

ON PLANETARY MOTION CAUSED BY SOLAR SPACE-VORTEX

By

Paramahansa Tewari , B.Sc.Engg.
Former Executive Director (Nuclear Projects)
Nuclear Power Corporation , India

Introduction

Rene Descartes, in 17th century before the formulation of mechanics by Newton, had postulated Vortex Theory, which explained motion of the planets in elliptical orbits around the Sun due to the eternal existence in space of a fluid matter, ether, that as a vortex with the Sun at its center, moved the planets. He also proposed that, on similar lines, the satellites were propelled around their parent planets, that too have *ether circulation* around them; and the ether surrounding the Sun and the planets had no *relative motion* with respect to these cosmic bodies.

Near the end of the seventeenth century (1689), Leibniz too believed that the planets are moved by their ethers', and had proved that such a motion will lead to Kepler's third law, as per which, the area swept by the radius drawn from the center of circulation to the planet will be proportional to the time elapsed. In 1673 Huygens stated that a body, in uniform circular motion, will experience a central force (centrifugal force) which is directly proportional to the square of the speed and inversely proportional to the radius of the circle. With the discovery of the electron by the close of the nineteenth century, knowledge on its *annihilation* with positron in the thirties of this century, quantitative values of mass and charge of electron, and the postulate of Einstein, at the start of this century, that speed of light is the *highest possible* speed in the universe; it had been possible (mid seventies) for the author to postulate *space vortex structure* for the electron, which shows further in this article that the *centrifugal force* of Huygens is produced only when there is *relative motion* between the space and a body in circular motion. Therefore, the question arises whether such a force will be exerted on the planets even if they have no *relative motion* with their surrounding space. And if the radial and outward centrifugal force on the planets does not exist, the centripetal force as gravitational attraction postulated by Newton becomes redundant in celestial mechanics. The following analysis shows that such, indeed, is the case for the motion of the planets and the satellites of the solar system and, therefore, will be generally applicable for all the cosmic bodies in the universe. Brief description that follows on the *nature of space, mass, charge and inertia* of electron, will enable in providing proof to the above conclusion.

Nature of Mass

Taking the case of electron, which shows the property of *mass* as applied in Newtonian mechanics, it has been explained elsewhere [1,2,3] as to why the electron

possesses *mass* and *inertia*. The structure of electron, Fig. 1a , shows that it is neither a *point – mass* nor a *point – charge*, as presently believed; It has a *spherical - void* at its center, where *void* is defined as a *field – less*, and *energy – less* zone, enclosed within a *spinning vortex of space*. The *space (absolute vacuum)* is postulated to be an *incompressible, homogeneous (continuous), non-viscous, and mass – less fluid* that has a limiting speed of flow at speed of light (c).The maximum speed of rotation of *space*, as shown in Fig.1a, is at speed of light. The space-vortex, which itself is electron, has *dynamic stability* [1,2].During the translation of electron *relative to space*, it is the *combined action of the void and the fluid space* that endows it with the property of momentum and inertia (discussed further). The electron, due to its central void, is subjected to an *inward pressure* from space (Fig.1a) , which determines the gravitational field [1,2,3]. The equation for the *rest mass* of electron has been derived as:

$$m_e = (\text{volume of spherical void}) c = (4\pi /3) r_e^3 c \quad (1)$$

where m_e is the rest- mass of electron; r_e is the radius of the spherical void, and c is the speed of light relative to the medium of space. In CGSE system of units, it is shown [2,3] that: $\text{gram} = 7.8 \times 10^6 \text{ cm}^4 / \text{s}$.

The *space* is the only entity of reality in the universe, and it follows from the postulates of the *Space Vortex Theory (SVT)* [1,2], that the electron is the *only fundamental particle* which is stable and can exist eternally, till it interacts with its own kind (positron) but oppositely *spinning vortex* relative to it, that leads to the phenomenon of annihilation. All stable particles of matter, including nuclei, atoms and cosmic bodies, are aggregates of electrons (conclusion from *SVT*), and hence are subjected to an *inward pressure* from space. With this structure of electron, gravity field is created in space at the time of creation of the electrons. The electron is not a *force-free* particle, and so also, all particles of matter, due to inward gravity pressure on them from space, are not *force – free* entities.

Nature of Charge

The electron (Fig.1b), due to the spin of space, which is termed as *velocity-field* around the central void, possesses electric charge, defined [1,2,3,] as

$$q_e = (\pi/4) (4\pi r_e^2) c \quad (2)$$

where q_e is the charge of electron. In CGSE system of units, $\text{cm}^3 / \text{s} = \text{esu}$, which is CGSE unit of charge. Depending upon the direction of spin of the particle, it can be termed as electron or positron, and *negative or positive* charge respectively [1,2].

A cosmic body, if it has circulation of space, that is, *velocity-field* around it, will develop electric-charge in direct proportion to its velocity- field. Thus all rotating cosmic bodies like the Sun and the planets (excluding Mercury) will have electric- charge due to their axial rotation.

Solar Space Vortex

Refer Fig.2 which shows the side view of the Sun (taken spherical for simplicity of calculations) with radius R_s , and the Earth in the planetary plane which is transverse to the axis of the Sun. Consider an elemental-area dA on the rotating surface of the Sun such that

$$dA = 2\pi R_s \sin \theta R_s d\theta \quad (3)$$

The period of the axial rotation of the Sun varies from 26 days at the equator to 37 days at the poles. Let the average angular velocity of rotation be ω . Then the tangential velocity at the elemental surface will be

$$V_s = \omega R_s \sin \theta \quad (4)$$

where V_s is also the velocity-field of space in immediate vicinity of the surface and tangential to the elemental area dA .

Due to V_s at each point of space on dA , there will be an inward acceleration a_s , such that

$$a_s = V_s^2 / R_s \sin \theta. \quad (5)$$

The product, $dA a_s$, will be

$$d\phi_s = (2\pi R_s^2 \sin \theta d\theta) (\omega R_s \sin \theta)^2 / R_s \sin \theta$$

where ϕ_s is defined as “*space acceleration flux*”.

Integrating for θ varying from 0 to π ,

$$\phi_s = 2\pi R_s (\omega R_s)^2 \int_0^\pi \sin^2 \theta d\theta = \pi^2 V_s^2 R_s, \quad (6)$$

where $V_s = \omega R_s \sin \theta$.

Assuming that ϕ_s , due to zero-viscosity of space, remains constant at any spherical space surface (Fig.2) that is central with the Sun, from (6)

$$V_s^2 R_s = \phi_s / \pi^2 = \text{constant}$$

or $V_s \propto 1 / \sqrt{R_s}$. (7)

From (7), and the constancy of ϕ_s mentioned above, *velocity-field of space* (V_f), at any point within the solar vortex, distant r in the planetary plane (equatorial plane of the Sun), will be given by

$$V_f = k / \sqrt{r} \quad (8)$$

where k is a constant pertaining to solar space-vortex.

Eq.8, derived from the *space dynamics* of the solar system, can be derived from Kepler’s third law on planetary motion as follows.

$$T^2 \propto r^3 \quad (9)$$

where T is the period of any planet, and r is the mean distance of the planet from the Sun. Substituting $T = 2\pi r / V$, where, V , is the orbital velocity of the planet, we get

$$(2\pi r / V)^2 \propto r^3$$

or

$$V \propto 1 / \sqrt{r} \quad (10)$$

which is similar to Eq.8, as per which the velocity- field of space within the solar vortex also falls in inverse proportion to the square root of the distance, just as it is the case with the planets [10]. Therefore, conclusion can be drawn that the solar space- vortex moves the planets at its own circulating motion provided the properties of the Sun and the planets like gravity field and electric-charge can be derived from it through methods independent of Newton’s equations on gravitation and celestial mechanics as shown below.

Sun's Gravity Field

Consider the innermost planet of the solar system, mercury, which has orbital speed of 47.9km/s, and its mean distance from the Sun is 57.9×10^6 km. If V is its orbital speed, and r , the distance from the Sun, from (8),

$$V \sqrt{r} = k \quad (11)$$

or

$$k = 47.9 \times 10^3 \text{ m/s} \sqrt{57.9 \times 10^9 \text{ m}} = 11.52 \times 10^9 \text{ m}^{3/2}/\text{s}, \quad (12)$$

where k is a constant described before.

The tangential V_f in the Sun's equatorial- plane in close vicinity of its periphery where the radius $R_s = 6.96 \times 10^8$ m, from (7) and (8) will be

$$V_s = k / \sqrt{R_s} \quad (13)$$

Substituting the value of k from (10), and R_s from above, we get

$$V_s = (11.52 \times 10^9 / \sqrt{6.96 \times 10^8}) \text{ m/s} = 4.367 \times 10^5 \text{ m/s}. \quad (14)$$

In the equatorial plane on the periphery of the sun, the velocity field, V_s , will create an *inward acceleration field*, V_s^2 / R_s , which from (12) is

$$a_s = (4.367 \times 10^5)^2 / 6.96 \times 10^8 \text{ m/s}^2 = 274 \text{ m/s}^2$$

which happens to be exactly equal to the presently accepted value of the gravity field of the Sun, that is, 274 m/s^2 . It is, therefore, concluded that the *gravity field of the Sun is determined by the inward acceleration field created in the vicinity of its surface due to space circulation around it.*

Earth's Gravity Field

Consider the motion of the Moon around the Earth at the orbital speed of 1017 m/s (derived from the orbital period: 27.3 days; orbital radius: 3.82×10^8 km). From (8),

$$V_m \propto 1/\sqrt{r} = k / \sqrt{r}, \quad (15)$$

where V_m is the orbital speed of the Moon, r is its distance from the Earth, and k is a constant pertaining to the Earth's space-vortex. Substituting the values from above

$$k = 1017 \text{ m/s} \times \sqrt{3.82 \times 10^8 \text{ m}} = 1.987 \times 10^7 \text{ m}^{3/2}/\text{s}. \quad (16)$$

With the above value of k and from (8), the *tangential velocity of space* in the equatorial plane of the Earth in immediate vicinity of its periphery, will be

$$V_f = (1.987 \times 10^7 / \sqrt{6.37 \times 10^6}) \text{ m/s} = 7.8 \times 10^3 \text{ m/s}.$$

There exists a *velocity-field* due to *space circulation* at the periphery of the Earth and in the equatorial plane; it will produce an *inward acceleration field* given by

$$a_e = V_f^2 / R_e, \quad (17)$$

where R_e is the radius of the Earth. Substituting the values from above

$$a_e = (7.8 \times 10^3)^2 / 6.37 \times 10^6 \text{ m/s}^2 = 9.55 \text{ m/s}^2 \text{ against the presently}$$

accepted value of the gravity field of the Earth which is: 9.83 m/s^2 .

Gravity Field of Mars and other Planets

The satellite of Mars , Phobos, completes one orbital revolution in 7 hours and 19 minutes, that is, 26340 sec. The orbital radius r_p being 9400 km, the orbital speed V_p will be, 2.241km /s. Similar to Eq.13,

$$v_p = k_p / \sqrt{r_p}.$$

Substituting the values from above,

$$k_p = 2241 \sqrt{9.4 \times 10^6} = 6.8 \times 10^6 \text{ m}^{3/2} / \text{s}.$$

With the equatorial radius of Mars $R_p = 3395$ km, the velocity field of space-vortex around Mars will be

$$v_f = k_p / \sqrt{R_p} = 6.8 \times 10^6 / \sqrt{3.39 \times 10^6} = 3720 \text{ m} / \text{s}.$$

Gravity field on Mars = $(v_f)^2 / R_p = (3720)^2 / 3395 \times 10^3 = 407 \text{ cm} / \text{s}^2$, against the presently accepted value of $372 \text{ cm} / \text{s}^2$. Similarly, the gravity fields of other planets derived from their respective space-vortices are: Jupiter 24.5 m/s^2 , Saturn $10.4 \text{ m} / \text{s}^2$, Uranus 8.9 m/s^2 , Neptune 11.02 m/s^2 . The presently accepted values are: Jupiter 22.9 m/s^2 , Saturn 9.05 m/s^2 , Uranus 7.77 m/s^2 , Neptune 11 m/s^2 , that are quite close to the above computed values. *The derivation of the gravity fields of the sun and the planets without the use of Newton's equation provides a positive proof of the real existence of the space-vortices around the stars and the planets.*

Solar Charge

The electric charge of electron from Eq.2 is proportional to the product of the *space-surface* around the central void and the *spin-velocity* c . Similarly, it is supposed that the Sun will develop electric- charge on its surface on account of axial rotation. The surface of the Sun possesses tangential velocity, V_t : 1.945 km / s, at its periphery in the equatorial plane. The solar charge Q will be given by

$$Q = (\pi / 4) 4\pi R_s^2 V_t = (\pi / 4) 4\pi (6.96 \times 10^{10})^2 \times 1.945 \times 10^5 \text{ cm} / \text{s} = 0.928 \times 10^{28} \text{ esu} \text{ , (18)}$$

where $\text{cm}^3 / \text{s} = \text{esu}$, in CGSE system. The value of the solar- charge derived above is very close to the presently accepted value of 10^{28} esu.

Axial Rotation of the Earth

In Fig.3, the space-vortex encircling the Earth within the solar space-vortex is shown. The velocity-field in the equatorial plane around the Earth earlier computed as 7.8 km/s, will exist in the higher layers of atmosphere (ionosphere) making the same electrically charged, and imparting momentum to the ionized particles to move them at high speeds. The terrestrial atmosphere reduces the velocity-field to about half a kilometer/s, at which the surface of the Earth is rotated by the space –vortex. *There is no relative motion between the medium of space and the Earth's surface, though there is gradient of velocity-field that gives rise to electric potential-gradient in clear weather, varying from 150 to 550 volt/meter vertically up in the atmosphere.* Beyond the ionosphere, the velocity-field falls inversely as the square- root of the distance from the center of the Earth as stated earlier.

Orbital Stability of the Planets

In Fig.4a, the Earth is shown within the velocity-field of solar space-vortex, while its own velocity-field due to space circulation around it, is shown in Fig.4b. The superposition of the velocity-fields within the larger solar vortex, changes the pattern of the streamlines that are shown in Fig.4c. The Eq.11 implies that the product of the velocity-field at any space- point in the solar space-vortex and the square root of its distance from the sun center, is a constant quantity. Since the velocity-field on the nearer side of the Earth has decreased, it (Earth) should move farther from the Sun experiencing an outward repulsive force in view of the above constancy. Similarly, on the farther side of the Earth, due to increase in velocity field, it should move closer to the Sun to satisfy (11), and thus should experience an inward attractive force as a reaction of the outward repulsive force. The equal and opposite forces, required for the above radial movements of the Earth are electrical in nature (discussed below); and are produced by the interaction of the velocity-fields of the two space-vortices. The Earth is dynamically stable with regard to the above forces acting on it .The movement of the Earth in elliptical orbit is due to the tangential force by the velocity-field on each point of its orbit as further shown in this article. All planets with axial rotation will have similar forces for planetary stability such that there is no resultant radial force on them. For more rigorous calculations, the inclination of the planet' axis of spin (at right angles to which, in the diametrical plane, its space- vortex exists), with the solar space-vortex in the diametrical plane of the Sun, will have to be taken into consideration, since the interactions between these two vortices may tilt the planet, that are smaller in mass, to produce just the required amount of repulsive force for the stability of the planet in the orbit.

Electrical Force of Repulsion between the Sun and the Earth

The electrical charge of the Sun was computed in Eq.18. Similarly, the charge of the Earth Q_e can be determined as:

$$Q_e = (\pi / 4) (4 \pi R_e^2) V_t, \quad (19)$$

where, V_t is the tangential velocity of space (peripheral velocity in the equatorial plane) at its periphery. With $R_e = 6.37 \times 10^8$ cm, and $V_t = 0.464 \times 10^5$ cm / s, substituted in (19),

$$Q_e = 1.85 \times 10^{23} \text{ esu.} \quad (20)$$

The electrical force of repulsion [2] between the Sun and the Earth, due to their axial rotation being in the same direction, and hence producing the same kind of charge, will be given by

$$F = (c / 4\pi) Q_s Q_e / r^2, \quad (21)$$

where r is the distance between the Sun and the Earth. Substituting the values from (18) and (20), and putting $r = 150 \times 10^{11}$ cm in Eq.21,

$$\begin{aligned} F &= (3 \times 10^{10} / 4\pi) (0.928 \times 10^{28}) (1.85 \times 10^{23}) / (150 \times 10^{11})^2 \\ &= 2.33 \times 10^{27} \text{ dyne.} \end{aligned} \quad (22)$$

As stated earlier, electrical forces of outward repulsion and inward attraction, produced on account of unequal strength of velocity-fields on the farther and the nearer side of the Earth (relative to Sun), are equal and opposite, thus making the planet dynamically stable.

The calculation made with *Newton' equation on gravitational attraction* between the Sun and the Earth gives

$$F = 3.52 \times 10^{27} \text{ dyne}, \quad (23)$$

which is one and a half times larger than the electrical repulsion (22) and would, therefore, lead to the instability of the planet in the orbit by forcing the Earth towards the Sun. Further, the outward centrifugal force on the Earth does not exist (shown below) to oppose the above gravitational force (23) as postulated by Newton.

Origin of Centrifugal Force, and Inertia

In Fig.5 the spherical void at electron center is shown moving *relative to space* at uniform velocity v . Due to the existence of the field-less void as earlier stated, the electron is subjected to an inward *pressure* from space, shown as “p” in Fig.6a. The space –vortex of electron is not shown in this figure since the velocity-field of the vortex of electron does not contribute to the properties of inertia and momentum as shown below. At point A at the interface, space is displaced horizontally at velocity v against the pressure p . While the radial component of the velocity-field at the *front* of the moving void indicates the velocity of the displacement of space; similar component at the *rear*, gives the *in-flow velocity* of space into the cavity left (Fig.5c) due to the motion of the void. Therefore, as regards the contribution to the *work done* in displacing space and moving the void against the space-pressure is concerned, the velocity- component, $v \cos \theta$, at the front, gets canceled with the similar component at the rear. The tangential component $v \sin \theta$, however, remains as resultant velocity-field.

The Fig.5b Shows an elemental volume $dV = \pi r_e^2 \sin^2 \theta r_e d\theta$, which displaces space at velocity $v \sin \theta$ as earlier stated. From *mass- equation* (Eq.1), in which the product of the *void-volume* and *speed of light* is defined as *mass*, the elemental volume will have mass, $c dV$, and momentum,

$$dP = (c dV) v \sin \theta = c \pi v r_e^3 \sin^3 \theta d\theta.$$

Integrating for θ varying from 0 to π ,

$$\int_0^\pi dP = \int_0^\pi \pi c v r_e^3 \sin^3 \theta d\theta = (4 \pi / 3) r_e^3 c v ,$$

which from Eq.1 becomes,

$$P = m_e v. \quad (24)$$

In the above analysis, it was the *relative motion* between the electron-void and the medium of space that created the velocity, $v \sin \theta$, which produced momentum as derived above (24). Force was initially required to move the void against the space- pressure, however, the velocity-field created initially, due to zero-viscosity of space, carries forward the void. Since all the material particles and bodies must necessarily be built of electrons [1,2], the above derivation for the momentum and inertia are applicable in general. The property of inertia arises due to the fact that : (a) matter has void-content, (b) space exerts pressure on matter, (c) the medium of space is a non-viscous fluid.

The planets and the satellites are carried by their respective space-vortices, and hence there is no relative motion between their surfaces and the surrounding medium of space. It is therefore that the cosmic bodies orbiting around their respective primaries can not have outward centrifugal force acting on them.

Creation of solar matter

Consider the case when the Sun had no matter and around its present center existed the solar vortex. Since electron is created [1,2,3] when space has rotational speed reaching light speed, it is shown below that the speed of space- circulation at the solar- vortex center does reach the limiting speed of light, thus fulfilling the condition for the material creation. The Eq.8 can be written as

$$\sqrt{r} = k / v_f. \quad (25)$$

Substituting the values, $k = 11.52 \times 10^9 \text{ m / s}$ from (12), and $v_f = 3 \times 10^8 \text{ m/sec}$ (speed of light) in (25), the value of r is found as

$$r = 1474.5 \text{ m}. \quad (26)$$

It is thus seen that at the center of the Sun, within a diameter of 2949 meters, the medium of space is broken down and creation of matter, starting from electrons, is continuously taking place. It appears that the created matter accumulated within the Sun over some time will lead to intermittent bursts that should account for the solar flares from the Sun- spots as observed.

Conclusion

From the orbital rotation of the Moon, determination of the Earth's gravity field, which is an experimentally measured quantity, provides a clear proof that the space circulates around the Earth, and subjects it to an *inward pressure* that produces the gravity field. The exact value of the gravity field of the Sun, computed from the orbital motion of the planet, Mercury, points towards the universal applicability of some new principles:

1.The space circulation around cosmic bodies causes their axial spin and produces gravity field by exerting pressure on matter.

In terrestrial condition, the medium of space is stationary relative to the surface of the Earth (neglecting the velocity gradient vertically up in the atmosphere), and, hence, a body on the Earth, in uniform circular motion, develops centrifugal force; such a force is, however, absent in the orbital motion of the cosmic bodies where the space-vortices around the primaries (planets, stars, galactic centers) carry their respective secondary bodies in their orbits.

2.The cosmic bodies in orbital rotation have no relative motion between their surfaces and the surrounding medium of space in the immediate vicinity.

On the orbital stability of the planets it is concluded that the electrical repulsive force exists between the Sun and the Earth. As an universal principle it can be stated that:

3.All cosmic bodies with axial spin will possess electrical charge that will result into repulsive forces between the bodies with the similar spin, and attractive forces with dissimilar spin. According to this, the movement of the galaxies speeding away from each other, should be due to repulsive electrical forces.

4. *The Sun in its central zone creates its own matter including the matter for the planetary system. Since the Sun rotates axially, possibility exists for the existence of a three kilometer diameter cylindrical hole along the axis of the Sun from north to south pole.*

In seventeenth century, Newton opposed the Vortex Theory of Descartes on the ground that it did not account for the quantitative observations on planetary motion, such as, Kepler's laws did. Though the principle of inertia for straight line motion postulated by Rene Descartes found place in Newton's Principia, and was used by him for planetary motion, he did not consider space to play role in driving the planets in their orbits. It was in this sense that Newton considered the medium of space inert, and generalized on the existence of the centrifugal force acting on bodies in uniform circular motion, in terrestrial as well as universal space. It has now been possible to derive from the postulates of the *SVT* (that pinpoints on the limiting speed of flow of space equal to the speed of light, and utilizes this process for the creation of universal matter), not only the third law of Kepler, but also the quantitative results on gravity field, charge, and electrical repulsion between the Sun and the planets. Newton's treatment of space as an *inactive* entity has been shown through the above analysis to be erroneous. It is concluded that while the celestial mechanics of Newton needs revision, Rene Descartes is vindicated for his most basic postulate that the planets are moved by the vortex of the fluid space.

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