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Research Paper

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Parabolic Type of the Motion of Moon in the Cyclic Orbit Appearing Associated With the Earth during Revolution

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Abstract—An exhibition of the orbitary motion of the moon associated with the earth is derived. The revolutionary movement of both the earth and the moon present in the ecliptic orbit of the earth in association around the sun is helpful in obtaining the mechanism of the actual path of the moon. In the solar system, the earth has to remain in the elliptical orbit around the sun under its gravitational attractive force. While the moon's orbit is decided by the gravitational force acting at the same time mutually by the sun, and earth. The gravitational force acted by the sun is responsible for giving an elliptical velocity to the moon to travel behind the earth. In contrast, the gravitational force of earth is responsible for its movement circularly. Both these types of motions are simultaneously imposed on the moon. Because the earth also moves in its orbit. Therefore, the line of gravitational force acting at the resultant position of the moon will go on changing throughout the whole motion. Thus, the moon only follows the earth for remaining associated behind by revolving in a cyclic path in design. The resulted locus of motion is evidenced to occur by repeating a successive parabolic type of path for completing a full cyclic orbit. The distance of the moon in perigee and apogee positions is related with the parabolic type of motion associated with the earth. The extra distance traveled by the moon to follow the earth via going through the cyclic orbit is accomplished with the displacement provided by the vertical component of orbital velocity. This component of velocity is assessed by Newtonian mechanics and is found to be entirely responsible for carrying the moon vertically displaced from the orbit of the ecliptic into the cyclic orbit. The ecliptic velocity provided by the gravity of sun ever remains unchanged with the moon and plays the active role of horizontal component of orbital velocity necessarily required for displacing the moon behind the earth during the whole motion.

Keywords—Revolutionary motion, gravitational force, ecliptic, cyclic orbit, acceleration and retardation, parabolic motion, circular and elliptical motion, resolution of velocity and acceleration, sun, earth and moon.

I. INTRODUCTION

The gravitational force acted by the earth can not revolve the moon around the earth in a circular or elliptical type of any perfect orbit. Because neither the earth is static nor the moon is. Both the earth and the moon are found in the same elliptical orbit of the earth around the sun. Hence, both will be called in motion. The gravitational force of the sun is responsible for providing the existence of each in the revolutionary orbit of the ellipse. The earth leads in motion, and the moon follows its motion by remaining 385000 km distant apart. In such conditions, the gravitational force acted by moving earth on the moving moon keeps the moon to travel in a cyclic route of path affiliated with the earth during the revolution. In other words, the moon, which is going to move around the earth for a circulatory motion is diverted by the gravitational force due to the sun to run in the orbit of the cycle. Thus, it is clear that the moon possesses two types of velocities. One regulated by the gravitational force of sun for remaining ever associated behind the earth in the elliptical orbit of the earth. The other type of velocity is regarded for going in the circular type of orbit around the earth, hence it is regulated by the gravitational force of the moving earth. Thus, two components of velocities are imposed on the moon for taking it in its resulting motion. The moon's motion is treated by the application of gravitational force of earth on moon at that position which is provided by the gravity of sun.

The orbit of the moon associated with the earth can not be a circular. The earth is not in a static position at a fixed point for providing an unchanged magnitude of gravitational force. Such a centripetal force is essentially required for a revolutionary type of motion in a circular orbit for unchanging the magnitude of orbital velocity. The direction of orbital velocity is only changed during the perfectly circular motion. Similarly, the elliptical type of motion is also disallowed. In such type of motion, the source of gravitational force must also be static at a fixed point situated at one of the foci of the ellipse. These two types of revolutionary motion are simple to explain by considering the motion in a fixed two- dimensional plane during the whole motion. The motion has been explained in the previous investigation while discussing the revolutionary movement of a body under the action of resolution of acceleration due to gravity involved [1]. Hence, the two components of acceleration due to gravity are involved in changing the velocity components present in the respective directions. Newton's second law of motion can access the type of change [2]. During the motion in such type of two orbits, the direction of gravitational force acting on the body towards a fixed point plays the role in changing the direction of velocity as well as to decide its magnitude. The motion is either in a closed envelope of a circle or in a closed envelope of the ellipse.

But, in case of the motion of the moon around the earth, the conditions for revolutionary motion in any of the circular or elliptical type of orbit are not favorable. Therefore, a most important orbit comes into the role, which can define the mechanism of the effect of the gravitational force of moving earth on the velocity of the moon. NASA report on-orbit of the moon shows that the orbit of the moon is very near to the ecliptic orbit of earth. To estimate the orbit of the moon, the main attention is focused on the effect of change of line of gravitational force acted by the moving earth. Because the orbit can not be a closed envelope of any kind. Therefore, the orbit would be the cyclic in shape. Thus, the cyclic orbit is very easy to design for the moon. The cyclic orbit is naturally made for orbiting the moon. The line of action of gravitational force acting on the moon changes throughout the whole motion due to the cause of moving earth. Hence the moon’s motion around the earth seems to be affiliated for an orbitary motion by making a track of path cyclic in design. Here, the orbit represents the relative motion of earth and moon concerning to each other in the contest of positions in space. The moon is attracted by the sun, due to which the moon has a speed for revolution around the sun, but it is carried via a cyclic type of orbitary motion by the changing magnitude of the gravitational field of moving earth also. The two types of motions of the moon for providing related displacement during motion are listed below.

1) The sun gives a displacing motion to the moon for remaining behind the earth. This type of displacement is related to the high speed of moon (30 km/sec) and is acted towards the tangent of ecliptic chosen as the X-axis for the treatment during the whole motion.
2) The gravitational force of moving earth also gives a displacement to the moon during motion. This type of displacement is related with the change of circular velocity of moon (1.022 km/sec) effective only towards the Y-axis of the selected plane during the whole motion.

The resultant displacement of the moon from the elliptical orbit results from these two types of displacements involved during the motion via the cyclic path. Thus, the moon travels long distance when it goes via the orbit for completing a cycle. This additional distance is traveled by the moon due to the gravitational involvement with the earth. In fact, the moon must exhibit its presence in a cyclic type of orbit due to the superposition of these two types of motions imposed by the gravitational forces of both the sun, and the earth. The total displacement during the resultant motion towards the horizontal and vertical directions is the result of the locus of finding the action of resultant velocity. The linear velocity of the moon provided by the gravitation of the sun ever remains with it. The position of the moon from the elliptic orbit is displaced by the circular velocity imposed on it to follow the earth via revolving. The actual revolution of the moon around the sun as well as around the earth occurs via a cyclic path. The velocity of the proceeding of the moon in the orbit can be obtained by the vectorial sum of the velocity of the moon related with the gravitational force of the sun, and the circular velocity related with the gravitational force of the earth. The change in magnitude and direction of the gravitational force acted by the moving earth keeps the moon to move by the resultant velocity in the orbit of two parabolic half-cycles situated successively on both sides along the ecliptic orbit. In this way, the moon can be found to revolve in an orbit cyclic in nature by remaining associated with the earth in the orbit of ellipse provided by the gravitational force of great sun from its equilibrium state of existence in the solar system [3].

II. THEORY

The moon is a member of the solar system, which is found in the orbit of the earth. The orbit of the earth is elliptical. The earth revolves around the sun under its gravitational force. The moon is located in the orbit of this ellipse behind the earth. Hence it will also be called gravitationally revolving around the sun as the earth is revolving. The gravitational field of the sun at this height of earth can be determined by the relation [4].

$$
\begin{aligned}
gs &= G\ Ms / R^2 \\
&= (6.67 \times 10^{-11} \times 2 \times 10^{30}) / (1.5 \times 10^{11})^2 \\
&= .0059 \text{ Newton/kg} = .0059 \text{ m/sec}^2
\end{aligned}
$$

The same acceleration due to the gravity of the sun will also act on the moon for its existence at the level of ecliptic orbit of the earth. The moon is situated at 385000 km distance apart from the earth. The average speed of earth can be calculated with the help of the formulae of orbital velocity defined by the relation –

$$
\begin{aligned}
Vx &= \sqrt{ (G\ Ms / R) } \\
&= \sqrt{ [(6.67 \times 10^{-11} \times 2 \times 10^{30}) / (1.5 \times 10^{11})] } \\
&= 3 \times 10^4 \text{ m/sec} = 30 \text{ km/sec}
\end{aligned}
$$

Thus, for the attachment of the moon behind the earth in the same elliptical orbit, each earth, and the moon will possess the same average speed of about 30 km/sec. This type of consideration of the presence of both the earth and the moon in the same elliptical orbit under the same gravitational effect of sun is phenomenologically correct. Further, this matter of fact is supported by the following logical argument-

What ever be the mass m of a revolving body if it is revolving in the same circular orbit of radius R around an another fixed body of comparatively greater mass M, its interval of revolution will be fixed by the formulae -

$T^2 = I R^3 / M$

Where $I = (4 \pi^2 / G) = 5.91 \times 10^{11}$ kg²/Nm²

By using the mass of the sun and the orbit of the earth, the period of revolution around the sun is obtainable.

$$T^2 = [5.91 \times 10^{11} \times (1.5 \times 10^{11})^3] / (2 \times 10^{30})$$
$$= 9.97 \times 10^{14} \text{ sec}^2$$
$$T = 3.158 \times 10^7 \text{ sec}$$
$$= [(3.158 \times 10^7) / 86400] \text{ days}$$
$$= 365 \text{ days}$$

Thus, the period of revolution of both the earth and the moon around the sun will be the same 365 days. Because the motion of each is concerned with the same elliptical orbit. The change in velocity during motion in the elliptical orbit will occur for both the bodies according to Kepler's principle [5]. Each body will go quickly when passing through the perigee and will go slowly when passing through the apogee vertex of the ellipse. However, the moon is moving in a cyclic orbit associated with motion behind the earth. But, the moon is found at about the height of earth from the sun. Of course, it will be attracted by the sun. It is said that the sun wins the earth in attracting the moon. The moon will also be attracted by the earth. Because the moon is very nearly associated with the earth. This gravitational force keeps the moon in a circular motion to go around the earth. This velocity is gravitationally affiliated with the earth at a distance of 385000 km, hence is very useful for the treatment of the cyclic path of orbit for the moon. Therefore, this component of circular velocity of moon related to the gravity of earth can be obtained by –

$$Vy = \sqrt{ (G Me / r) }$$
$$= \sqrt{ [(6.67 \times 10^{-11} \times 6 \times 10^{24})] / (3.85 \times 10^8) }$$
$$= 1.022 \times 10^3 \text{ m/sec} = 1.022 \text{ km/sec}$$

The acceleration due to gravity of earth acting on this circular velocity of moon at the distance of its orbit can be obtained by the expression –

$$ge = G Me / r^2$$
$$= (6.67 \times 10^{-11} \times 6 \times 10^{24}) / (3.85 \times 10^8)^2$$
$$= .0027 \text{ Newton/kg} = .0027 \text{ m/sec}^2$$

The sun bounds the earth and the moon in the same elliptical orbit of the earth to revolve the moon behind the earth at about 385000 km distant apart. The moon will have almost the same speed of 30 km/sec. Thus, earth–moon system is associated within the same elliptical orbit, so-called ecliptic of earth. The earth applies a gravitational force on moon to attract, but the attractive force acts on the tangential velocity for keeping the moon around the earth in a circular motion. Therefore, the moon will have a second type of velocity (1.022 km/sec) so-called the circular velocity. These two velocities simultaneously act on moon perpendicularly applied hence give a resultant velocity to moon for proceeding motion. The resultant of these two velocities can be easily found as the vectors sum by –

$$V = \sqrt{ [(Vx)^2 + (Vy)^2] }$$
$$= \sqrt{ [(30)^2 + (1.022)^2] }$$
$$= 30.0174 \text{ km/sec}$$

The direction of this velocity from the X-axis will be -

$$\theta = Tan^{-1} (Vy / Vx)$$
$$= Tan^{-1} (1.022 / 30) = Tan^{-1} .034 = 2°$$

Thus, the moon can be considered to have velocity of 30.0174 km/sec inclined by 2° from the ecliptic X-axis for projecting in a cyclic type of orbit for associating with the earth also. The resultant velocity attained by the moon is further affected due to the change of the gravitational field of moving earth. For finding the effect of gravitational force on the cyclic velocity of the moon during motion, the velocity is required to be resolved at every point into two components. These components are called respectively the horizontal and the vertical components of the orbital velocity of the moon. The acceleration due to gravity acting on displacing moon at every point during the motion is also considered to resolve along these directions of velocity components for finding the effect. The effect of the horizontal component of acceleration is ignored to take any part for the change in the velocity component present along the X-axis. Therefore, the horizontal component of velocity is assumed to remain constant throughout the whole motion. This velocity is only regulated by the gravitational field of the sun, hence remains (30 km/sec) unchanging throughout the whole motion. While the vertical component of velocity depends mainly upon the gravitational acceleration of earth, hence is either accelerated or retarded by the vertical component of acceleration of the gravitational field of the earth acting on it during the whole motion.

The moon is a very large natural satellite of earth. Its radius is 1738 km, while the radius of the earth is 6378 km. The state of motion of the moon is affected by the gravitational force of earth only due to the cause of having comparatively a less mass of moon than that of the high inertial mass of earth. Its mass is only 7.34×10^{22} kg while the earth contains a mass of 6×10^{24} kg. The moon makes a cyclic type of revolution associated with the earth once in 27.3 days [6].

Because 27.3 days = 86400×27.3 sec = 2.36×10^6 sec

In this duration of time, the moon is displaced towards the ecliptic by its speed of 30 km/sec. Hence, the distance traveled by the moon along the ecliptic during one cycle so-called the length of a cycle, will be –

$30 \times 2.36 \times 10^6$ km = 7.07×10^7 km = 7.07×10^{10} m
The circumference of the elliptical orbit of earth around the sun is approximated by –
$2 \pi R = 2 \times 3.14 \times 1.5 \times 10^{11}$ m = 9.42×10^{11} m

The number of cycles of revolution of the moon associated with the earth during one revolution in the periphery of elliptical orbit around the sun will be -
(9.42×10^{11} m) / (7.07×10^{10} m) = 13.3 cycles

The earth completes its revolution around the sun in 365 days, while the moon takes 27.3 days to complete a cycle once associated with the earth. Therefore, the number of cycles of revolution of moon associated with the earth during one revolution around the sun done in one year can also be calculated by -
365 days / 27.3 days = 13.3 times in a whole year.
The observations are fruitful and match for studying the path of the moon associated with the earth in a cyclic orbit.

III. RESULTS AND DISCUSSION

Obviously the moon follows the path of the earth with a component of about 30 km/sec speed. Simultaneously, the moon is also attracted by the earth for carrying it in the circular orbit around the earth by a component of velocity 1. 022 km/sec. The moon has no any option except, to sum up these mutually perpendicularly acting velocities. As a result, the moon proceeds for motion by a resultant velocity of 30.0174 km/sec towards the direction at an angle of 2° inclined from the orbit of the ecliptic X-axis. But the earth at every moment moves forward in its way of motion. Now, the positions of both the moon and earth have shifted from the initial positions. The position of the moon on which the gravitational force is acted and the point towards which it is being attracted, both the points go on changing throughout the whole motion. Thus, the line of gravitational force acting on the moon changes at every point during the motion. To resolve the velocity at any point and to resolve the gravitational acceleration acting during the motion of the moon in a cyclic orbit, a slightly variable two dimensional X-Y type of plane is selected to build up to deal with the motion for finding the effect of resolved components of acceleration on respective components of velocities. The projected direction of the moon towards the cyclic orbit at an angle of 2° (known value 1.5°) is not possible to draw diagrammatically to show the details of motion. Hence an arbitrary angle is used for the treatment of motion with particulars. To deal with the motion, firstly, the main emphasis is focused on searching the positions of both the earth and the moon in orbit considered for motion. The relative positions of earth and the moon during the motion is achieved diagrammatically. Figure 1 shows the finding of the model presented.

The moon is in its orbit average 385000 km distant apart from the earth. The earth and moon are in its different ways of motion. Let at any time the earth is at point A. The relative position of the moon in its orbit is represented by the point A’. The relative positions are expressed by the points (A, A’). Both A and A' are situated in the arc of the elliptical orbit of the earth. The line joining A ← A' is assumed very near to the X-axis. It is the nearest distance of the moon from the earth during motion associated with this part of the ecliptic. It shows the direction of gravitational force of earth acting on the moon. Thus, the ecliptic plays the role of X- axis. The resultant velocity of the moon at this point towards the cyclic orbit is shown by V. Similarly (B, B'), (C, C'), (D, D'), (E, E'), (F, F'), (G, G'), (H, H'), (I, I') are the other relative positions of the earth and the moon displaced concerning due to both types of velocities. The relative distance and the direction of the gravitational force acted by moving earth on the moon while passing through these points will be represented by (B ← B'), (C ← C'), (D ← D'), (E ← E'), (F ← F'), (G ← G'), (H ← H'), (I ← I').

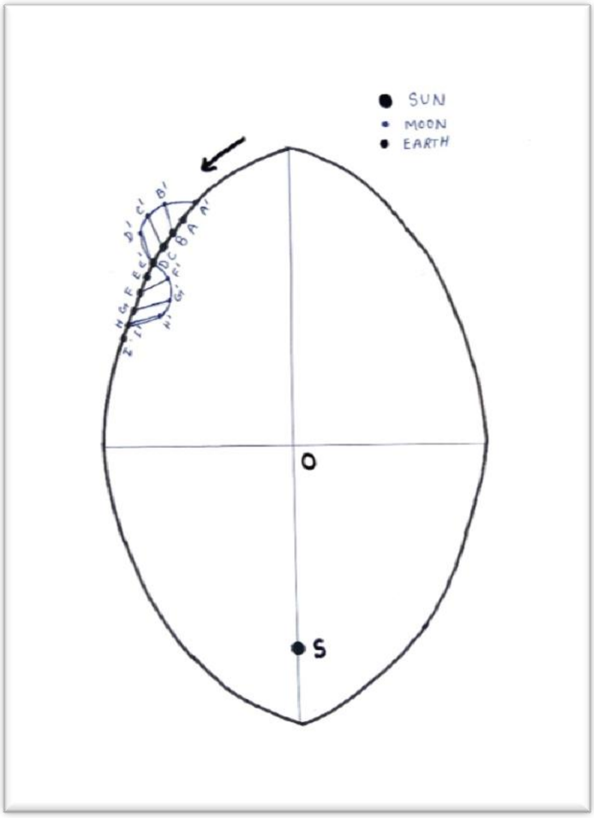

Figure 1. Positions diagram of earth and moon for the parabolic type of the motion of moon in the cyclic orbit associated with earth during revolution around the sun.

Now, let us treat the motion of moon in its cyclic type of revolutionary orbit. The effect of the gravitational field of moving earth will occur on the vertical component of the velocity of the moon only. But, the gained resultant velocity (V) at every point is resolved into two components, the horizontal Vx towards the X-axis and the perpendicular to it along the Y-axis is the direction for the vertical component of velocity Vy. To determine the effect of gravitational force on velocity components responsible for motion in two-dimensional plane, the acceleration due to gravity (a) acting on the moon (.0027 m/sec²) towards the earth is resolved into two components, ax and ay. But, the change occurring in velocity towards the horizontal direction along the speed of the moon is trivial, hence it is precluded. These factors are shown in figure 2. Only the effect of the vertical component of acceleration ‘ay' on vertical component of velocity is taken into account. The vertical component of velocity is either accelerated or retarded during the motion. While the horizontal component of velocity always remains 30 km/sec throughout the whole motion.

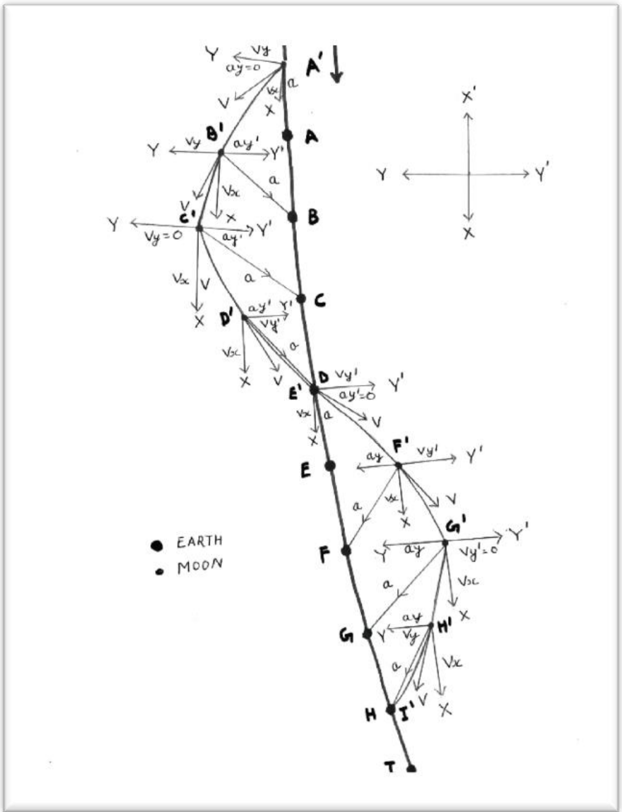

Figure 2. Resolution of orbital velocity and acceleration due to gravity responsible for carrying moon in the parabolic type of cyclic orbit for association with earth during revolution.

Let us start to interpret the motion from the point when the moon passes through the point A’. For this position of the moon, the earth will take the position at A. The acceleration due to gravity 'a' acting on the moon at A' will be totally towards the horizontal direction of the X-axis. Hence the vertical component of acceleration ‘ay' can be expected to have zero value. The speed of the moon will be shown by Vx (30 km/sec) ever directed towards the X-axis during the whole motion. The circular velocity Vy (1.022 km/ sec) acting on the moon for the circular motion will be directed towards the Y-axis. In such circumstances, by obtaining the two such types of velocities together, the moon's resultant velocity becomes V= 30.0174 km/sec for going at an angle of 2° from the ecliptic orbit. As soon as the moon is projected forward to go ahead by this resultant velocity 30.0174 km/sec towards the prescribed orbit, the direction of the line of the gravitational force of earth acting on the moon goes to change. When the moon enters into the cyclic orbit, it has two components of velocities horizontal and vertical. However, the moon uses the resultant of these two components to proceed in the cyclic orbit. But, the acceleration and retardation due to the gravity of the earth can not be applied on each component of resultant velocity during motion. Therefore, only that part of the vertical component of velocity, which is related with the circular velocity regulated by the earth, is taken into account for acceleration and retardation processes occurring during the motion.

During the motion within the first quarter, due to the increasing distance of the moon and changing directions of acceleration acted by the earth, the vertical component of acceleration increases. Because the vertical component of acceleration acts oppositely to the vertical component of velocity. Hence, this acceleration causes retardation. As a result of retardation, the vertical component of velocity decreases, and it is zero at the peak of climax. The horizontal component of velocity is neither accelerated nor retarded during the whole motion. The horizontal component of acceleration is assumed to be ineffective in changing the speed of the moon that is regulated only by the gravitation of the sun acting on the moon. The speed of the moon shown towards horizontal direction is fixed by the high acceleration due to the sun .0059 m/sec² acting on the moon for remaining unchanged. Thus at the apogee vertex, the horizontal component of velocity is the only total resultant velocity of the moon. Hence, the value will be only 30 km/sec. This velocity is assisted by the vertical component of acceleration acting at the vertex of apogee of the cyclic orbit to go down fall parabolic motion. During this motion within the second quarter, due to the decreasing distance of the moon and changing directions of acceleration acted by the earth, the vertical component of velocity is increased by the decreasing value of the vertical component of acceleration. The horizontal component of velocity will neither be accelerated nor retarded by the horizontal component of acceleration acting along with the speed as the moon is provided by the sun. Because during the motion in the second quarter, the vertical component of acceleration applies in the same direction of the vertical component of velocity. Hence the vertical component of orbital velocity is accelerated by the vertical component of acceleration. Thus, during the motion from the peak to the level of the X-axis, the vertical component of velocity is accelerated from the value zero to 1.022 km/sec. While the horizontal component of velocity remains unchanged. The resultant of these components of velocities is the resulting velocity of moon in this part. This velocity becomes maximum when the moon reaches at the level of elliptic orbit of the earth. The resultant orbital velocity becomes equal to the vectorial sum of Vx and Vy and is equal to 30.0174 km/sec. The moon is shifted nearestly to the earth and is called the perigee of the cyclic orbit of the moon. The orbital velocity of the moon will be comparatively greater at perigee than other points in the half- cycle. And, the velocity at apogee will be lesser than comparatively at other points in the half- cycle.

When the moon crosses the elliptical orbit of the earth, it passes through the perigee of the revolutionary cyclic path. At this time, it has the highest velocity. At this point, the acceleration acts only horizontally. The vertical component of acceleration acting at perigee is almost zero. But as soon as the motion proceeds in the third quarter, the horizontal component of acceleration is ineffective to change the horizontal component of velocity Vx. Because it can not be either accelerated or retarded by the horizontal component of acceleration. Thus horizontal component of velocity remains 30 km/sec in this quarter also. Although the vertical component of acceleration acting on the vertical component of velocity goes on increasing in the third quarter, but it acts in the opposite direction of the vertical component of velocity. Therefore, the vertical component of velocity decreases due to retardation and climbing towards the peak of the orbit. At the climax of climbing, the vertical component of velocity is retarded to zero value. Thus at this vertex of apogee, the moon contains the only a horizontal component of velocity as its orbital velocity. This orbital velocity is assisted by gravitational force to act for downfall parabolic motion. The down fall motion occurs during motion in the fourth quarter. During downfall towards the earth, again, the horizontal component of velocity remains unaffected. The vertical component of velocity is only accelerated by the vertical component of acceleration acting in the direction of the vertical component of velocity. On reaching the level of earth's orbit, both the components of velocities enhance the resultant orbital velocity maximum. This point is called the perigee again.

During one revolution in the cyclic orbit, the moon goes through the nearest distance from the earth at two places when it crosses the elliptical orbit of the earth. The moon is said to be in the position of perigee due to affiliation with earth during motion by passing through the nearest distance. The distance is approximately 356400 - 370400 km. Similarly, during one revolution, the moon goes through the farthest distance from the earth at two places when it reaches the height of the climax. The moon is said to be in the position of apogee vertex due to affiliation with earth by passing through the farthest distance [7]. The distance is approximately 404000 – 406700 km. The change in distance of perigee and the apogee can be understood based on change of speed of the earth and moon while revolving around the sun in the same elliptical orbit of earth. Because the moon has to complete its revolution in a cyclic path within its standard time of 27.3 days. In this duration, whatever be the distance traveled by the moon in its way of the length of a cycle.

The moon's motion associated with the earth appears to happen within two successive parabolic envelopes situated cyclically across both sides of the elliptical way of the earth. The parabolic motion can be understood to start from a point of perigee situated in elliptical orbit of earth. The projectile velocity V= 30.0174 km/sec is the resultant of the revolving speed of the moon (30 km/sec) around the sun in the elliptical orbit and the tangential velocity (1.022 km/sec) for going in the orbit of a circle under the effect of the gravitational force of earth. The point is just behind the earth. This projectile velocity can be resolved into two such parts horizontally and vertically. During the climbing motion of the projectile, the vertical component of velocity is retarded (decreased). While the horizontal component of velocity remains unchanged. On reaching the apogee vertex of the parabola, the vertical component of velocity is retarded to zero value. Only the horizontal component of velocity remains in action. This velocity is assisted by the gravitational force for a down fall motion. The velocity of the downfall parabolic motion increases. On arriving at the level of the elliptical orbit in front, the velocity attained becomes maximum. The resultant velocity gained at this point of perigee is again used by the moon for going in a successive parabolic journey towards the space available from the back side around the moving earth. Firstly, the climbing of parabolic motion occurs, so the velocity goes on decreasing. At the vertex of climax, the vertical component of velocity is finished, and the horizontal component of velocity remains only in action. The velocity of the moon at the apogee vertex is assisted by the gravitational force to go for a downfall parabolic motion to complete. When the moon reaches in front at the level of elliptical orbit of earth at the perigee, one cycle of the motion of moon is completed in 27. 3 days. The orbit is seen as a cyclic in design. The motion is assisted by two successive parabolic motion associated with the earth. One parabolic motion occurs associated with the moving earth when the moon travels a certain path of length via half cyclic motion towards one side of the ecliptic for during a period of 13. 6 days. While the second parabolic motion of the moon occurs associated with the forwarding earth from the back side until the moon is reached at the ecliptic level by completing the next half cycle in a period of 13.6 days.

IV. CONCLUSION

The earth and the moon are both associated with the sun. The earth revolves in an elliptical way around the sun, and moon is found to follow the earth behind it in a cyclic type of orbital path. When the moon completes a full cycle during motion by remaining behind for following the earth, it is said to be one revolution done by the moon associated with the earth. It is evidenced that the cyclic motion of the moon is composed of two successive parabolic types of motions to occur one by one on both sides across the elliptical orbit of the earth provided for motion. The route is selected by the moon for its existence in the solar system. The velocity in the parabolic orbit is composed of two types of component of velocities which remain mutually perpendicularly acting on moon during the whole motion. A component is the speed of the moon- related to the finding of it in the ecliptic orbit of earth and is provided by the gravity of the sun. This component of velocity remains unchanged during the whole motion. The gravitational force of earth does not affect it by the application of a horizontal component of acceleration towards this component. The other component of velocity is under the control of vertical component of acceleration due to the gravity of the earth acting towards it during the whole motion. Only this component of velocity is changed during the whole motion in a cyclic orbit. During motion in the cyclic orbit, the horizontal displacement towards the ecliptic X-axis is related to the speed of the moon provided by the sun. In contrast, the vertical displacement during motion is related to the velocity provided by the earth. Thus, the moon moves in a diverted orbit, which seems to follow the earth. The route becomes the path for finding the position of the moon concerning the position of earth. Velocity of the moon- related with the gravitational force of the sun can not be changed by the gravitational force of earth acting. While velocity- related gravitational force is affected by the gravitational force of the sun. Thus the physics of Newtonian mechanics can well explain the moon in its orbit.

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