Universal medium:

Quanta of matter constitute observed three-dimensional matter bodies and the universal medium, which creates and sustains 3D matter particles. Entire space is filled with '2D energy fields', two dimensional latticework formations by basic single-dimensional quanta of matter. 2D energy fields, in various directions and planes, passing through a point, co-exist. Entire space, outside basic 3D matter particles, is filled with 2D energy fields. 2D energy fields, in various directions and planes, together, provide an all-encompassing universal medium [1]. Although, 2D energy fields are made of (apparently) rigid quanta of matter, it has all properties of an ideal fluid. All apparent interactions between 3D matter bodies take place through the universal medium. 2D energy fields are in direct contact with every 3D matter particle in nature. This avoids the assumption of 'actions at a distance through empty space'.

2D energy fields, within the spatial dimensions of a 3D macro body, contain sufficient distortions (work) to sustain macro body's integrity and stability in its current state. This part of 2D energy fields is 'matter field' of the macro body. Distortions in the matter field are 'work', existing about the macro body. Matter is inert; it has no ability to move or act on its own. Associated matter field-distortions of a macro body produce all apparent actions, presently assigned to 3D matter (bodies). Additional distortions, transferred into matter field of a macro body produce its inertial motion. Magnitude of additional distortions in a matter field remains constant until modified by addition or removal of distortions from or to an external source. This provides an undisturbed 3D matter body's constant state of motion in space.

Universal medium is inherently under compression. It has a natural tendency to fill-up any gap in it. This phenomenon is 'gravitation'. Presence of 3D matter particles, in a 2D energy field, breaks its continuity. Discontinuity causes imbalance in the structure of 2D energy fields and form distortions.

Pressures applied by distorted 2D energy field-latticework from sides, in an attempt to restore its own continuity, compress a 3D matter particle, present within the gap. [Basic 3D matter particles (photons) are of uniform radial size and they constitute all other superior matter bodies]. If extents of 2D energy fields on opposite sides of a 3D matter particle are unequal, the 3D matter particle experiences a resultant effort, which tends to move it towards the side of lower effort (pressure or force).

In order to regain homogeneity, a distorted region of 2D energy field tends to transfer distortions from high distortion-density region to low distortion-density region. During such transfer of distortions, any 3D matter particle present in the region is also carried along with the distortions, which are being transferred. Displacements of constituent 3D matter particles of a macro body affect its motion in space. Transfer of a macro body's matter field, in 2D energy fields, accomplishes macro body's whole-body motion in space.

2D energy fields, about 3D matter bodies, store work in the form of distortions in their latticework structure. Such distorted regions about any 3D macro particles are 'distortion fields'. Distortion fields of all 3D matter particles in a macro body, together make the macro body's 'matter field'. When distortion fields of two macro particles overlap, distortion-density in the region is no more homogeneous. Inherent property of 2D energy fields to maintain their homogeneity, cause translational transfer of distortions in 2D energy field-latticework structures in the region. This tendency produces 'field forces'. Transfer of distortions carries any 3D matter particle, which happens to be in the region, along with distortions. This movement of 3D matter particles converts 'field force', into inertial actions of 3D matter bodies. Depending on the nature of distortions, distortion fields are classified into linear (magnetic field), angular (electric field) and radial (nuclear field) distortion fields. Electric field, which has low curvature of its lines of force, acts as a magnetic field [1].

3D matter particles:

A very brief outline of creation and development of basic 3D matter particles, primary particles, fundamental particles and atoms are given in this paragraph. For details, kindly see reference [1].

Photons:

Creation and sustenance of 3D matter particles are major gravitational actions. 2D energy fields do suffer occasional local breakdowns due to various reasons. Quanta of matter, released from 2D energy fields, during their (local) breakdowns, are gathered together by surrounding 2D energy fields to form 2D disturbances. Larger 2D disturbances are further compressed to create matter-cores of basic 3D matter particles. Gravitational actions, by distorted 2D energy fields, mould these matter-cores into segmented spherical discs, move them at highest possible linear speed (without causing own breakdown) and spin them about one of their diameters at spin speeds proportional to their matter contents. These linearly moving spinning core-bodies, together with associated distortion fields (equivalent to electromagnetic waves), which are carrying the core-bodies, are corpuscles of light ('photons'). Matter-core body and associated distortion field of a photon cause and support each other to maintain their stability and other critical parameters.

Biton:

Under suitable conditions, gravitational actions help two complimentary photons (of high matter contents) to form a binary unit of a 'biton'. Biton is a self-sustaining primary particle, made up of a binary union of two identical photons. Constituent photons of a biton maintain their linear motion at critical linear speed in a common circular path. Simultaneously, they spin in phase about a common axis passing through biton's centre.

Distortion fields about each of the constituent photons' are transferred along their common circular path. These distortions carry core bodies of the photons along with them. Repeated passages of distortion fields (associated with the photons of a biton) along same circular path create a common distortion field around the biton, in its plane of rotation. By virtue of its structure and movements of its constituent photons, a biton has an angular distortion field around the common path of its constituent photons. Being an angular distortion field, this is a 'primary electric field'. All other types of distortion fields (electric, magnetic and nuclear fields) about other fundamental matter-particles are combinations of primary electric fields in different phase relations.

Circular path of photons in a biton necessitates creation of angular distortion field about them. Since

biton is a binary unit, its linear motion in its plane is bound to make large variations in linear speed of its constituent photons. Natural interactions between 2D energy fields and the moving photons tend to minimise and stabilise these variations. In order to do so, these actions compel a linearly moving biton to re-orient, so that plane of the biton is perpendicular to direction of its linear motion. Thus it is a natural tendency of all linearly moving angular distortion (electric) fields to re-orient so that their planes are perpendicular to direction of linear motion. If any free electric field or free floating matter particle that produces resultant electric field is moved linearly, such electric field or matter particles tend to line up so that their axis is along the direction of their linear motion.

Tetrons:

Under gravitational actions, two bitons may form a combined unit of a tetron. Each of the constituent bitons is positioned in perpendicular plane in relation to the other and has a common centre, shared with the other biton. Each tetron has two primary electric fields, placed in planes perpendicular to each other. Free tetrons, under gravitational attraction, assemble in layers to form neutral shells of neutrons, protons and deuterons.

Fundamental particles:

Under suitable conditions, three bitons may group themselves under gravitational actions to form 'hextons'. Depending on constituent bitons' relative spin direction and phases, there are two kinds of stable hextons – 'positrons' and 'electrons'. A positron and an electron have similar electric fields but dissimilar magnetic and nuclear fields.

Tetrons, in layer formation, arrange as a spherical shell to form a 'neutron'. If the spherical shell formed by tetrons is in conjunction with a positron, the resulting fundamental particle is a 'proton'. Two tetron-shells formed about a common positron make a 'deuteron'. A deuteron is presently counted as one proton plus a neutron.

Atoms:

Deuterons are major components of nuclei of atoms. Deuterons, in circular sections of nuclei of (larger) atoms, join to form tubular structures of nuclei. Electrons, attracted and approaching positrons in nucleus of an atom, cause and maintain spin motion of nucleus about its longitudinal axis. Orbiting electrons of an atom form another tubular structure around the nucleus. Thus, all (larger) atoms are tubular structures made of circular sections of different girth. Development of nucleus of an atom depends on availability of constituent fundamental particles and continues until distortion fields, about the nucleus, achieve neutral status. In certain cases, left-over distortion fields in fully-formed individual atoms are neutralised by formation of molecules, with similar or different type of atoms.

Although a stable nucleus, of an independent atom, is electrically neutral within itself, its spin motion creates an external resultant electric field about it. Linear motion of any such free atoms at high speed, through the 2D energy fields, tends to align them, so that the axes of their tubular structures are in the direction of their linear motion. This alignment provides least resistance to their motion through universal medium. In all cases, where free atoms have to move at very high linear speeds, they orient themselves in this fashion.

Fields:

A deformed region of 2D energy fields in space is a 'distortion field'. Distortions in 2D energy field fields strain them. Stress in a 2D energy field, due to the stored distortion, is the energy stored in that region. Unlike matter (which is real entity), energy is a functional entity. It has no real existence in space. It is an expression of strain in 2D energy fields. Distortion fields may be classified according to the type of deformations, they contain. 2D energy fields are two-dimensional latticework structure by quanta of matter. There are three possible types or directions of distortions in 2D energy fields. Directions of distortions may be determined by direction of inertial actions produced during their interactions. Direction of a distortion field is represented by imaginary lines of force with arrows in the directions of its deformations. Distortions, represented by parallel straight lines of force, produce a magnetic field; distortions, represented by curved (circular) lines of force, produce an electrical field and distortions, represented by radial lines of force (to or from a central point), produce a nuclear field.

Since there is no matter particles that cause parallel straight-line distortions in 2D energy fields, magnetic fields are produced by arranging electric fields in proper array. Magnetic fields are distortion fields with deformations of linear nature in 2D energy fields, where lines of force of distortions are straight lines with arrows in the direction of associated inertial actions.

An electric field is an angular distortion field, where direction of deformation in distortion field may be indicated by imaginary 'curved lines of forces' with arrows in the direction related to inertial action, it may cause. As there are no means to produce linear distortion fields, combination of electric fields in proper array is used to create magnetic fields. A straight line may be regarded as an angular line with no curvature. As curvature of lines of force decreases, an angular distortion field will reduce its electric nature and increase its magnetic nature. As curvature of lines of forces increases, an angular distortion field will increase its electric nature and reduce its magnetic nature. An electric field, with low or no curvature of its lines of forces, behave as magnetic field.

The face (side) of an angular distortion field, where lines of force appear in clockwise direction is 'positive electric charge' and the face, where these lines of force appear in anti-clockwise direction is 'negative electric charge'. Electric charges are nothing but relative angular directions of distortion fields. Every electric field has both positive and negative electric charges.

Secondary electric field:

In an atom, nucleus spins about its axis and the orbiting electrons go around in their orbits about the same axis. Each of the axially placed hextons (positrons in the nucleus and electrons in orbits around nucleus) not only has its electric field in planes perpendicular to the nuclear axis but it is also taken around the axis, once every spin of the nucleus. Hence, all electric fields, which are in the direction of spin of the nucleus, gain additional angular motion of one turn and all those electric fields, which are in opposite direction to the spin of the nucleus, lose angular motion of one turn during every spin of the nucleus. Changes in the magnitude of angular motion of an electric field are to be understood in terms of an increment or reduction in the magnitude of distortion density (in the direction of its lines of forces).

Such turning motions of the electric fields are only apparent movements but it means that the concerned electric field (resultant electric field of the atom, as a whole) is either strengthened or weakened. Therefore, in a spinning (electrically neutral) atom, there is a difference between its resultant electric fields in either direction. This difference gives rise to a resultant electric field about the atom, over and above any resultant electric field it has, due to the arrangements of its constituents. This additional resultant electric field, developed in an atom due to its spin motion, is the 'secondary electric field'. Circularly placed hextons (positrons and electrons) in an atom do not contribute towards secondary electric field. Thus, any atom, with axially arranged deuterons (positron with two neutron-like shells) in its nucleus and corresponding electrons in orbit (which is otherwise electrically neutral) will have a secondary electric field about it, in the direction of its spin.

As the numbers of electrons and positrons, forming an atom are equal, any atom is an electrically-neutral 3D matter body. Although stable atoms are electrically neutral, due to their spin motion, these atoms have additional angular distortion field (electric field) in the 2D energy fields about them, in the direction of their spin. Most types of atoms have this resultant distortion fields (secondary electric fields) about their bodies. Secondary electric fields help formation of molecules, during which they may be neutralized. However, certain types of stable atoms are capable to maintain their individuality and remain independent. These atoms exhibit secondary electric fields about them. Although the secondary electric field, about an atom, is too small to be noticed, when great many atoms, spinning in the same direction are accumulated in a region, their secondary electric fields may give rise to reasonably strong resultant electric field.

Magnetic field about a spinning body:

With respect to absolute reference, a spinning macro body that has no translational displacement is a hypothetical entity. Such a hypothetical body, assumed with respect to relative reference frame about its spin axis may provide a simpler (but not true) explanation of creation of magnetic field about a spinning macro body.

A very large spinning fluid macro body in space is a huge collection of atoms of various elements and

molecules of elements or compounds. Inter-particle gravitational attraction, during formation of these massive bodies, shapes them roughly as spheres. Uneven motion of matter particles, during formation of a large macro body, initiates its spin motion. A stationary spinning macro body in free space has no translational motion with respect to absolute reference. Since all free bodies (except stable galaxies) in space have linear motion, this spinning fluid macro body is a hypothetical consideration.

Most of the atoms/molecules of this body have secondary electric fields. Due to definite orientation of these atoms with respect to each other (in small groups in a macro body), a macro body as a whole appears to be electrically neutral. Nuclei of most atoms (and the atoms themselves) are tubular in shape [1]. Every atom on or near a spinning planetary body is carried along with it, in its rotation. All matter particles in the spinning macro body move in angular paths relative to the body's spin axis. Hence, all actions of these particles may be considered with respect to the planet's axis rather than with respect to 2D energy fields outside the body's matter field.

Matter is inert. It is the transfer of distortions in the 2D energy fields about a macro body that is carrying its constituent 3D matter particles, to move the macro body. Distortions in 2D energy fields tend to choose the easiest path for their transfer. Due to the fluid nature of the 2D energy fields and the tubular shape of atoms, all loosely held (independent) atoms on a rotating fluid macro body tend to line up in a direction parallel to the direction of their motion. This is a simple mechanical arrangement, required for the easiest path for the transfer of distortions in the 2D energy fields. Selection of easiest path of transfer of distortions may be understood as a path for relative motion with least apparent resistance. All free atoms on or near the equatorial region (due to lower speed of the regions of higher latitudes and inner regions, they may be disregarded) of the spinning macro body, tend to line up with their axes along their circular paths (in east-west direction).

Secondary electric fields of these atoms have their similar electric charges facing forward or rearward.
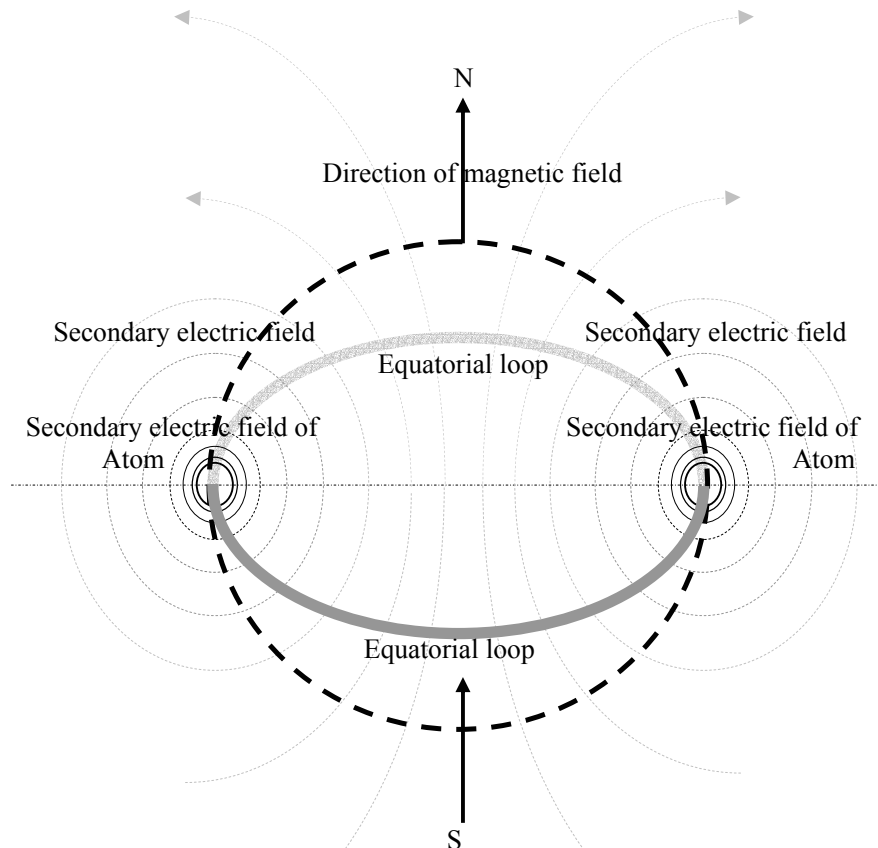

Figure 1

Each of these free atoms has its secondary electric field aligned, such that its clockwise lines of forces are facing forward or rearward. Resultant of the secondary electric fields of all these atoms forms an electric current in the direction along the equator of the macro body, forming a loop around the globe. [An electric current is nothing but the extension of electric field along a conductor − there are no displacements of fundamental particles along a current carrying conductor] [1]. Arrangement of secondary electric fields, around the macro body along the lines parallel to its equator, appears as a resultant electric current. This loop of electric field produces a resultant magnetic field in a direction along macro body's spin axis. In fact, this magnetic field is the resultant electric field itself, acting beyond its 'zilch force distance' (zilch force distance is the distance between two electric fields, at which their interaction does not produce resultant inertial action on matter bodies, which produce the electric fields) and hence acts like magnetic field.

Electric fields in each plane being circular, appearance of the current loop along any line, parallel to macro body's equator, may be likened to number of circular discs, linked face to face, all around and parallel to the equator, as (two secondary electric fields placed diametrically opposite sides about the equator) shown in figure 1. Resultant of the secondary electric fields produce resultant distortion field as shown by the dotted curved lines in figure 1. Curvature of circular lines of force being very small, a small part of it acts as a linear line of force. This distortion field exhibits more of its magnetic nature and less of its electric nature. In other words, this distortion field acts as a magnetic field.

Number of lines of force through the macro body, about its equator (or latitude lines parallel to equator), in one direction and equal number of lines of force outside planet's macro body in the opposite direction produce a magnet through the spinning macro body as shown by the arrows, N and S. This is the magnetic field of a spinning fluid macro body**.**

Planets and other similar massive bodies in space are huge collection of atoms of various elements and molecules of compounds. Some of the atoms/molecules in these bodies are held rigidly in solid matter, some others are held loosely in liquid matter and yet some others are more freely floating as in gases. Due to definite orientation of these atoms with respect to each other, in small groups in a macro body, a macro body as a whole appears to be electrically neutral. Most of these atoms/molecules have secondary electric fields. During spin motion of the macro body free floating atoms in the macro body orient themselves in east-west direction.

Magnetic field of a spinning planetary body is produced by east-west alignment of free atoms on or near its surface. Alignment of these atoms is purely a mechanical action and there is nothing to prevent them from orienting their electric charges in any of the two directions – same electric charge facing east or west. This is what happens and the secondary electric fields of most of the re-oriented atoms, being in opposite directions, neutralize each other. Secondary electric fields are not strong enough to prevent re-orientation of atoms against inter-atomic binding forces. Only those secondary electric fields, which are not neutralized, contribute towards the creation of planetary magnetism. Hence, planetary magnetic field is very weak and varies, depending on many factors affecting the alignment and the orientation of these free atoms. A similar phenomenon causes galactic magnetic field. In this case, the magnetic field is caused by east-west alignment of primary electric fields of bitons in galactic halo [3].

Relative motions:

Since no absolute reference is currently available, in physics, we use relative frames of references. By using a relative frame of reference, we assume certain region or a particular body is static (or is in assumed steady state) and use relative motions of other bodies, with respect to the static reference (for all our purposes in mechanics). An alternative concept, advanced by the author, envisages a real universal medium structured by matter particles and which fills the entire space to encompass all three-dimensional matter bodies. As this medium is normally homogeneous and static, it can provide an absolute reference for actions and movements of all matter bodies.

In nature, no three-dimensional matter body (except stable, spinning galaxies) can remain static in space [3]. To survive, it has to have translational motion with respect to universal medium. In fact, it is an inherent property of the universal medium to move all basic three-dimensional matter particles at the highest possible linear speed. Macro bodies are formed by numerous 3D matter particles, moving at their

critical linear speeds in circular paths within (fundamental particles of) the macro body. Each macro body has certain inherent motion and appropriate magnitude of work (kinetic energy) associated with it. By assuming a body as a (static) reference, in that instant, we wipe-out whole of the reference body's kinetic energy, associated with its particular motion. Simultaneously, we modify magnitudes of kinetic energies associated with all referred bodies, considered. Although this is an unreal situation, it is convenient for general understanding of mechanics and mathematical analysis with respect to relative positions of the bodies. When we start assigning reality to the resulting parameters, other than relative positions of the bodies, it will invariably distort any ensuing theories/physical laws.

Parameters of macro bodies or paths traced by them in their motion, as considered in above situation, are unreal with respect to static universal medium. These parameters have no relation to real movements or other parameters of the considered bodies in space, except for their relative positions. Theories or mathematical treatments, using these (geometrical figures) apparent paths of moving macro bodies, represent unreal circumstances. They can, at the most, indicate assumed or imaginary results, which may coincide with our observations. They are always in relation to the steady (immobile) state of the chosen reference, within a system of bodies. These apparent or imaginary parameters cannot provide results for real physical actions.

A spinning macro body can be assumed as a static reference provided the observer is assigned with imaginary motion in a path around the reference body in opposite direction at equal angular speed. By doing so, magnitude of kinetic energy of the spinning macro body is reduced to zero and the observer is given appropriate magnitude of kinetic energy to maintain his apparent motion. Any action on the reference macro body's spin motion by an external effort will appear to produce its results on the observer's apparent motion rather than on the state of (motion of) reference macro body. Work done on reference macro body has its effect on unrelated referred macro body, while reference macro body is not affected by the work. In order to maintain the static state of reference macro body, it is necessary to refrain from any change in its static state (of motion). All real changes in its state of motion are born by the apparent motion of the observer. An external effort, acting on the observer can change his state of motion. This change will be born by the observer, himself, without affecting the reference macro body.

Calculations, based on observer's apparent (relative) motion, can give correct results with respect to relative positions of macro bodies within the system in the same region of space. These results will be true only within the system and it will not constitute physical reality about states of the macro bodies. However, we must concede to the fact that when an external effort acts on reference macro body, resulting real action is only in the magnitude of its associated work-done (kinetic energy) and corresponding change of state of (motion of) the reference macro body. Although the external effort appears to have changed the kinetic energy associated with the observer (in opposite direction); in reality, the external effort could change only the kinetic energy associated with the reference macro body. When an external effort acts on the reference macro body, real action is only in the change of state of (motion of) the reference macro body. And when the external effort acts on the observer, real action is only in the change of state of (motion of) the observer. However, as the reference macro body is assumed static, in both cases apparent changes are assumed in the magnitude of kinetic energy and corresponding state of (motion of) the observer.

Real physical action of a small linear effort on an observer, towards a reference macro body, is to move the observer towards the reference macro body. However, in the case considered above, apparent motion and speed of motion of observer encompasses both the real physical action and apparent motion of the observer. Observer will apparently move in a resultant direction at a resultant speed. Magnitude of resultant action is greatly influenced by direction of applied effort. This does not correspond to real physical action on the observer.

An apparent action, noticed on a macro body within a system, which is related to a steady reference may be considered real only within a framework and limited within the system in the same region of space. This is not real physical action in nature, with respect to an absolute reference. Real physical actions can take place only with respect to an absolute reference. Only a static universal medium can provide an absolute reference. If macro bodies are in different regions of space with differing properties of universal medium, this type of assumption may not work well.

Relativistic considerations can give right results only in determining relative positions of macro bodies, considered. They are unable to provide real parameters of other states of macro bodies (size, work-

done, temperature, pressure, matter content, kinetic energy, etc.) or shapes of their paths. With respect to an observer on the surface of a planet, it is currently assumed that the planet appears to spin about its axis and orbit around its central body. These observations are unreal. They are observed with respect to static references, provided by static spin axis and by static central point of the central body. Hence these observations can only provide relative positions of points on the planet and relative position of the planet with respect to the central body and nothing else.

Path of a matter particle:

Every 3D matter particle in a linearly moving macro body moves in straight-line-path in absolute space. However, paths of 3D matter particles in a linearly-moving spinning macro body, with respect to absolute reference, are traced by resultants of macro body's linear and spin motions. If a macro body's linear speed is much greater than linear motion of constituent 3D matter particles due to macro body's spin motion, resultant paths of all 3D matter particles in the macro body are linear in the same direction, with slight curvatures to form wavy shapes in space.

With respect to macro body's spin axis, its 3D matter particles may have no linear motion in space other than those motions around the spin axis, produced by macro body's spin motion. Constituent 3D matter particles of the macro body will appear to move around spin axis of the macro body. However, these motions are apparent only with an assumed static state of the macro body's spin axis. They are apparent only when real linear motion of the macro body is neglected. Since these motions are imaginary, no physical actions can be attributed to such motions.

As the spinning macro body is moving in linear direction, every 3D matter particle on its surface (and interior) moves in the same direction but at slightly different linear speeds. It is the differences in the magnitudes of absolute linear motion of constituent 3D matter particles that creates the illusion of macro body's rotary motion to an observer. Although, spin motion of the macro body is observable in relation to its axis, with respect to absolute reference, constituent atoms of the macro body move in (curved) wavy paths in the same direction [2].

Magnitude of observed spin motion of a planetary body is too small compared to its linear speed along its orbital path. Therefore, a planetary body in its orbital path has no real spin motion in space (with respect to absolute reference). Fluid core of a spinning planet does not swirl within the planetary body. Only real changes in parameters of a macro body can cause developments of real phenomena; like: magnetism about it. Planetary magnetism generated by these macro bodies are as explained below, rather than as a result of (apparent) swirling motion of magma within them.

Magnetic field about a moving body:

Let us consider a free fluid macro body, moving in a straight line path, in space. All fluid macro bodies in free space acquire spherical shape. Generally, a large composite fluid macro body is likely to contain many types of independent stable atoms in it. These atoms, being tubular in shape, are likely to orient themselves in the direction of motion of the macro body. By orienting themselves in this fashion, they experience least resistance to their motion. This is a mechanical action and their identical electric charges, due to secondary electric field, may face forward or rearward direction, at random. Secondary electric fields of equal strengths in opposite directions neutralise each other. Un-neutralised secondary electric fields of atoms in the macro body, together, form an electric field about the moving fluid macro body. Thus, any very large fluid
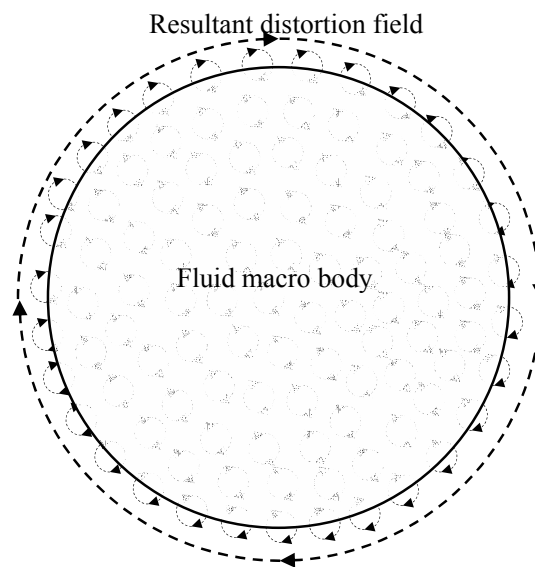

Figure 4

macro body is likely to have a resultant electric field about it in planes perpendicular to its direction of motion.

Figure 4 shows the view of a large fluid macro body (moving at a considerable linear speed), from the rear. Circle in thick black line represent the fluid macro body. Let us consider a hypothetical condition, where all free atoms in the macro body orient themselves in phase with each other. Secondary electric fields of these atoms are shown by circular arrows in the figure. Since they are in phase with each other, together they produce resultant electric fields in all planes, perpendicular to the direction of macro body's motion. Lines of force of resultant distortion field exist around the macro body, in all planes perpendicular to direction of its motion. It is an angular distortion field with lines of force of very low curvature. Due to low curvature of lines of force, magnetic nature of the distortion field will be prominent. As the fluid macro body is sufficiently large, resultant distortion fields around the body will appear as magnetic field without definite magnetic poles.

Figure 5 shows the view of a large fluid macro body (moving at a considerable linear speed), from the rear. Circle in thick black line represent a very large fluid macro body. A, B, C, D, E, F, G, H, I, J, K, L and M show different regions of the body in a plane, parallel to equator of the body. Free atoms in the macro body orient themselves in the direction of macro body's linear motion. As it is a mechanical action, free atoms orient at random with same electric charge facing forward or to the rear. Resultant of secondary electrical fields in different regions may have different polarity. As shown in the figure 5, resultant of secondary electric fields in regions A, B, E, F, H, M and K have their positive charge facing to the rear of the macro body. Similarly, resultant of secondary

Resultant distortion fields

Figure 5

electric fields in regions C, D, L, G, J and I have their negative charge facing to the rear of the macro body. Together, they may create resultant electric fields about the macro body in all planes, perpendicular to the direction of macro body's motion. Lines of force of distortion fields exist around the macro body, in all planes perpendicular to direction of its motion. It is an angular distortion field with lines of force of very low curvature. Due to low curvature of lines of force, magnetic nature of the distortion field will be prominent. As the fluid macro body is sufficiently large, resultant distortion field around the body will appear as magnetic field without definite magnetic poles.
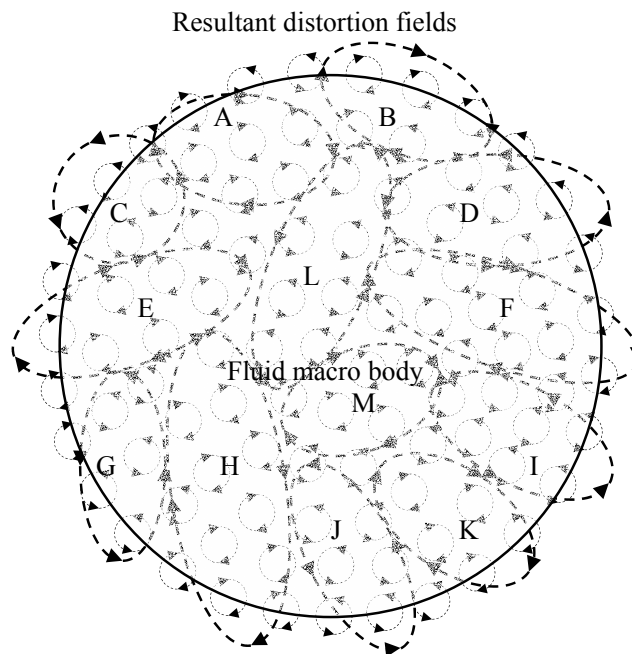
Let the interior of the large macro body (moving at a considerable linear speed) consist of viscous fluid or solid matter and lower density fluid cover its surface, as shown in figure 6. As free atoms in viscous fluid and solid matter are not free to re-orient themselves, due to linear motion of the macro body, only those free atoms in the surface area of the macro body align their secondary electric fields with direction of macro body's motion. Therefore, interior of the macro body does not take part in creation of distortion field about the macro body.

Let us assume the surface of the linearly-moving macro body is covered with fluid matter of low viscosity. Freely suspended atoms in the fluid matter tend to line-up in the direction of macro body's linear motion. As such alignments are at random, direction of similar charge of their secondary electric fields may face forward or rearward. Dashed elliptical arrows represent resultant distortion fields produced due to secondary electric fields of free atoms, floating in these regions of the fluid part of the body.

Different regions on the surface of the macro body may produce resultant electric fields of different directions and magnitudes. In figure 6, in the plane shown, resultant electric fields A, C, E and H are in clockwise direction and others are in opposite direction. Resultant electric fields A and H are of higher magnitudes; C, E, F and G are of medium magnitudes and B and D are of small magnitudes. Grand resultant electric field of all these resultant electric fields of different regions will be around the whole macro body. Such resultant electric fields may be present in every plane, perpendicular to direction of macro body's motion. It is an angular distortion field with lines of force of very low curvature. Due to low curvature of lines of force, magnetic nature of the distortion field will be prominent. As the macro body is sufficiently large, resultant distortion field around the macro body will appear as magnetic field without definite magnetic poles.

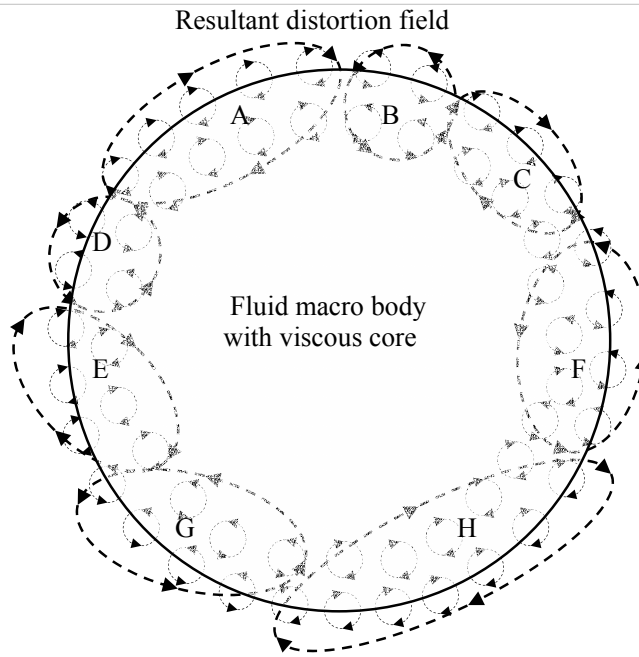Resultant distortion field

Fluid macro body with viscous core

Figure 6

Figure 7 shows a large linearly-moving macro body with viscous core, from the rear. Surface of the macro body is covered uniformly by fluid matter of low viscosity. Let this macro body be spinning about an axis XX, perpendicular to its direction of linear motion. Upper region, in the figure, recedes from and the lower region approaches the observer. Linear speed due to spin motion adds to upper region's linear speed and linear speed due to spin motion deducts from lower region's linear speed. However, all regions in the macro body moves linearly in the same direction – away from observer. Difference in linear speeds at various surface regions affects independent floating free atoms in the fluid matter differently. More free atoms will be re-oriented in the regions of higher linear speed. Thus, for the same number of free atoms in a region, upper regions (in the figure) will have greater number of re-oriented free atoms compared to middle regions. Lower regions (in the figure) will have lesser number of re-oriented free atoms compared to middle regions.
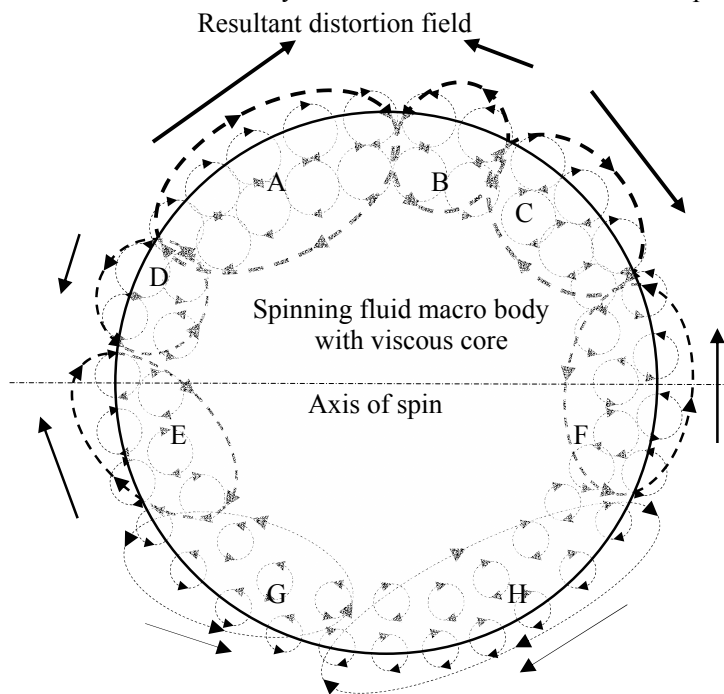
Resultant electric fields, produced in any region will depend on number of secondary electric fields, surviving neutralisation. Relative strength of distortion fields in the plane are shown by straight arrows associated with each region in the figure. Similar distortion fields

Resultant distortion field

Spinning fluid macro body with viscous core

Axis of spin

Figure 7

are produced in all regions in every plane perpendicular to the direction of motion of the macro body. They are angular distortion fields with lines of force of very low curvature. Due to low curvature of lines of force, magnetic nature of the distortion field will be prominent. As the macro body is sufficiently large, resultant distortion fields will appear as magnetic field without definite magnetic poles.

All very large macro bodies have most of the natural chemical elements as their constituents, in various physical states. Ferrous matter constitutes greater part of cores of these bodies. Ferrous materials are easily affected by magnetic fields. Continuous exposure to magnetic fields in the same direction is likely to have more or less a permanent effect on them. Ferric core of a large macro body, exposed to magnetic lines of force in the same direction, is likely to acquire permanent magnetism.

Differences in linear speeds of matter particles, at various locations in a large macro body, appear as the spin motion of the macro body. Due to this apparent spin motion of the macro body, lines of force of distortion fields in the direction of (parallel to) spin axis, in planes perpendicular to macro body's direction of motion, are the only ones that keep steady relative direction with the spin axis of the macro body. Directions of lines of force of all other resultant distortion fields about various regions of the macro body are intermittent about spin axis of the macro body. They cannot contribute towards permanent magnetism of ferric interior of the macro body. Effects of these distortion fields on the core-body will be only of temporary nature. Therefore only those distortion fields, whose lines of force keep steady direction with respect to spin axis of the macro body, need to be considered. These are limited to planes containing (and parallel to) spin axis of the macro body and perpendicular to its direction of motion.
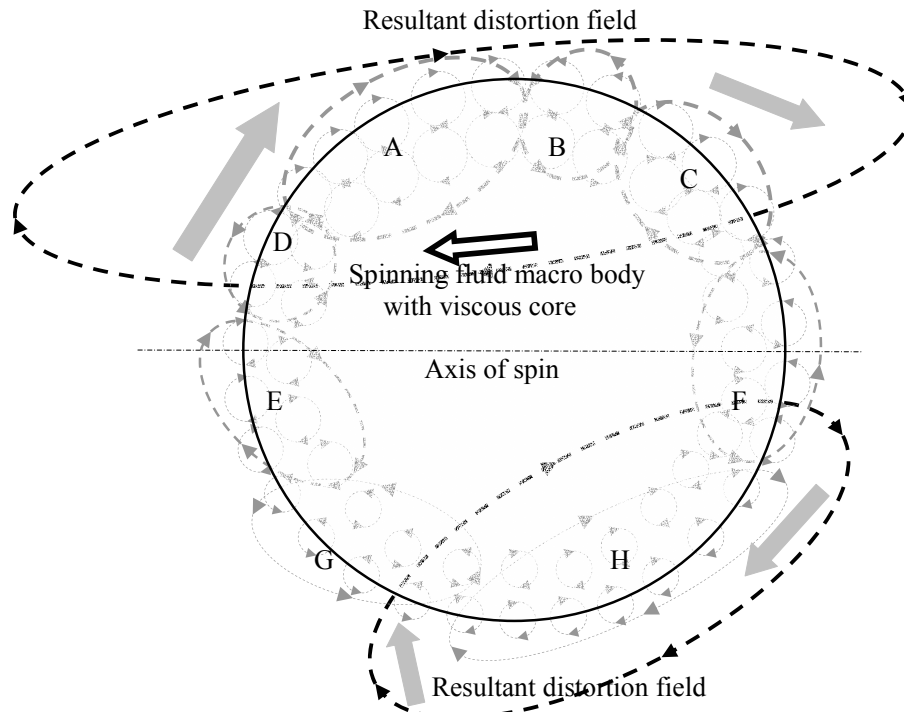

Figure 8

Figure 8 shows resultant distortion fields about a plane of linearly moving, spinning macro body. View is from the rear of the macro body. Upper region of the macro body, in the figure, has higher linear speed (receding from the observer) and lower region of the macro body, in the figure, has lower linear speed (approaching the observer). The macro body is assumed to have a ferric core. Resultant distortion fields are shown by black dashed ellipses with arrows in the direction of lines of force. As shown in the figure, lines of force of resultant distortion fields are identical (both are clockwise). Directions of magnetism, affected by the lines of force near the surface of the macro body are shown by thick gray arrows. Since they are in opposite directions in upper and lower hemispheres, with respect to spin axis of the macro body, they tend to neutralize each other. Only the remaining part will appear as overall resultant magnetic field of the macro body, as shown by thick block arrow.

As shown in figure 8, resultant distortion fields in upper and lower hemispheres are of similar angular direction. They being in opposite directions, with respect to core of the macro body, tend to neutralise each other. Magnitude of magnetic field, induced in the core, will be resultant of these two distortion fields. If these resultant distortion fields are dissimilar, they will enhance each other along the spin axis of the macro body and act as a single magnet.

Ferric matter in the core of the macro body, being under steady directions of distortion fields, will be affected by them. Gradually, core body of the macro body will attain permanent magnetism corresponding to overall resultant distortion field as shown by the thick block arrow. Magnitude of induced magnetic field not only depends on magnitudes and relative directions of distortion fields about upper and lower hemispheres of the macro body but also on ferric content in the core of the macro body and its distribution within the macro body. As the macro body apparently spins about its axis, these factors vary continuously. Parameters of distortion fields, created within the macro body, vary from instant to instant. Presence of ferric core of the macro body and magnetism induced in it stabilises and sustains strength and direction of magnet about the macro body.

Planetary magnetism:

Spin motion of a planetary body, as mentioned in this paragraph, is to be understood as apparent rotation of the macro body with respect to its spin axis. This is the result of different magnitudes of linear speeds and directions of constituent 3D matter particles of the macro body, in the same direction, with respect to absolute reference. Although, resultant distortion field (producing planetary magnetism) at any point on the surface of the planetary body is the sum of secondary electric fields in that region, curvature of lines of force being very small, they exhibit their magnetic nature. Hence, all such distortion fields are addressed as magnetic fields in this paragraph.

Interior of a very large macro body, similar to earth, is in liquid state. Magma below its crust is dense and hence, free floating atoms in it may not be free enough to re-orient themselves along the direction of the body's linear motion. Magma, being nearer to the spin axis of the planetary body, its apparent spin speed is relatively low. We may, for the present, disregard the contribution of free atoms in the magma towards planetary magnetism. Atmospheric gases are unsteady and are mostly in agitated state. Hence, their free atoms cannot contribute much towards development of the planetary magnetism. Liquids or not-very-dense fluid matter on the surface of planetary body (like: ocean waters) are relatively calm and carry atoms of most elements in free form. Agitation of fluid surface-matter is mainly limited to surface of the planetary body. Hence, free atoms in the fluid matter (below the surface) tend to remain aligned in the direction of planet's linear motion. So, it is the fluid matter in the equatorial region of an apparently spinning planetary body that (mainly) helps to form its magnetism. A planet's solid matter, contrary to present belief, cannot contribute towards creation of its magnetic field. Conversely, it is affected by 'created' planetary magnetism and helps to stabilise and sustain continuity of magnetism about a planet. Magnetic field, produced in any region (on the surface) of a planet, is roughly proportional to the quantity and apparent tangential speed of fluid matter in that region.

Most of larger planetary and central bodies are spherical in shape. A spherical body has two hemispheres on either side of its equator as shown in figure 9. We shall take the southern hemisphere of a planetary body for discussion. Let B and C be two points on planetary body's surface on the same latitude. Similarly let A and D be two other points on planetary body's surface at higher latitude. For the time being, let us suppose that the surface-fluid matter is calm and its consistency is identical throughout this region. Free atoms in the fluid-matter produce magnetic fields, whose strength is (roughly) proportional to quantity of fluid matter at these points. Let the strengths of these magnetic fields and their directions be represented by A'AA', B'BB', C'CC' and D'DD'. Direction of lines of force of the magnetic field, produced at a point near the surface, is tangential to the surface of the planetary body, at that point. Similar magnetic fields are produced at every point on the surface of the planetary body, wherever large body of fluid-matter is present. These, in turn, induce nearby ferrous core matter with permanent magnetism. Resultant of all these magnetic fields, produced in the southern hemisphere is EE'. Similarly fluid-matter on the northern hemisphere of planetary body also produce its own resultant magnetic field and induce core matter with permanent magnetism in the direction FF' shown in the figure 9. Difference in their direction from the planetary body's spin axis is due to the difference in the quantity of fluid-matter at

different points on the surface and quantity and distribution of ferric core materials of the planetary body. At each point on the surface of the planetary body, magnetic field is tangential to body's surface. All magnetic fields produced and sustained at certain latitude, around the surface of the planetary body, form surface of a conical section, in space. Their resultant may be found by adding them, taking into consideration both their magnitude and direction. Resultant magnetic fields at both hemispheres of the planetary body are separate. They are concentrated only at the outer pole of the magnet (in space, away from the planet). At the inner pole of the magnet (which is towards the equator), lines of force spread out, around planet's equator. Separation of hemispheric magnetic fields is due to the curvature of the planetary body's surface at the equator. Cones of magnetic fields, produced at particular latitudes, are distinct and separate, each having its apex at different points in the space.

Axis of magnetic field EE' in figure 9, which is the resultant of all sustained magnetic fields of southern hemisphere has one of its pole near (in the direction of) the planetary body's south geographical pole and the other pole some where inside and near planetary body's center. Similarly the magnetic axis of
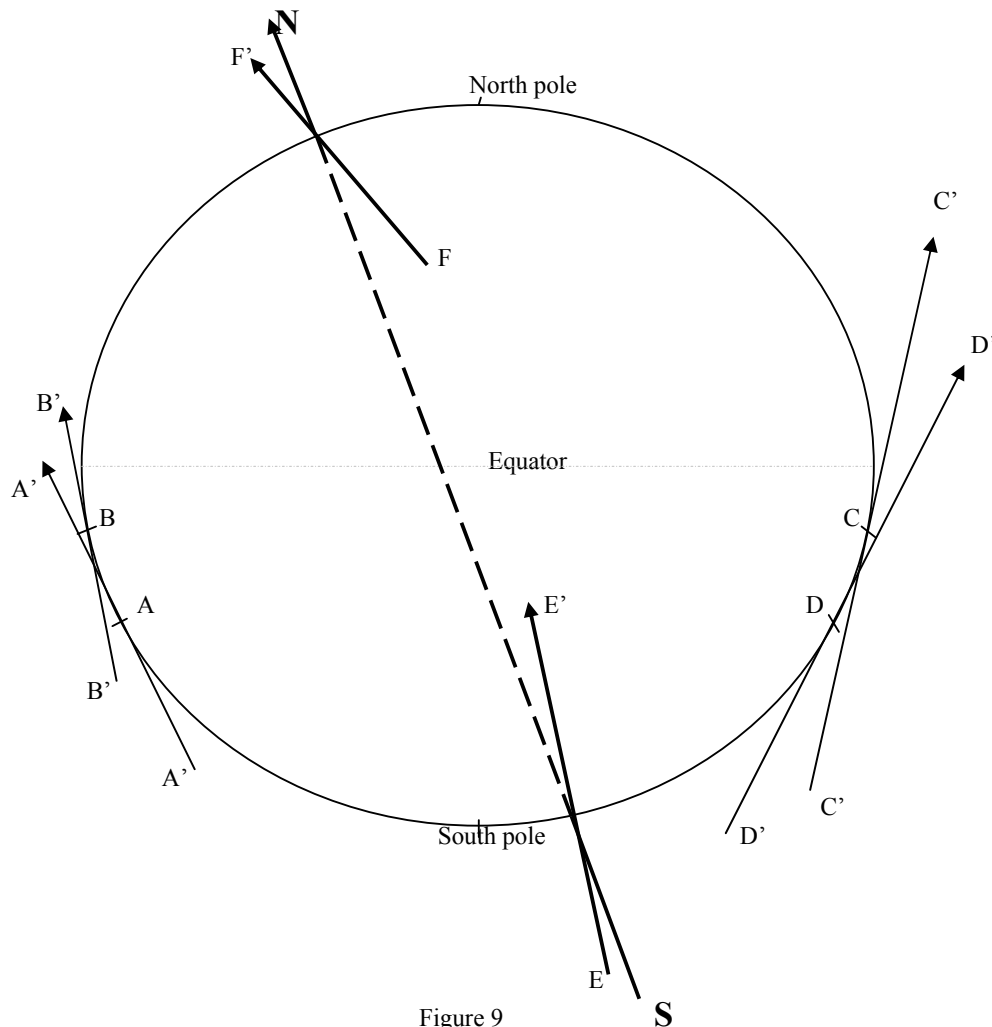

Figure 9

northern hemisphere has one of its poles near (in the direction of) the planetary body's northern geographical pole and the other pole somewhere near planetary body's center. These apparent magnetic fields, together, produce the planetary body's magnetic field, whose axis is along the dashed line NS, shown in the figure. Line NS represents the planetary body's magnetic axis.

Since the magnetic field of each hemisphere is separate and independent, a planetary body can be considered to have two separate magnets placed somewhat end-to-end. Their strength, direction and polarity are independent of each other. It is possible to change any of these parameters, independent of

others. Natural upheavals in surface fluid-matter or gradual changes in its distribution are likely to affect strength and direction of planetary magnetism. Any change in planetary magnetism due to variations in the structure of solid crust or core is likely to be of temporary nature.

Apparent spin speed of a planetary body greatly influences the east-west alignment of free atoms. Hence, planets with greater apparent spin speed have greater chances to have stronger magnetic fields. Bodies with no spin motion or are spinning at very low speed have least self-induced magnetism. However they may exhibit magnetic property, induced by their linear motion or induced by surrounding magnetic fields extending from other bodies. Ferric content of a planetary body influences maintenance of its permanent magnetism. Greater ferric content enhances magnitude of planetary magnetism. Main parameters, to determine the magnitude of planetary magnetism created in any direction, are the number of free floating atoms in the fluid-matter and their relative directions. This information is very difficult to obtain. Further, the magnetic strength in a hemisphere cannot be measured in isolation. Hence, it is almost impossible to determine the magnitude of planetary magnetism (due to apparent spin motion) from fundamental parameters. Magnetic strength is further influenced by ferric content of planetary body's core and its distribution. Rough relative strength and direction may be determined from the known distribution of relatively calm fluid-matter on planet's surface. Bodies of very large planets and stars are wholly fluid and they have very dense atmosphere, which may also contribute towards their magnetism. This helps them to have much stronger magnetism.

Conclusion:

Linear motion of a planetary body is extremely large compared to its spin motion. Hence, with respect to absolute reference, every particle in a planetary body move in the same direction and spin motion of the planetary body is an apparent phenomenon. Planetary magnetism of an apparently spinning planet is the result of free floating atoms/molecules in relatively calm fluid on or about its surface. Magnetic field, created by secondary electric fields of free floating atoms is sustained by induced magnetism of ferric content of planetary body's crust and core. Magnitude of resultant magnetism depends on the apparent spin speed of the macro body, quantity of calm fluid on its surface and ferric content of its solid/core part. Similar magnetic fields are present on all large, apparently spinning bodies with ferric core, which have a relatively calm fluid on it. Since all very large bodies are fluid throughout, they are likely to exhibit greater magnetism.

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