



Equilibrium of Planets in The Solar System-A New Approach

D. P. Sheth 

R. H. 40, Konark Pooram, Kondhwa, Khurd, PUNE – 411 048, INDIA

fundamentaljournals@gmail.com

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ABSTRACT

As per Newtonian laws of motion and gravitation, the gravitational force of attraction governs all the planets of solar system. Here we discuss equilibrium of planets in which gravitational force represents one side and the magnetic hold the other side. The planet achieves equilibrium in the solar field at that point where its centrifugal (i.e., gravitational) force balances the magnetic hold of sun. The sun develops magnetic flux on the planet according to its surface area, magnetic content and rotational velocity. As per available data, calculations in this regard are in good agreement with the functions achieving rotational and orbital motions and equilibrium of planet, thus supporting our concept. Therefore, this theory provides the missing link explaining magnetic interaction with the centrifugal force of planet to achieve equilibrium, hold and motion.

Keywords: Magnetic fields – Sun, Magnetic fields – Solar system, General

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INTRODUCTION

This research aims at the understanding of equilibrium of planets and their functions in which magnetic force plays an important role. We assume that magnetic force pervades throughout universe which is in energy form. To understand, we consider the case of our solar system which is a part of universe. Therefore, this research differs from the old theory of Sir Newton and others where gravitational force of attraction has been considered to govern all the planets of the solar system. As per my findings, it is the magnetic force along with the centrifugal force (i.e repulsive version of gravitational

force) is responsible for the equilibrium of planet in the solar system. We discuss as under:

MAGNETIC FORCE

The magnetic force is in the form of magnetic lines that conduct electric force. It develops as the supplementary function of electric force.

The transformations and actions have taken place from the capable form of energy content which is Hydrogen Atom comprising of Proton and Electron as its two opposite components. Hence, Hydrogen Atom is the required Energy

Quantum of Universe (D. P. Sheth). To understand, we discuss about electric force as below. The Electric Force is the active version of hydrogen atom in which the hydrogen atom as a whole convert into activity similar to that of an electron. The hydrogen atom can be presented as

$$m_p \times r_p = m_e \times r_e \quad (1)$$

where m_p and m_e are the masses and r_p and r_e are the rotations of proton and electron respectively. The left-hand side represents proton while right hand side is electron. In activation, proton contributes its strength to electron in terms of activity and then subsides. We name this active form of hydrogen atom as Active Electron. Hence, electricity is composed of active electrons.

The neutron is the opposite form of hydrogen atom in which the activity of proton and electron is withheld due to hold between them. This held state of proton-electron assembly is NEUTRON. Here we do not go in details of the dynamics of neutron formation, but neutrons are responsible for the development of magnetic force. In neutron, the usual alignment of proton to electron is at 90° as they are opposite of each other and in hold of one another. Hence, neutrons have nil activity. Therefore, they have the tendency to be attracted towards active electric force. Hence, the electric charge enters neutron on establishing contact with the sun. It enters from proton's side as proton is opposite in activity to that of electric charge. The passage of electric charge in neutron imparts activity to proton and compels the electron to align in line with the passage of electric charge. This means the electron aligns south of proton changing its alignment to 180° which becomes North-South Magnetic Axis. During this change of alignment, rotations of electron synchronize with those of proton and accordingly, the magnetic axis formed rotates anti-clockwise. This suggests that the charge flows from the north pole (i.e. proton) to the south pole (i.e. electron) of Magnetic Axis. The charge conducted through neutron is as per conducting capacity of neutron and proceeds as per nut-screw rule. The nut-screw rule ensures that one force passes through the other if they have opposite activities and their rotational axes lie parallel in one line. This is just like a nut passing on the screw due to opposite turns. The Faraday's Laws of Induction confirm this fact that magnetic force is the carrier of electric force which we note by its induction to the object disturbing the magnetic field.

The stars are the nuclear reactors producing electric force. Hence, they develop magnetic fields. The neutrons existing in space are attracted towards electric force and line up linking to one another in the manner N-S-N-S due to passage of electric force received from the star. Thus, magnetic lines are formed in energy form and they exist in conjunction forming a plane. Thus, magnetic field of star is developed which is an energized field through which electric force spreads to long distances (Sears, Zemansky, & Young, 1982).

Thus, the masses of solar system receive electric force for their functions like rotation, hold and motion. Magnetic lines survive as long as the flow of electric charge remains continuous. If the flow stops then the magnetic lines break down and vanish. Attraction persists in these magnetic lines in

such manner that North Pole attracts South Pole and vice versa. A magnetic circuit is established between the two poles of sun just like an electric circuit'

MAGNETIC MASS

From the above knowledge, it is clear that neutrons are responsible for the development of magnetic force. In elements, magnetism is due to unshared neutron content. From the chemistry of elements, we find that every atom consists of protons and neutrons. Here according to me, proton represents proton-electron pair (i.e., hydrogen atom) as proton or electron does not exist singly. So, in space, hydrogen atoms combine with neutrons in equal ratio forming a closed structure i.e., Hydrogen Gas which is a mass form (D. P. Sheth). The stars develop from Hydrogen Gas which is an established fact. In the nuclear reaction, elements are formed with the expulsion of heat (D. P. Sheth).

From the periodic table of elements, we find that every element has a different configuration. The atomic number represents number of electrons which according to my analysis signifies number of hydrogen atoms. The atomic mass represents total number of hydrogen and neutron atoms. Deducting atomic number from atomic mass gives us total number of neutron atoms present in the element. As hydrogen atom combines with neutron in equal ratio, we deduct atomic number from total number of neutrons. This gives us the balance neutrons not involved in combination with hydrogen atoms. This unshared neutron content is the magnetic mass of the element and exists in energy form as its integral part. The magnetic mass helps the element to align with the magnetic forces of the field. To ascertain magnetic mass, I cite the example as under: Let us consider element Aluminum. Its atomic weight i.e., mass is 27, atomic number is 13 which means 13 hydrogen atoms. Hence deducting 13 hydrogen atoms from Atomic mass, we get 14 total number of neutrons present in Aluminum. Now 13 hydrogen atoms combine with equal number of neutrons. Accordingly, one neutron atom is left unshared which exists in energy form and as the integral part of Aluminum. Hence the Magnetic mass of Aluminum is 1. Thus, unshared neutrons add mass to the element but are not involved in the formation of closed structure i.e., Mass form (D. P. Sheth). In mass formation, neutrons act as the link between hydrogen atoms. Due to unshared neutron content, the element displays magnetic character. Non-magnetic elements do not have unshared neutron content (i.e., Magnetic Mass). Similarly, we can find magnetic mass of the element Iron (Fe) which is 4 and it is easily magnetized as compared to aluminum. The planet contains magnetic and non-magnetic masses out of which magnetic masses help the planet to align in the field of the primary i.e., the sun.

MAGNETIC FIELD OF SUN

The sun develops heat, light and electricity (as by-product) in its nuclear reaction due to which it develops magnetic field. The sun delivers electric charge to its members through magnetic field and thus every member of solar system has the magnetic field.

ROTATION

As per scientific knowledge, rotation of mass is due to action of electric and magnetic force acting at right angles (Motor Principle). For rotation to exist in particular direction, it is essential that its rotation axis should be held from its two ends so that the mass rotates about the rotation axis. If it is not so, then the mass rotates in every possible direction. The motor principle states that when electric current is passed through a conductor under the influence of magnetic force, it develops rotation.

Regarding the direction of rotation, we take the help of Fleming’s Left-Hand Rule which states that if the thumb and the first two fingers of left hand are extended at right angles to one another so that a set of three mutually perpendicular axes is formed, then the first finger points in the direction of flux (From North to South) the second finger shows the direction of current (i.e., from +ve to -ve), then the thumb shows the direction of force (Yarwood, 1973). Considering these conditions with respect to Earth and assuming it to be a conductor and assuming it to be situated in the magnetic field of sun, then the earth develops its rotation as under see Fig (1).

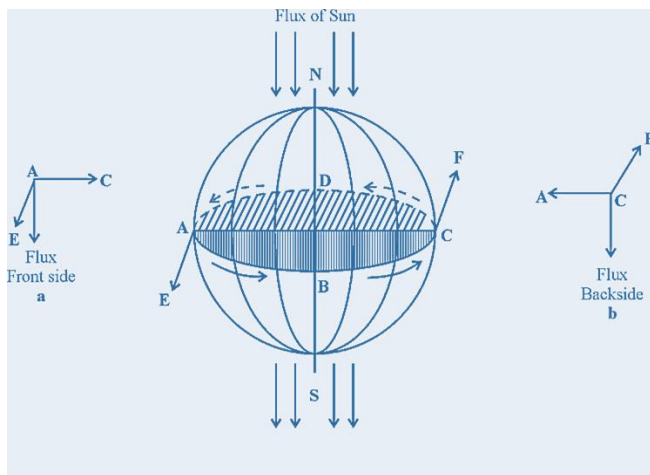


Figure 1 Earth as conductor of electricity. N-S is the magnetic axis of earth parallel to the magnetic flux of sun. ABCD is the cross-sectional plane of earth perpendicular to the magnetic axis. (a) and (b) show the direction of force according to Fleming left hand rule.

Now in Fig 1, due to dynamo action, electricity is induced to earth developing a magnetic field. Thus AC and CA are the directions of current, flux being in north-south direction. Then according to Fleming’s left-hand rule, force is developed in the directions AE and CF to give an anti-clock wise rotation. The rotation is displayed about the magnetic axis. This means the rotational axis is magnetic axis. Now if the earth displays its actual rotation from west to east, which matches with the direction of rotation according to Fleming’s left-hand rule. Then it proves that the earth follows motor-principle and is situated in the magnetic field of sun. Its rotational axis i.e., magnetic axis is aligned with the lines of flux of the sun, and is fixed in that direction.

ELLIPTICAL ORBIT AND RULES OF MOTION

Orbits of planets are described following the conditions of magnetic force as, 1- North-South magnetic axis of planet should align with the lines of force of the sun and therefore held in that direction. 2-The Lines of force of sun and those of planet should be perpendicular to one another and equal in strength to maintain hold and equilibrium. 3-The direction of orbital motion of planet will be in the direction perpendicular to its magnetic axis i.e., rotational axis.

The magnetic field of round object takes the shape of an ellipse in three dimensions (i.e., a disc like structure bulging at the center). Therefore, the magnetic field of sun will achieve the shape of an ellipse. Planets in the solar system move as per the equilibrium of forces following aforesaid conditions. Every point on the orbital path lying in equatorial plane of magnetic field is equidistant from the center i.e., the sun. This means that orbit is a perfect circle, while the points on the path lying in planes other than equatorial, will vary in distances from the center. Therefore, their path will be elliptical when plotted according to distances from the center. Accordingly, the position of sun with respect to the orbit will be at the center. (See Fig 2 & 3).

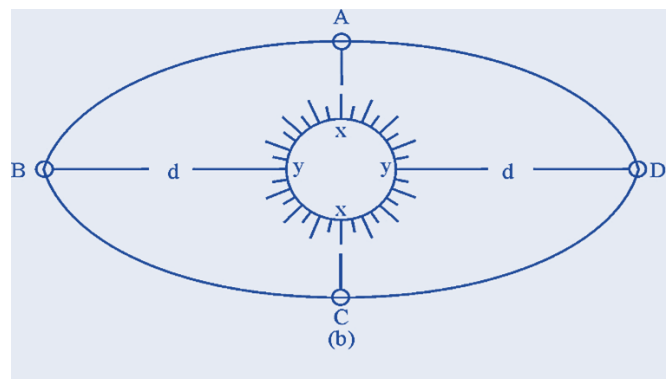


Figure 2 Earth in the magnetic field of sun. As per distances from the sun, the pad is elliptical. Points A and C are the near points and B and D are the farthest points on equator.

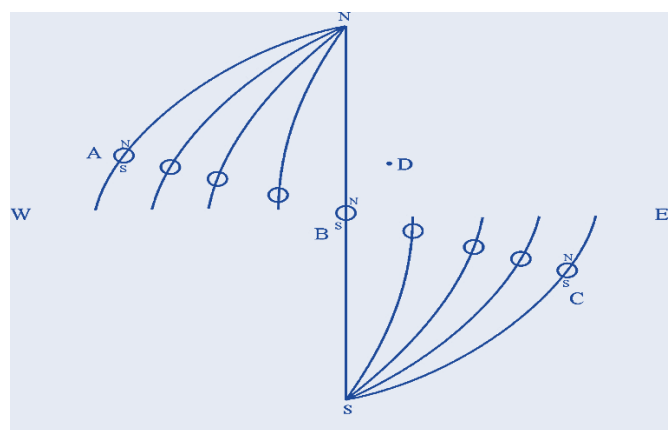


Figure 3 Orbital path of Earth. The earth orbits the sun through points A, B, C and D from the northern to the southern hemisphere of magnetic field of sun. During its orbital motion Earth maintains the alignment of magnetic axis i.e., rotation axis to be parallel to the lines of force. B and D are the points on the equator.

It is thus clear that rotational axis is the magnetic axis as the earth follows motor-principle. According to the rules of motion in the magnetic field, a planet will cross the equator twice during its orbital motion. This means that the planet moves from the northern to the southern hemisphere of magnetic field of sun and back completing the orbit. (See Fig.3).

MAGNETIC HOLD

It is now proved that the magnetic field of sun exists. Magnetic lines divide and separate from one another equally, reducing in intensity as they proceed in space away from the sun. Considering the sun’s force (i.e. flux density) at the distance of earth, it is very weak. These weak lines of force of sun align with the magnetic mass spread throughout the surface of earth. This alignment appears to have taken place during the formation of earth when it was in the gaseous form.

So, it is just like threads passing through a pearl. In other words, the earth becomes the part of magnetic lines of sun, maintaining continuity. Now if we assume the rotation of earth to be nil, then these flux lines will have no strength to create hold or equilibrium. But due to rotation, dynamo action takes place in which electricity is induced and ejected to earth from the magnetic lines of sun. As per equilibrium principle, an opposite force (emf) is developed in the said flux lines to balance the ejection, just as firing of a bullet gives us the backwards thrust. The flux lines of northern hemisphere of earth will have the pull towards North Pole of sun while those of southern hemisphere will have the pull towards the south pole of sun. This means that north and south poles of sun attract respective hemispheres of earth towards them. This will cause equilibrium of earth meaning it is free to move and rotate but will maintain its alignment with the forces of the sun’s field. Faraday’s laws of induction display the said fact. (Halliday, Resnick, & Walker, 2013). (See Fig. 4(a) & 4(b)).

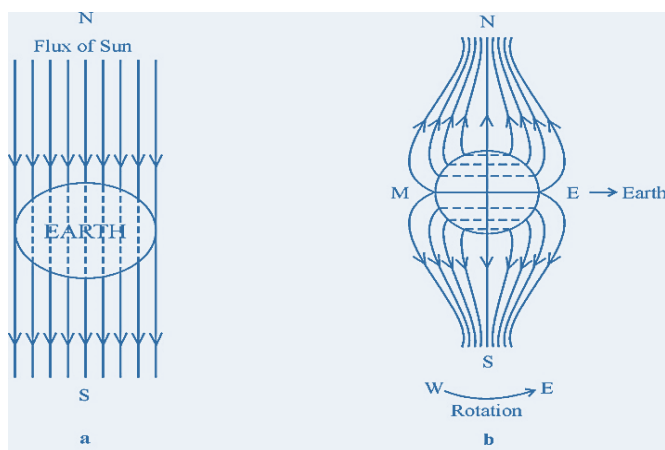


Figure 4 Magnetic Flux of Sun. **a)** Lines of force of sun align with the magnetic mass of earth in then-S direction of flux. Rotation of earth is assumed to be zero. **b)** Due to rotation, dynamo action take place. The arrows show the direction of force of attraction developed towards the respective poles of sun. *ME* is the magnetic equator.

In figure 4(b), we note that flux lines of both the hemispheres of Earth have a pull towards their respective poles of sun. Due to rotation of Earth, the flux lines of both hemispheres get twisted meaning they concentrate merging in one another develop strength so that the flux of north hemisphere and that of south hemisphere act equally and opposite to each other causing equilibrium of earth in the solar field. Here we note that lines of force of the sun’s field and those of the earth’s magnetic field are perpendicular to one another and equal in strength. See figure 5. Hence the Earth achieves hold as the field lines of Sun and Earth are perpendicular to one another and equal in strength. The earth maintains fixed distance from sun while orbiting due to balancing between centrifugal force of earth and the magnetic hold of sun. Force developed in the lines is as per following equation (Clark’s 1997; Yarwood, 1973).

$$F = B I ds \sin \theta \tag{2}$$

Where *F* is the force, *B* is the flux density of earth (i.e. planet), *I* is the current induced and *ds* is the small unit area and θ is the angle subtended by flux lines with the surface of earth. Therefore it implies that the force developed is due to combined action of magnetic flux density and electric charge (i.e. force) received from the sun. Accordingly magnetic flux density is proportional to the electric charge. It means more is the flux density, the more is the induction of electrical charge which is proportional to the disturbance i.e. rotation.

Therefore, $I \propto r$ (where *I* represents induction of charge and *r* is rotation). Now in Equation (2), *B* is the flux density, which is defined as the number of lines of force passing through unit area, i.e.1 cm² (described in Clark’s Tables 1997). Unit is gauss. Due to rotation, these lines concentrate to develop strength just as in the case of rope, twisting of number of strings make the rope stronger. So, it follows that flux density ‘*B*’ is proportional to the product of magnetic density and rotational velocity. Considering proportionality constant to be unity, it can be written as:

$$B = \rho_{mag} \times V_{rot} \tag{3}$$

Where ρ_{mag} represents the magnetic mass per unit volume of earth i.e. magnetic density, expressed in kgm⁻³ and *V_{rot}* is rotational velocity of earth (i.e. planet) in ms⁻¹.

Magnetic flux Φ is defined as the number of lines of force held by the earth (i.e. planet) according to its area (Clark’s 1997). Therefore, according to the definition, magnetic flux Φ through any area perpendicular to the magnetic flux, is proportional to the product of the area and the field strength as under (Yarwood, 1973).

$$\Phi \propto A \times H \quad \text{or} \quad \Phi = \mu \times A \times H \tag{4}$$

Where Φ is the magnetic flux in Maxwell, *A* is the area in sq. cm. (as we consider the value of Φ in Gauss), *H* is the field strength of sun’s flux in Am⁻¹ and μ is the magnetic permeability of the medium.

The magnetizing force of sun (i.e. magnetic field strength H) induces magnetic induction B (i.e. Flux density B) to earth through dynamo action in proportion to the disturbance developed by rotation. This means that magnetic flux density B of the earth, develops in proportion to the electricity induced. Both are different quantities. H is expressed in $A\ m^{-1}$ and B is expressed in gauss. Both are related as under:

$$B = \mu \times H \quad \text{or} \quad \mu = \frac{B}{H} \quad (4')$$

Here μ is the permeability of free space containing magnetic force and it is uniform i.e., constant (Clark's 1997; Sears et al., 1982) It is the function of H and it is the ratio of magnetic induction to the magnetic field producing it. Its value is $4\pi \times 10^{-7}$ wb. $A^{-1}\ m^{-1}$. As per this relation, B equals H in terms of strength. Therefore Equation 4 reduces to,

$$\phi = B \times A \quad (5)$$

Now magnetic fluxes are developed at both the hemispheres of earth containing magnetic poles. Both these fluxes work opposite and are equal in strength creating equilibrium. The hold occurs between the primary and the secondary when the planet (i.e. earth) through its orbital motion creates the equivalent centrifugal force (i.e. gravitational force) equalizing the strength of fluxes working at both the hemispheres of the planet, (see Fig. 5).

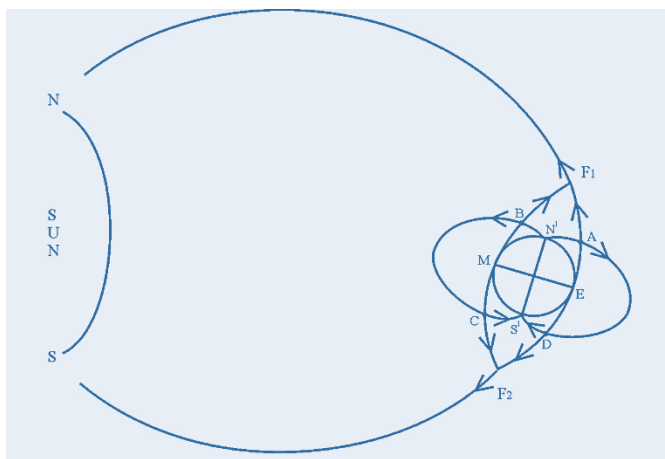


Figure 5 Hold of earth in the magnetic field of sun. Hold is created at both the hemispheres of earth during the orbital motion, as lines of force of sun and earth work at right angles at A, B, C and D. F1 and F2 show the direction of force of attraction that equalizes the orbital force.

Now when masses or planets are in the same magnetic field, then their ratios of magnetic flux to mass will have the same value (i.e., constant) as that of the primary throughout the solar system. Hence it follows that the ratio of magnetic flux of sun to that of earth is proportional to the ratio of their masses. Considering proportionality constant as unity it is expressed as under:

$$\frac{\phi_s}{\phi_p} = \frac{M_s}{M_p} \quad (6)$$

Where ϕ_s and ϕ_p are the magnetic fluxes of sun and earth in maxwell and M_s and M_p are the masses of sun and earth in kg respectively. Therefore, it gives the relation that magnetic flux ϕ of any planet is proportional to its own mass. After equating it is as under:

$$\phi_p = S \times M_p \quad (7)$$

Here S is the solar constant which is the ratio of magnetic flux to mass of planet in the whole solar system and at large in the universe. Its value is 0.34991×10^{-6} Maxwell Kg^{-1} .

ORBITAL MOTION

The orbital motion of earth around the sun is the result of resistance of magnetic hold of sun to the rotation of Earth. This can be compared to that of moving car which achieves linear motion due to resistance of the road to its rotating wheels. Hence in case of earth, due to resistance of magnetic hold to the rotation of earth, the earth's lines of force change hands with those of the field achieving linear motion i.e. orbital motion around the sun and maintaining fixed distance due to balance between centrifugal force of earth and the magnetic hold of sun. If the earth is not able to develop the required force, then the earth moves to that place where the said equilibrium between the two is established. The equation of equilibrium of earth (or the planet) is represented as under:

$$\phi_p \times V_{orb} = M_p \times F_{bal} \quad (8)$$

Where ϕ_p is the magnetic flux of planet in Maxwell, V_{orb} is its orbital velocity in $m\ s^{-1}$. M_p is the mass in Kg, and F_{bal} is the balancing force per unit mass expressed in Maxwell meter $Kg^{-1}\ s^{-1}$. Here we take F_{bal} as the centrifugal force per unit mass of planet (earth) responsible for equilibrium. In Equation 8, L.H.S. represents Magnetic Hold of Sun while R.H.S. denotes centrifugal force of planet. Both sides are balanced on substituting the values of the concerned planet confirming that magnetic interaction balances gravitational interaction. Due to this fact, the planet achieves equilibrium in its orbital path around the sun. Hence from equation 8, we have,

$$F_{bal} = \frac{\phi_p \times V_{orb}}{M_p} \quad (9)$$

Where $(\phi_p \times V_{orb})$ is the total force i.e., magnetic hold, M_p is the mass of planet. Thus, we can arrive at the ratio of F_{bal} to orbital velocity which is also constant S . whose value is 0.34991×10^{-6} Maxwell Kg^{-1} . This ratio can be expressed as,

$$\frac{F_{bal}}{V_{orb}} = S \quad (10)$$

From this ratio, we are able to calculate F_{bal} of the planet if its orbital velocity is known. These calculations are tabulated in (Table 1).

Table 1

From Table 1, it is clear that orbital velocity as well as balancing force (i.e. F_{bal}) of planets decrease with the increase in distances from the sun, irrespective of the magnitude of the magnetic flux or mass.

Planet	Mag. Flux (Maxwell)* ϕ	Orbital Velocity m/s V_{orb}	Mass (Kg) M_p	F_{bal} Maxwell meter $Kg^{-1} s^{-1}$
MERCURY	11.5505×10^{16}	47840	3.301×10^{23}	0.0167397
VENUS	17.0371×10^{17}	35000	4.869×10^{24}	0.0122468
EARTH	2.09141×10^{18}	29780	5.977×10^{24}	0.0104203
MARS	22.4642×10^{16}	24112	6.42×10^{23}	0.0084370
JUPITER	6.6447×10^{20}	13249.7	1.899×10^{27}	0.0046362
SATURN	19.8924×10^{19}	9779.9	5.685×10^{26}	0.0034221
URANUS	30.3932×10^{18}	6894.3	8.686×10^{25}	0.0024124
NEPTUNE	3.58657×10^{19}	5510.7	1.025×10^{26}	0.0019282
PLUTO	17.4955×10^{16}	4803.3	5×10^{23}	0.0016807
SUN	0.69595×10^{24}	20000	1.989×10^{30}	0.0069980

POSITIONS OF PLANETS IN THE SOLAR SYSTEM

Planets are situated in the solar system according to the decreasing order of their rotational velocities in their respective groups. As per calculation from (Table 2), it is clear

that we can classify planets of the solar system into three groups; the first group containing nearby planets Mercury and Venus, the second group containing middle distance planets Earth and Mars and the planets beyond Mars form the third group.

Table 2

Planet	Magnetic Density ρ_{mag} (Kg/m ³)	Mag.Flux density B (Gauss*)	Mag.Field Strength H A/m**	Rotational velocity V_{rot} (m/s)	Rotational Period days/hrs
Mercury	0.052413	0.15703	12.502	2.996	58.7 d
Venus	0.2012800	0.36634	29.167	1.82	243 d
Earth	0.0008817	0.41000	32.643	465	23.93 hrs.
Mars	0.0006562	0.15703	12.502	239.3	24.6 hrs.
Jupiter	0.0000825	1.03775	82.620	12581.1	9.9 hrs.
Saturn	0.0000420	0.43413	34.560	10329.8	10.2 hrs.
Uranus	0.0001129	0.43447	34.590	3847.6	10.7 hrs.
Neptune	0.0002330	0.57422	45.720	2462	15.8 hrs
Pluto	0.0044730	0.15477	12.320	34.6	6.3 d

The Magnetic flux density 'B' of our Moon (earth) is 0.06833 Gauss.

*Gauss is in CGS system; its equivalent in SI units is $1G = 10^{-4}T$ (Tesla). $1 \text{ gamma} = 1 nT$. $1G = 10^5 nT$.

**Value of 'H' is calculated by the formula $B = \mu H$. Here 'B' is considered in Tesla and ' μ ' is permeability of free space, which is $4\pi \times 10^{-7} \text{wb. A}^{-1} \text{m}^{-1}$.

We find that these calculations agree with the concept of the theory and it is seen that planets have taken positions in reality according to the decreasing order of rotational velocities in their respective groups.

Now as per available data (Clark's 1997; Geomagnetism, 1997) value of B of Earth at Chennai i.e. Madras (G. Lat. 13° 5' N 80° 18' E) is 40660 nT and that at Pondicherry (G. Lat. 11.92° N 79.92° E) is 40123 nT. As the magnetic axis and the geographical axis are inclined at 23.5°, then both the equators are also inclined at the same angle. Hence the magnetic equator is supposed to pass through the vicinity of these places. The value of B at magnetic equator will be higher than the values at these places. The value of B at magnetic equator as obtained from the Magnetic Observatory is nearly 41000 nT. The value of rotational velocity at the equator as per data is 465 m s^{-1} (Clark's 1997).

Therefore the parameters of other planets considering the base reading of the earth at magnetic equator (i.e. value of B) have been calculated in Table 2.

RELATION WITH DISTANCE

Magnetic parameters of planets are related with distance as below. As stated earlier, the magnetic force reduces in its flux intensity as it proceeds in space away from the sun. The flux density of sun's force at the distance of planet can be calculated as follows:

$$D = \frac{B_s \times 10^{22}}{4\pi d^2} \quad (11)$$

Where D is the flux density of sun's force developed on the planet at the concerned distance. B_s is the actual flux density of sun, d is the distance of planet from the sun. Considering the fall in flux density per unit square distance (i.e. 1×10^{22}),

the value of D is calculated, $4\pi d^2$ represents the area of ellipse formed by the magnetic lines of sun at the said distance. This creates the scenario that the planet surfs on the surface of the magnetic field developed at that distance. Therefore, according to the force of sun existing at the concerned distance, the planet will develop rotational velocity R considering magnetic hold to be nil, it will be as per following equation (derived from Eq.3).

$$R = \frac{D}{\rho_{mag}} \tag{12}$$

Where R is the rotational velocity of planet according to sun's force in ms^{-1} , D is the flux density of sun's force at the said distance in gauss and ' ρ_{mag} ' is the actual magnetic density of the planet in kg m^{-3} (Table 2 & 3).

Table 3

Sun's magnetic flux density $B_s = 11.43946$ Gauss.

Planet	Distance Meters	Parameters of Sun's Force at the distance of the Planet		
		D (Gauss)	R (m/s)	F
Mercury	5.791×10^{10}	2.7158	51.816	17.295
Venus	1.082×10^{11}	0.77796	3.86506	2.12366
Earth	1.496×10^{11}	0.40696	461.56	0.9926
Mars	2.279×10^{11}	0.17536	267.235	1.1167
Jupiter	7.783×10^{11}	0.01504	182.285	0.01448
Saturn	14.27×10^{11}	0.00447	106.427	0.01030
Uranus	28.69×10^{11}	0.00111	9.80	0.002547
Neptune	44.98×10^{11}	0.00045	1.9300	0.000784
Pluto	59×10^{11}	0.00026	0.05849	0.001690

Here, D_s is the flux density of the sun's force existing at the distance of the planet. R is the rotational velocity of planet considering action of magnetic hold as nil and F , is the ratio for the planet concerned i.e., the ratio between R and V_{rot} .

Actual rotational velocity of planet is due to resistance of magnetic hold developed according to the strength of flux. Hence it differs from R . The ratio of R to its actual rotational velocity is F . Factor F varies from planet to planet. Factor F is obtained by:

$$F = \frac{R}{V_{rot}} \tag{13}$$

Where V_{rot} is the actual rotational velocity of the planet (see Table 2). After determining the parameters of sun's force at the concerned distance of planet, we can relate them with the distance as follows:

$$d^2 = \frac{B_s \times 10^{22}}{4\pi \times B_p \times F} \tag{14}$$

F here is the ratio of rotational velocity due to sun's force to that of actual velocity of planet as (Table 3). B_s is the actual flux density of Sun which is 11.43946 Gauss, and B_p is the actual flux density of the planet concerned as (Table 2). These parameters have been tabulated in (Table 3). d is the distance of planet from the sun. The equilibrium between the forces of sun and those of planet at the concerned distance can be expressed as follows.

$$D \times V_{rot} = R \times B_p \tag{15}$$

Where D and R are the values of the sun's force as (Table 3) and B_p and V_{rot} are the actual flux density and rotational velocity of the planet concerned as (Table 2)

RELATION WITH NEWTONIAN DYNAMICS

As per Newtonian dynamics, the centripetal force is the force of attraction which is an attractive version of gravitational force. For centripetal action, physical contact between the active masses is necessary. The function of gravitational force varies according to the conditions of contact between the masses. If we consider planets or stars individually, then the centripetal force is developed in the contents (i.e. masses) of planet that are in physical contact and in rotational motion around the common rotational axis. Thus the contents of planet remain united. Here gravitational force plays the role of centripetal force i.e. force of gravity.

In the sun-planet system, the sun and the planet are two different bodies having no physical contact. They are linked through magnetic force. Therefore centripetal force is not developed. In this case, the gravitational force plays the role of centrifugal force. It is developed through orbital motion of planet, which balances the strength of magnetic flux developed by sun on the planet. Here the force responsible for attraction is the magnetic hold of sun. Hence "Force of Gravity" and "Centrifugal Force" are the versions of "Gravitational Force" responsible for attraction and repulsion respectively.

If we have magnetic parameters of the planet concerned at a given distance, we can calculate the strength of gravitational force as arrived by Sir Newton's formula ($F = GM_1M_2/d^2$). The conversion equation is as under:

$$F_G = \frac{4\pi \times \phi_s \times \phi_p \times B_p \times F \times G}{s^2 \times B_s \times 10^{22}} \tag{16}$$

Where F_G is the gravitational force, ϕ_s and ϕ_p are the magnetic fluxes of sun and the planet (Table 1) and B_s and B_p are the flux densities of the sun and the planet respectively (Table 2), F is the ratio of planet (Table 3), S is the solar constant whose value is 0.34991×10^{-6} Maxwell Kg^{-1} and G is the gravitational constant, its value being $6.67 \times 10^{-11} Nm^2kg^{-2}$.

Hence, we note that the magnetic force and the gravitational force (i.e. force due to motion of planet) have a combined action on planet for its equilibrium and hold. Hence we may consider gravitational force as the supplementary function of the action of electric and magnetic force working on mass in space.

CONCLUSION

We thus conclude that masses of solar system are governed by the precise action of electric, magnetic and gravitational forces for their equilibrium, hold and motion. The gravitational force is a mechanical force developed due to motion of mass. The nature works on equilibrium principle which is involved in every action and transformation of universal development.

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This theory thus provides the understanding regarding equilibrium of masses in the solar system and the masses of universe at large.

REMARK

This research is an effort describing the other side of nature i. e. the forces responsible for the functions of celestial bodies. So it is a study explaining how the nature works on its own and represents the knowledge different from our study of solar system or the exploration of space.

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