01. PRECESSION IN ORBITAL MOTION:

REALITY IN NATURE could not be changed but defined in many different angles by man from age to age. Though theories are cropped up and accepted or rejected from time to time by the society, the **realities in nature** remain unchanged eternally.

The natural phenomenon of "**precession** in orbital motion of planets", had been observed by Astronomers a few centuries ago and ever since many Physicists and Mathematicians have spent abundant of their time to explain the phenomenon to a more acceptable accuracy.
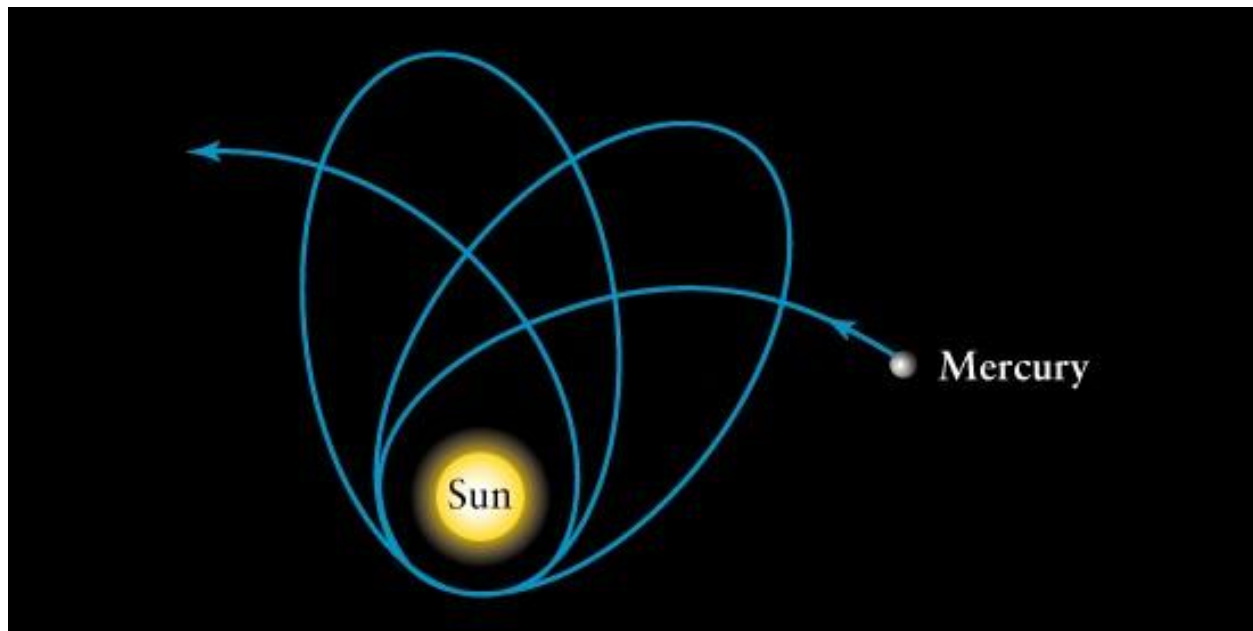

FIGURE-01 (Image outsourced from the web)

The great Scientists such as Sir **Isaac Newton** and **Albert Einstein** had also forwarded their theorizations in which the phenomenon was explained but in quite different angles.

But scientists by the 21st century seem to suspect the acceptability of both theorizations and they tend to argue in support and in against as well. However it shall be a shame upon the **scientists of the 21st century**, if the problem has to be conserved as it is, for the future generations to solve.

02. THE BACKGROUND ART:

 Kepler (1571-1630) has defined the elliptical orbital motion of planets in the solar system by introduction of three mathematical laws. In his 3rd law, he has derived the expression, $T^2/R^3 = k$ (*The square of the orbital period of a planet is proportional to the*

cube of the semi-major axis of its orbit), which precisely describes the relation between **orbital period** of a planet and **distance to Sun**.

It is wonderful to think how he succeeded in deriving such a deep reality so early of a stage of the revolutionary development of global sciences. Even though, 'Gravity' had not been defined by his period, he might have struck upon **Sun's attraction** over the planetary masses.

Isaac Newton (1643-1727), produced the '**Gravitational law**' and he could more scientifically explain how planets are orbiting round Sun in dynamic equilibrium of the two forces such as **Gravitational drag** and **centrifugal force**.

Gravity, as a physical parameter, could be well quantified by his derivation, $G=kM/D^2$ (as acceleration of gravity '**G**' which is proportional to '**M**'-Mass of the Gravity Source and inverse square of '**D**'-the distance to it.) The constant '**k**', which is named as 'Gravitational Constant', too was quantified practically by the great scientist.

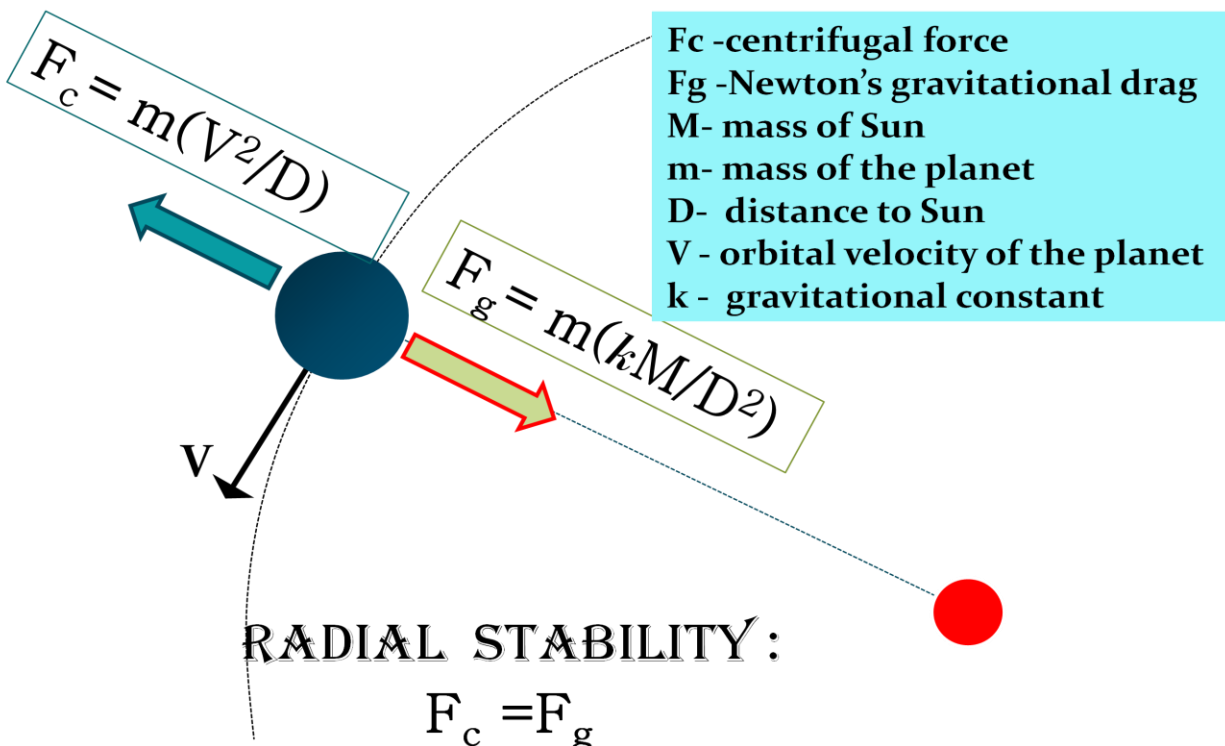2.1 Radial Stability of a Planet in Orbital Motion:

$$F_c = m(V^2/D)$$
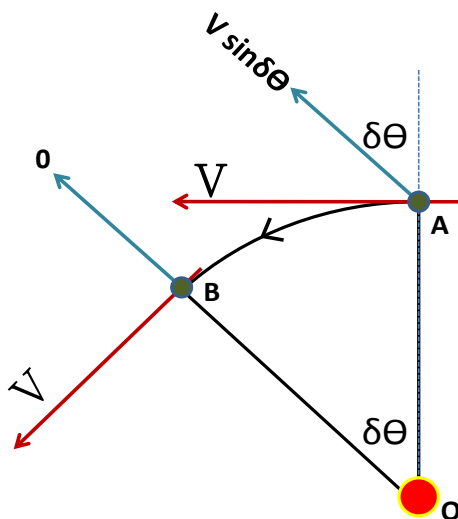
Fc -centrifugal force
Fg -Newton's gravitational drag
M- mass of Sun
m- mass of the planet
D- distance to Sun
V - orbital velocity of the planet
k - gravitational constant

$$F_g = m(kM/D^2)$$

V

RADIAL STABILITY :
$$F_c = F_g$$

FIGURE-02

2.2 Gravitational Drag:

Newton's Gravitational **Force** is always in the direction of the **Gravity Source**. As shown in the figurer-02, the radial dynamic equilibrium of a planet could be explained such that the **Centrifugal Force** due to curvilinear motion about the center is compensated by the **Gravitational Drag** of the source at the center.

But somebody may ask 'well, Gravity is somehow understood but what is that other force named 'Centrifugal Force' and who is the founder of it?

2.3 Centrifugal Force:

There need no founders for everything but you can feel that a force is applied to fall your bicycle when you take a sharp turn unless you bend your body towards the inner side of the turn. That is simply because of the force induced within your body mass to go ahead without turning. You can simply prove it as it is derived in figure-03.

Centrifugal force

Let's analyze any two close consequent positions, A & B, in the curvilinear motion of the planet. In the direction of OB, initial momentum is ' $m_x V \sin\delta\Theta$' and after time ' δt' it becomes zero. That indicates the influence of a force to divert away the initial mass motion from OB direction.

Impulsive force = change of momentum/time

$$Fc = (m_x V \sin\delta\Theta - 0)/ \delta t$$

(Where ' $\delta\Theta$' is small, $\sin \delta\Theta \approx \delta\Theta$) i.e.

$$Fc = m_x V \delta\Theta/ \delta t$$

(Angular velocity; $\omega = \delta\Theta/ \delta t = V/R$) i.e.

$$Fc = m_x V (V/R) = mV^2/R$$

$$Fc = mV^2/R$$

m - mass of the planet
V - orbital velocity of the planet
δΘ - a small angle of rotation
R - distance to Sun

FIGURE-03

2.4 Precession in Newtonian Mechanics:

According to Newtonian theorization of the precession of orbital axis of Mercury, the **two party gravitational relation** between Sun and Mercury could be affected by a third party gravitating body like Jupiter or by the **collective gravitational influence** of all the college planets orbiting in outer rings.

If Astronomers are not mistaken it is **5600** arcseconds of a rotation for a period of 100 years. According to analysis on Keplerian two body system, it could have been predicted as **5030** arcseconds. **530** out of the gap of 570 is covered by Newton's contribution upon the basis of collective gravitational drag of other planets in the system. However still there was a **challenge** to account for another **40** arcseconds, to fit with the Astronomers precession.

2.5 Precession in Einstein's Relativity:

The great Scientist **Einstein** (1879-1955) has explained the phenomenon in a different angle being based on his theory of **Relativity**. According to his **philosophic theory**, the **space time is wrapped** by the massive gravitational field of Sun and due to that curvature, Mercury undergoes a different set of conditions at the **perihelion** than that at the aphelion, resulting of **precession of perihelion** ultimately.

Upon that theory he could fill the long existed gap of 40 arcseconds by **43** arcseconds which is just a bit more than the needed.

However the thinking behind his theory, **Relativity**, cannot be born in a '**3D Spatial Frame**' and he might have struck upon the **4th Dimension** by the late century.

03. WHAT IS MORE IMPORTANT?

The few centuries old unnecessary **mathematical war** of physics, for **accuracy** of precession up to a nearest arcsecond, seems quite **unimportant** and useless of a struggle to continue.

That is mainly because some of the accepted fundamental theories in physics, and assumptions upon which the theories were built, could be **more erroneous**.

3.1 For an instant, in calculating **density** of our planet, it has been assumed that the Globe is homogeneously solid. But how far we could be away from the accuracy if Earth is really a **hollow globe**? (pl ref. 'Inverted Gravity and formation of Hollow Globes' /Space Dynamics-V3(2011)).

Then the average material density of Earth is not reflected by the known density at all. If the figures with Earth, where we step on, are of such an **uncertain degree of accuracy**, no need of talking about the giant planets and Sun.

3.2 What is the density of Sun? With the Newtonian **mass** and Astronomers **size** (volume), the **density of Sun** is **1.4 g/cm3** which is just a bit above the density of water.

To be frank, does it really reflect the real **material density** of Sun? How far are we away from the reality if Sun is really a **hollow globe**? (pl ref. 'Star Mechanism'/Space Dynamics-V3(2011)).

3.3 Besides that, **mass of an atom** is recognized as the sum of the masses of all the inner particles such as mainly **electrons**, **protons** and **neutrons.** But in consideration of the atomic structure there are other two masses not encountered as yet in sciences such as; mass of the **inner atomic medium** and mass of the **skin boundary** of an atom. (pl ref. 'Behavior of the Three Basic Space Matter' /Space Dynamics-V1 (2009) for derivation of the **mass of skin boundary** of a Hydrogen atom).

In calculating mass of a single Hydrogen atom (the lightest element in the world) the error must be **0.19%** and if that so, what could be the **error** in calculating mass of Sun?

3.4 Difference between 'Gravitational Mass' and 'Absolute Mass':

What do we really mean by **Mass**? According to Newtonian mechanics, the **acceleration of gravity** at any locality is born due to the **field strength of gravitation**. And it is directly proportional to the **Mass** of the **Gravity Source**.

Therefore, the masses that we recognize through gravitation can be named as **Gravitational Mass.** But that cannot be the actual mass of the object because there are some **other masses** too in them, which don't participate in the **mechanism of gravity**. (pl ref. 'The Mechanism of Gravity'/Space Dynamics-V2 (2009)).

For an instant, '**Solar Wind**' has a mass but it doesn't take part in Gravitation.

Dark matter too doesn't take part in Newton's gravitation. There are abundant of non atomic masses in Sun which don't respond for gravity and therefore, the so far recognized mass of Sun **cannot be accurate**.

Mass is more realistically defined in $E = mc^2$, the Einstein's expression of '**Energy Conservation'**. Therefore without knowing the **Ultimate Energy Stock** of Sun, we can't calculate the **absolute mass** of Sun.

3.5 Mechanism of Gravity:

Impact of Gravity was explicitly explained by Sir. Isaac Newton, but the **Mechanism of Gravity** remained unexplained and therefore, lots of miss interpretations have been cropped up in the mediatory period.

To brief on the mechanism of gravity; a single **atom** can be considered as a massive **dynamic rotary system.** Mechanical Engineers will assure you that there is no rotation in anywhere, without creating of a slightest **vibration** at least. A **bigger mass** is a bigger collection of atoms and therefore, it makes a **stronger vibration** to transmit a wave called '**Gravitational Wave**' through the **space medium**.

That is so simple so far but now the reader may question "well, suppose the so called wave is created somehow by the **source** but how on Earth, could it **drag** a secondary body mass in the same direction of the wave attack?"

As we have learned in class rooms, the **electron cloud** of an atom is orbiting around the **nucleus.** And if my memory is not gone yet, the attraction between **negatively charged** electrons and **positively charged** protons was very well explained by **Coulomb** (1785) in his expression $F=k\ q_1q_2/d^2$. Just imagine how similar that expression to the Newton's relation of Gravity. However the **Centrifugal force** upon rotating electrons must be balanced by the **Coulomb's attraction** or unless electrons must be thrown out from the atom.

With the frequent attack of the gravitational wave upon an atom, the **distance to the nucleus** is reduced from the **direction where the wave attacks**. When the distance becomes **closer**, Coulomb's attraction becomes **increased** in that direction. As a result, the **atom is dragged** by the wave towards the **gravity source**. When all the atoms in a secondary body are hit by gravitational waves, the entire body is dragged towards the Gravity Source. (pl ref. '**The Mechanism of Gravity**'/Space Dynamics-V2 (2009)).

3.6 No response for Gravity?:

Matter such as; electrons, protons, neutrons, rays of light particles, rays of heat heat particles, solar wind, galactic wind and the **space medium** don't respond for gravity at all. Only the **inner dynamic rotary systems** called 'atoms' are **succumbed** to the attack of the gravitational wave and at the same time, they themselves only are responsible to **create** the gravitational wave.

For an instant a **thunder stroke** (a massive bulk flow of electrons) cannot be turned or controlled at all by Gravity. It strikes from sky to the ground, or else, from a cloud to

another distant cloud or unless, from ground to the sky with no response for Newton's Gravity. That is mainly because an **electron** doesn't have a **dynamic inner rotary system**.

If everybody admits that Sun is made up only of **atomic matter**, then the calculated mass of Sun, **1.991 x 10^{33}g**, must be correct. But nobody really knows what is going on inside of Sun and what a **huge stock** of non atomic matter takes part in the inner dynamic organization of Sun.

As per my personal deductions, being an independent explorer, the **absolute mass** of Sun is not known to us. That is mainly because the inner dynamic store of '**Dark Matter** (neutron mass)' in the core of Sun, has not yet even been recognized. '**Dark Matte**r' doesn't respond for Newton's Gravity. (pl ref '**Star Mechanism**'/**Space Dynamics-V3(2011)**).

Then why should we so much worry about an 'arcsecond's accuracy in 100 years' in **precession** of a small planet? No, there are many more important things there to work out by the **Scientists of the 21st century**.

04. WHAT HAS GONE WRONG WITH PRECESSION?

4.1.What is there in against of Newtonian Precession?

It is possible that the body of Sun, the gravity source, could not be sharply symmetrical in the body shape.

But the center of gravity must definitely lay on the **spinning axis** of Sun and therefore no fluctuation in '**radial effect of gravitation**' could be expected owing to its spinning.

It is also possible that two-party Kepler orbit could be disturbed by the collective gravitational effect by the third-party planetary ring.

But obviously the resultant ring effect of the third party gravitation, which must be reasonably located in between Jupiter and Saturn, is much **slower** than speed of Mercury in orbital motion and therefore if it mattered, it should have made the precession in the **other way round** in direction.

4.1.What is there in against of Einstein's Precession?

Wrapping of the '**Space Time**' is brilliant but quite **philosophic** of an idea as yet for the world familiar only with the **3D Spatial Frame**.

Not only **time** but the three fundamental measures of physics such as **mass**, **distance** and **time** too are wrapped in to **dropped scales** and Einstein's **Philosophy** becomes a **Reality** in the **4D Spatial Frame**.

Matter is vanished somewhere from appearance and reappear again spontaneously at another where and it is quite magic for us relative only to the **3D-spatial frame**. But with reference to the **4D-Spatial Frame**, that is just a **contraction** and **expansion** of matter by activation of a **spherical vortex**.

4.2 Therefore Einstein was correct in his **Relativity**, but wrong in his thought that **Gravity** is the root cause for wrapping of the **space time**.

That is not Gravity but the wonderful mechanism "**Spherical Vortex**" is the machinery which wraps up the space and naturally Gravity too is there because all the atomic matter gets involved in the vortex. (pl ref **"Theory of Spherical Vortex"**/ 'Earth Mechanism'/Space Dynamics-V3 (2010)).

4.3 **Galaxy** is the exemplary dynamic organization of massive scale for '**Spherical Vortex**'. The vortex is **centrifugal** for **expanding galaxies** and it is **centripetal** for the **contracting galaxies**.

4.4 **Stars** are the next dropped scale of exemplary rotary organizations. The vortex is **centrifugal** in consideration of **young Stars** and it becomes **centripetal** in **contraction** of solar systems. **Red Giant** is the stage of a Star, at the **phase transformation** of the vortex from **centrifugal** in to **centripetal** and at that stage, spinning could be almost held up.

4.5 Spherical Vortex is in action in all the **Productive Planets** in the planetary system. Productive planets are identified by the special features given bellow;

   i.   Possession of a strong magnetic field to absorb Solar Wind
   ii.   Possession of an atmosphere to develop solar wind in to electrons
   iii.   Spinning about the axis through magnetic poles
   iv.   Possession of at least a single Moon
   v.   Growing in size and weight with time

Earth too belongs to the category of **Productive Planets**. A stock of **Dark Matter** is in action at the mid core of the Globe. It is **growing** by absorption of weak charged particles from **Solar Wind** during a certain period and it is **depleting by producing mass** for another certain period.

Magnetic poles are reversed at each phase transformation. A magnetic reversal of big scale can give perhaps a birth for another moon with a planetary bang. (pl ref. '**Origin of Moon by the Earth Bang'**/Space Dynamics-V3(2010).

 And a magnetic reversal of medium scale may perhaps sweep out some plants and animal species from the Globe.

Tectonic plates are more departed in **expansion** of the globe during the period of **producing mass**. (pl ref. 'Galactic Dimension on Climate Change'/Space Dynamics-V4(2012)).

4.6 Dark Matter participates in every scale of a **Spherical Vortex**, being the **Agent** in charge of Einstein's **Energy Conservation.**

The reader would be astonished to hear that there are billions of **spherical vortexes** of the **tiniest scale** in your body. Yes, those are nothing else but **Atoms** and **dark matter**(neutrons) is in action in a spherical vortex at the **nucleus**. Each atom of every element is **magnetically polarized** by the spherical vortex and **magnetism** is there, in your body too, if you could line them in one direction. (Pl ref. 'The 4th Dimension and Worlds of Different Scales' /Space Dynamics-V5/2013).

4.7 However as it is observed, Einstein was a bit mistaken in his thought of connecting **Curvature of Space Time** with **Gravity.** Gravity has no specific interrelation with Space Time. But his concept of **wrapping of the space** at Sun is brilliantly correct.

It is my personal view that, **Albert Einstein** should not have used such a brilliant concept as **'Relativity'**, to fill a gap of a few arcseconds for an unnecessary accuracy in **'precession'**.

05.   WHAT IS THE MECHANISM BEHIND PRECESSION?
Before getting in to Precession, we have to find answers for the questions bellow;
1. Why all the planets in the solar system are orbiting in the same **spinning direction** of Sun?
2. What is the theoretically **Stable Orbit** for a Planet?
3. What made planets deviate from **Stable Orbits** in to Keplerian orbits?

5.1 A clever Logician must observe at first the clear **connection** between **Spinning Direction of Sun** and **Orbital Direction of Planets**. When he cannot observe planetary motion in other distant solar systems to compare, he should look for observable **similar rotary systems** at closer spatial region.

Our Moon is orbiting in the same direction of Earth's spinning. Similarly moons of other **spinning planets** also do as the same. The other most remarkable thing to note is, '**no moon for non spinning planets**.

Then it can be deduced scientifically that, a **spinning source of gravity** should apply a certain **physical force** laterally (perpendicular to the orbital radius) upon the secondary object to make it **orbit** in the **same direction of spinning**. What is that mysterious lateral force then? Sir **Isaac Newton** has found only the **radial effect of gravitation**.

Unless having such a physical force in support, no orbital motion could be possible against resistance of the space medium. That is because Newtonian Gravity should have dragged them directly towards the source, when their speeds are lowered down.

Therefore the Scientists of the 21st century have got to accept 'Space Resistance' at first. Then only they would understand the necessity for an Orbital Motive Force in order to move Planets around Sun. At the equilibrium of the two lateral forces such as Space Resistance and Orbital Motive Force, planets are settled down to circular orbits of uniform orbital motion. (pl ref. 'Dynamic Stability in Orbital Motion of Planets'/Space Dynamics-V6/2013)

5.2 Orbital Motive Force:
Theory of Gravity Deviation:
Gravitational Wave is deviated when the Source is spinning and a lateral force component of the deviated gravity is applied upon any Secondary Object in the gravitational field to make it orbiting around the Source in the same direction of spinning.

THEORY OF GRAVITY DEVIATION

F_g

Angle of solar gravity deviation $\theta = \tan^{-1}(u/c)$
$= \tan^{-1}(1.994 \times 10^5 / 2.998 \times 10^{10})$
$= 3.81 \times 10^{-4}$ degrees
$= 0°, 0', 1.37''$

$F_g \sin\theta$

ut

$\theta°$

F_g

ct

Velocity of sun's rotation at surface = u

Velocity of the gravitational wave ≈ velocity of light = c

Time taken by the wave to travel up to the planet = t

SPACE DYNAMICS

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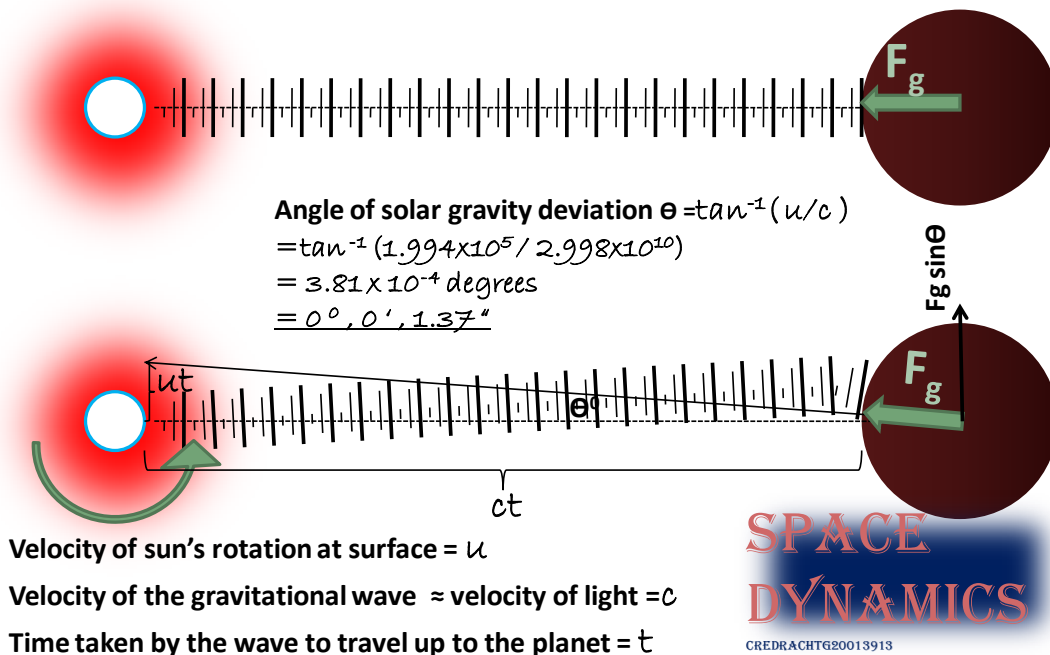
FIGURE-04

As shown in the figure-04, **gravitation is deviated** when the source is **spinning** and a force component $F_g sin\theta$ is applied on any secondary object to make it too orbiting around. The force is therein named as 'Orbital Motive Force' .

5.3 Space Resistance:

The resistive force against motion of a planet, applied by the space medium, is applied always in the opposite direction of the motion. Space resistance on a spherical planet has been derived as;

$$\text{Medium resistance against motion:-} \quad R_p = \eta \rho_0 v^2 (0.596A)$$

where, v - velocity of the planet

   A - Cross sectional area of the planet

   ρ_0 - density of the space medium at the planet

   η - Contact constant of surface materials $= (\rho_0 / \rho)$. Where, ρ is the mean density of the surface materials.

(For derivation of the equation pl. ref. 'Dynamic Stability in Orbital Motion of Planets'/Space Dynamics-V6/2013).

5.4 Lateral Stability in Orbital Motion:

Lateral stability of a planet has not even been considered by any Scientist up to the 21st century. That is probably because of their thinking that, Planets have ever been moving just as they were tossed at the **Origin** of the world.

But in reality, space medium is not a **vacuum of nothing**, but filled with a fluidic **substance** with a very light density and a very big pressure. Albert Einstein seems to had struck upon this reality in the 20th century but apparently he was isolated, being born in rather premature of an age.

Space is resistive for motion and a great deal of Energy is required to rotate a Planetary System around Sun. Who is giving that energy for planets? Theory of Gravity Deviation explains how Sun itself, is pushing them to move laterally by the force component of **gravity deviation** created due to its spinning.
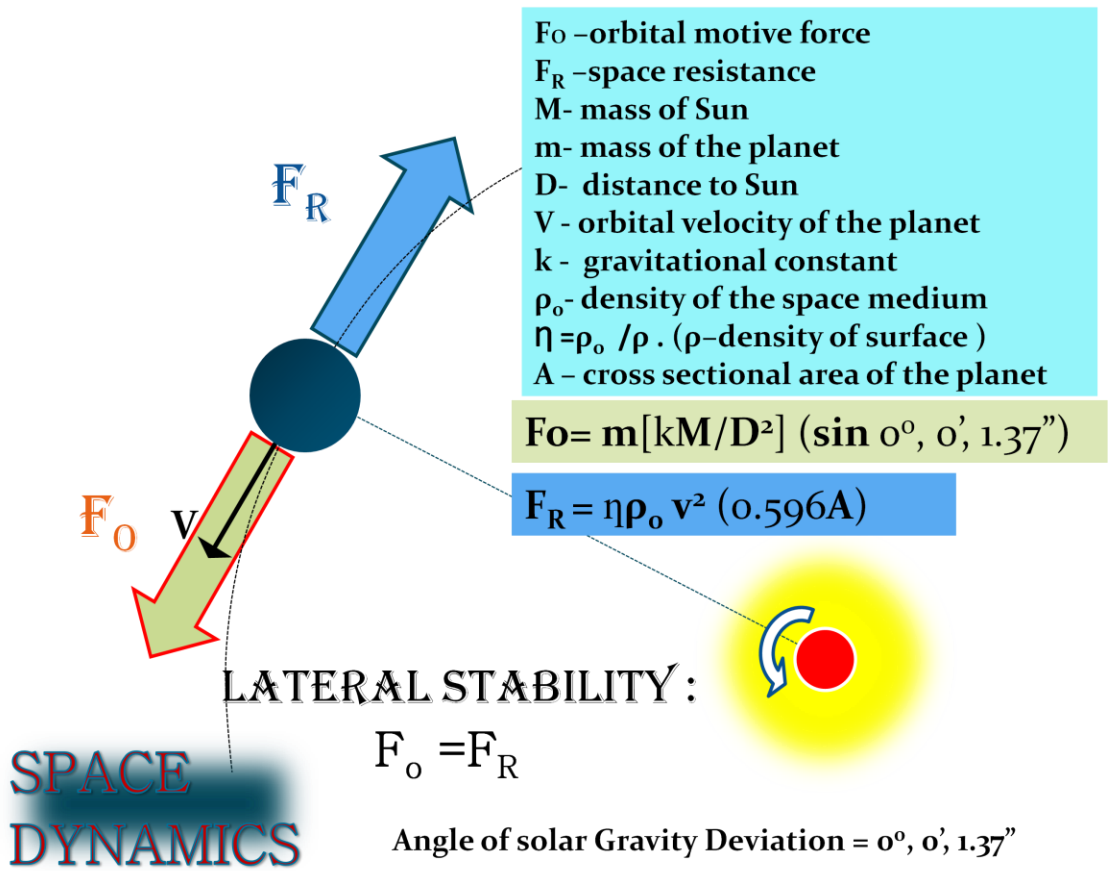
Fo –orbital motive force
F_R –space resistance
M- mass of Sun
m- mass of the planet
D- distance to Sun
V - orbital velocity of the planet
k - gravitational constant
ρ_o- density of the space medium
$\eta = \rho_o / \rho$. (ρ–density of surface)
A – cross sectional area of the planet

$$Fo= m[kM/D^2] \, (sin \, 0^o, \, 0', \, 1.37'')$$

$$F_R = \eta \rho_o \, v^2 \, (0.596A)$$

F_R

F_O V

LATERAL STABILITY :
$$F_o = F_R$$

SPACE DYNAMICS

Angle of solar Gravity Deviation = 0°, $0'$, $1.37''$

FIGURE–05

5.5 Getting away from Stable Orbit:

Stable Orbit of a planet ought to be a **circle** theoretically and at that dynamic stable stage, a planet should satisfy the two conditions such as;

1.   Gravitational Drag(F_g) = Centrifugal force (F_c)
2.   Orbital Motive Force (F_o) = Space Resistance (F_R)

Any **sudden variation** in Sun's **spinning speed** (probably could be expected due to some inner explosion), the **Orbital Motive Force** (F_o) can be dropped. Then the **lateral stability** of all the planets could be affected at the same time. In that change, **speed** of planets must be dropped due to **space resistance**.

Once **speed** is dropped, then the **radial stability** too is affected because the **centrifugal force** is also dropped consequently. But Newton's **Gravitational Drag** remains unchanged and as a result the planet is dragged a bit **towards the Sun**. During this transition, the circular **Stable Orbit** is **distorted** in to the **elliptical Keplarian Orbit**.

A planet takes a longer time to get back in to the **Stable Orbit** (circular orbit) again. Planets in closer orbits to Sun could be more affected by this phenomenon because both Gravity and Gravity Deviation both are much effective at closer distances to Sun.

5.6 Precession:

By now 'Precession in orbital motion of Planets' has been reduced in to a small problem with recognition of the **lateral force component** by the **Deviated Solar Gravity**.
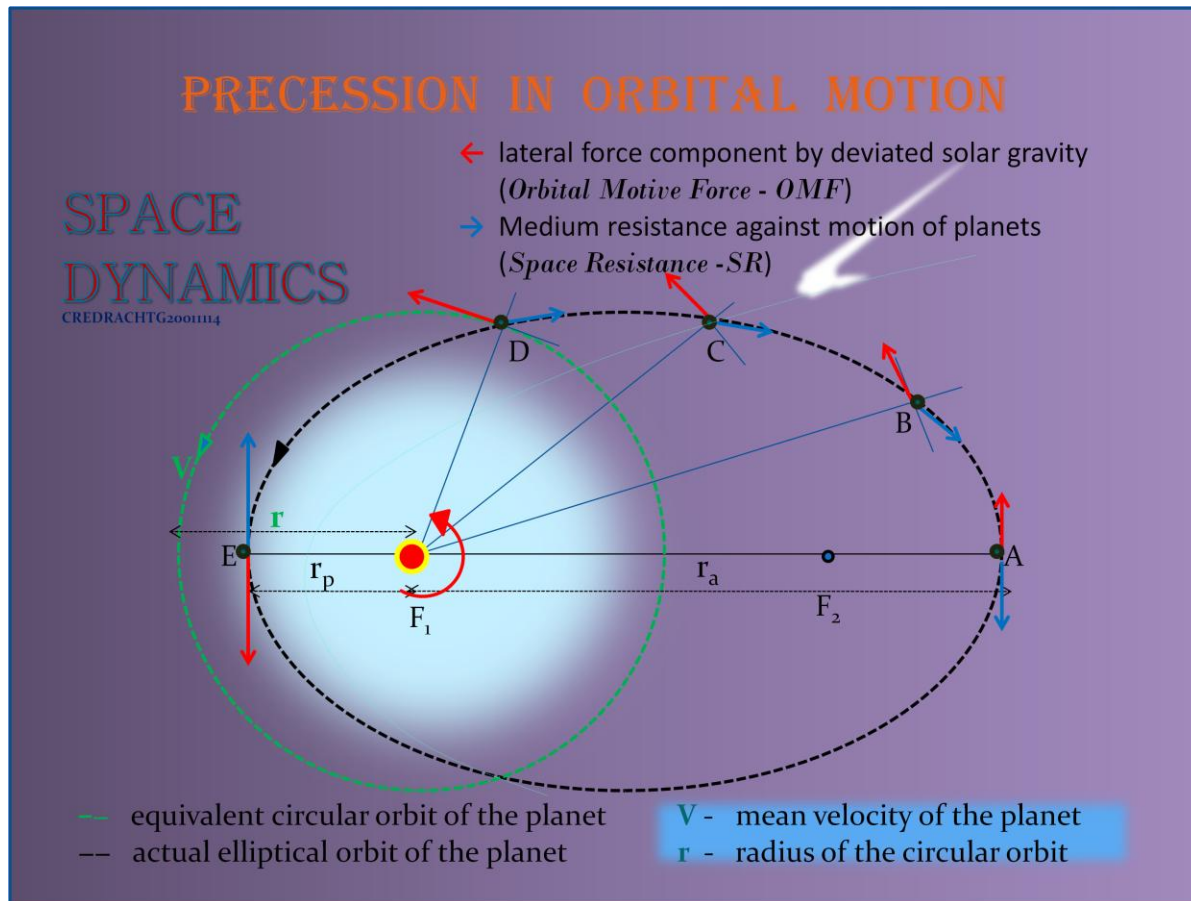

FIGURE-06

As shown in the figure-06, the actual elliptical orbit and the equivalent circular orbit both are considered to explain the cause behind precession. The **orbital motive force** (in red color) is equally balanced by the **space resistance** (in blue color) at every position on the **stable circular orbit** as indicated in green color in the picture.

But the two forces are **not equally balanced** at the points B, C & D on the **Keplerian orbit** as indicated in black color in the picture. The **orbital motive force** is applied always in

the **perpendicular direction** to the radius. But the space resistance is applied only in the opposite direction of motion.

Then only a **component** of **space resistance** is applied to balance the **orbital motive force** unsuccessfully. Therefore at the points B,C & D the **lateral stability** of the planet is lost and a **resultant unbalanced moment** is applied upon the **elliptical Keplerian Orbit** to move it in the same direction of spinning of Sun.

Precession is therefore occurred by the same force (the force component of deviated gravity) which also makes Planets revolve in the same direction of Sun's spinning.

Somebody may question herein; "Well, but the orbit of Mercury is just a **track** and how could any physical force move a track around Sun?"
Yes, it is just a track but you can make it solid by hammering the planet down in to pieces and spreading them all over the Keplerian orbit with no difference at all in its orbital dynamics.

06. CONCLUSION

The Space that we observe today is just a snap shot of the **Universe** which is ever been **oscillating** between the **Stability** and **Instability**. If theories are formed hurriedly by looking at an **unstable phase** of a certain **phenomenon**, they could be inapplicable when things become **stable**.

'**Precession**' in orbital motion of planets too exhibits just a scene from the planetary stage play, worth to be named as '**Recovery from Instability**'. But it also gives an important clue that something remarkable has happened in the past, to shift the **Planetary Family** a bit from the **Stability**. It cannot be the famous **Big Bang** but a secondary bang probably occurred at a later stage in Sun, which could have dropped its **spinning speed**.

<p align="center">END</p>

Any novel idea, concept or theory introduced herein by this experimental technical monograph, is freely exposed for the World Public, to test and adopt in any researches, inventions and applications on behalf of coexistence of the Global Ecosystem and Human Civilization.

<p align="center">*Cyril H Thalpe Gamage*</p>

<p align="center">*30th Jan 2014*</p>

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