THE CLASSICAL INTERPRETATION OF THE ADVANCE OF PERIHELIAN: THE TWO DRIFTS EXIST

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ABSTRACT: In this research paper we have defended the foundation of Newtonian Mechanics i.e. the law of force or the second law of motion which is the most basic axiom of Newtonian Mechanics. At the same time we have discussed its drawbacks, short comings or defects in Newtonian Mechanics so as to generalize it. The Newtonian Mechanics is based on second order motion which can be generalized easily to 'nth' order motion. From the general motion all the theories are derived. They are approximations and are evaluated and unified.

We have contradicted the law of conservation of mechanical energy in a gravitational field and generalized it. We have pointed out in Aristotelian, Galilean and Newtonian dynamics errors and drawbacks. In Einstein's General relativity the advance of perihelion has been discussed in detail.

We have classical interpretation of advance of perihelion. There are two drifts instead of one. It has been shown with exaggerated error with examples in two figures-The two drifts exist.

Keywords: Refinement or improvement, continuous refinement, generalization, unification, evaluation, approximation - successive approximation.

1. INTRODUCTION

After the publication of the Theory of General Relativity in 1916, Einstein denied the existence of Newtonian force.

"The best answer that can be offered to this reasonable observation is that the heart and soul of the theory of general relativity rests on the assumption that gravitation is not a force in the usual sense" ([1] P.196)

Comments in favor and against of Newtonian Classical Theory:

(i) The Newton's Second Law or Newtonian Force is a reality. It needs to be generalized only, which the first author has done already in [2].

(ii) During the launching of all rockets, skylabs, artificial satellites etc, even today the Newtonian Theory is used in practical and not of Einstein's Theory. [3].

(iii) All the practical motion problems, which are not comparable with velocity of light, are dealt with accuracy in Newtonian Theory. [4].

(iv) What is the orbit of comet? The orbit of a comet is parabola instead of ellipse, which violate Newton's Law. [5].

(v) EDDINGTON, Sir Arthur Stanley (1882-1944), English astronomer and astrophysicist who pioneered the theoretical study of the interior of stars and who, through his Mathematical Theory of Relativity (1923), did much to introduce the English-speaking world to the theories of Einstein.

Eddington was the first Astronomer-Scientist who gave in 1918, the classical interpretation of advance of perihelion of Mercury by 'r^3' in Newton's Law of Gravitation which gave the same error as that of Einstein's General Theory of relativity. It has been confirmed practically by all the Astrophysicists for 'r^3'. ([4] P.11).

Further the classical Mechanics is bound to second order motion only, "For the Newtonian, the law of motion is bound to be a second order differential equation, whereas as for the Aristotelian it is just as clearly bound to be the first order " ([1] P.46).

A SAYING: If a man is preparing food "In thinking" cannot get short of oil or any other thing. Similarly in case of theory the known things are involved to the maximum, if they are variable. However in case of practical the error is known and can be decreased in different way. [6].

Aristotelian Dynamics, Newtonian Theory and Einstein Theory are different or contradictory disciplines of physics. Their such existence has given birth to a basic problem of physics: the unification of physical theories or the intertheory relations leading towards the unified field theory of Einstein. [4, 5, 7, 8].

Some Philosophers of science have proposed the name "Super Physics" the most general physical theory. A unified physics in which we can relate and evaluate all the existing theories of physics. [4, 9]. Recalling that the efforts of whole generation of physicists-theorists are left in vain in the founding of such a super physical theory for the unification, relation and evaluation of all the different or contradictory disciplines of physics. Among them are the towering intellects- the greatest minds in physics; Einstein, Eddington, Schrodinger and Heisenberg who spent their lives on this enterprise, with the end result of precisely zero. [10, 11, 12].

The world-wide scientists, in the span of three hundred years, since Sir Isaac Newton published his book "Principia" in 1686 have badly failed to generalize Newton's any law or equation of motion in a classical way. Moreover, the problem of unification of basic forces; gravitational and electromagnetic is not a serious or basic one as is usually thought. It is not even clear to some philosophers of science. Whereas, the problem of unification of different theories of physics, when they contradict each other, becomes an actual and serious problem in the philosophy of science. [8, 13, 14]

To find a real theory of physics which embraces all its parts without contradicting each other, our present physical theories need to be generalized in different ways. In the present work it has been assumed that the Newtonian classical physics is an approximate account of the actual theory of gravitation and mechanics. It requires multigeneralization of its physical and philosophical foundations to account for the modern discoveries[15, 16].

2. THE GENERALIZED MECHANICS

Several People have recognized my book [2], but most important of them are given:

Highest level specialist comments on Dr. Aman Ullah's work, Honourable Professor Goroshko Oleg Aleksanderwich, D.Sc Physics and Mathematics. Head, Department of Theoretical Mechanics, Kiev State University, UKRAINE, USSR are:

"Thus the improvement of Newton's Second Law, when the influence of higher order velocities is taken into account by the author (Aman Ullah), is realized in the Relativistic Mechanics (of Einstein) . . . Possibility of the apparatus of "Generalized Mechanics" is illustrated by explaining the Drift of Perihelions of Planets and other examples in a Classical Way . . . The method offered for the construction of Generalized Mechanics is original and in our opinion is a promising one". [2] (P.77).

Further comments by word renowned Academician, my D.Sc Teacher, Great Russian Academician, Professor. Dr. Mitropolsky Yuri Aleksiwich, Academician, Russian Academy of Sciences, USSR are:

"The Foundations of Super Physics, - - - One of mankind's greatest adventures of discovery by Dr Aman Ullah, a young Pakistani Scientist . . . . . This rare achievement of the young Pakistani Scientist has superseded the three main disciplines formulated by the greatest scientists of the whole history of mankind. That is why his work is at the highest level in the world of Physics and he deserves a unique honor in the history of scientists". ([2] PP.78,79).

Further comments of Prof. Dr. Singh N. L, M.Sc, Ph.D in Mathematics, Professor of Mathematics. Post Doctorate Research Scholar, Kiev State University, Kiev USSR are:

"I hope that his finding in this direction will be the landmark in the history of science, ever long it will be remembered as a beacon by the coming generations". ([2] P.80).

Prof. Dr. C.M. Hussain, Professor of Mathematics, Department of Mathematics. Quaid-e-Azam University Islamabad, Pakistan. (He gave comments in the presence of several members together for break of tea time, in which the Head of Department, Prof. Dr. Mushtaq Hussain was also sitting as witness).

"When velocity varies, we say acceleration exists, but when acceleration varies, we do not have even notation. For that we are misled, because 'g/t' is not equal to zero."

3. THE CLUE OF GENERALIZATION
(i) ARISTOTLE (384 - 322 BC) Greek Philosopher and Scientist.

Aristotelian Dynamics begins with an anecdote.

Once a traveller asked Aristotle, "How much time it will take me to reach my destiny". Aristotle said, "I do not know". Then the traveller walked towards his destination. Aristotle saw him for some time and said, "You will reach your destination in so much time". The traveller asked Aristotle, "When I asked you, why you have not told me before?". Aristotle responded the traveller, "At that time I did not know your speed. Now I have checked your speed, then I have told you".

In this way Aristotelian Dynamics begins with 'v'. Thus the first Kinematical Equation was formed such as: $s = vt$.

When velocity is constant Aristotelian Dynamics work well. When velocity 'v' is variable it badly fails. For example, the motion of a train which moves from rest and the stone dropped from some height when its initial velocity is zero.

In case of train, when it starts from zero, it will cover some distance.

Thus, $s = vt = oXt = $ zero. Therefore, it fails to work well. Similarly it will fail in case of gravitation, which has 'g' = 'a' as acceleration.

(ii) GALILEO GALILEI (1564-1642)
Italian mathematical physicist who discovered the laws of falling bodies and the parabolic motion of projectiles. His most significant contribution to science was his provision of an alternative to the Aristotelian dynamics.

Galileo's Laws of free falling bodies in which $g = 32 ft/sec^2$, is his great discoveries. His laws are working well in gravitation even today which form his 'Dynamics'.

$h = ut + 1/2\ gt^2$ or $h = 1/2\ gt^2$.

When height is sufficient high, the formula is:

$h' = 1/2\ gt^2 + 1/4\ (dg/dt)\ t^3$,

Which gives error directly proportional to height and violate Galileo dynamics. Galileo did not know that 'g' is a veriable.

(iii) NEWTON, Sir Isaac (1642 - 1727)
The most prestigious natural Philosopher and Mathematician of modern times. The author of the theory of universal Gravitation, his derivation of Kepler's Laws; his formulation of the concept of Force expressed in his three laws of motion which makes his Mechanics.

He was the first to know the variation of 'g' was a variable, but did not use it. His whole mechanics is based on second order motion and all the basic laws can be generalized.

We have given Five General Laws of motion instead of Newton's three simple laws of motion.

We have given 'nth' order General Law of Gravitation instead of Newton's second order law of Gravitation.

We have Set of Forces (nth order) instead of Newton's one law of Force.

4. CONTRADICTION IN THE LAW OF CONSERVATION OF MECHANICAL ENERGY FOR GRAVITATIONAL FIELDS
The law of conservation of mechanical energy of a body moving in a gravitational field is one of the most basic laws of classical gravitation and mechanics. It states that the total mechanical energy of a freely moving body remains constant. Only one form of energy changes into another form i.e. the sum of potential energy and the Kinetic energy is constant. For the proof of conservation of total mechanical energy of a body in motion, the example of pendulum or a free falling body in a gravitational field is usually given. The ordinary method consists of the calculation of total energy of the given body of mass 'm' at different points having different heights when it falls freely in a gravitational field whose gravitational acceleration is 'g', where the total energy is taken as the sum of the potential energy and the kinetic energy.

Consider the free falling body initially at a point 'A' at a height 'h'. After covering a distance 'h$_1$', it reaches a point 'B' at a height 'h$_2$' and finally it falls on the surface of earth at a point 'C' with zero height. During free fall of the body. the total mechanical energy is calculated at the three points A,B,C which is equal to 'mgh' with ordinary law of conservation of mechanical energy. In this way, the total mechanical energy of the body is claimed to remain the same at the three points in all respects and hence the law of

conservation of mechanical energy is believed to hold true, perfectly and undoubtedly.

To challenge the law of conservation of mechanical energy in gravitational field, we show the existence of contradiction in the equality of total energy at all the three points A,B,C taken at different heights. Recall the non-linearity of the gravitational force discussed in detail ([2] PP.25-30). It reminds that the gravitational acceleration is an infinite ordered non-linear function of 'h'. Thus if the value of gravitational acceleration at the three points A,B,C is respectively given by g_1, g_2,g, then we get the inequality:

$$g_1 < g_2 < g \qquad (1)$$

Multiplaying each term in the inequality (1) by 'mh', we get

$$mhg_1 < mhg_2 < mhg \qquad (2)$$

From the inequality (2), it follows that the total mechanical energy of the falling body at the points A,B,C is mhg_1, mhg_2, and mhg respectively. It is different at all the three points, where the expression for kinetic energy has been converted to potential energy s.t. total energy is expressible in the form of potential energy.

Example: To give a concrete example, take earth as a gravitating body whose radius is 'R' = 6370 Km and acceleration due to gravity at its surface is 'g' = 9.81 m/sec^2. Let a body of mass 'm' = 1 kg, falls freely from a height h_1 = 1Km and passes through the point 'B' at a height h_2 = 0.5Km during the fall. The actual value of the total mechanical energy (= P.E. + K.E) at the three points is given below in numerical, where equivalent P.E. of K.E. has been used.

Total mechanical energy at A = 9806.92 Joule.
"   "   "   B = 9808.46 Joule.
"   "   "   C = 9810.00 Joule.
The error involved at the point A = 0.0314 %.
"   "   "   "   B = 0.017 %

If someone says that this error is minute and so is ignore able, then we take the point 'A' at a height 'h' = R because in astronomy very large distances are usually involved. Thus the total energy and its error in percentage is given below.

Total mechanical energy at A = 1,56,22,425 Joule.
"   "   "   B = 6,24,89,700 Joule.
Thus the error involved at the point A = 75 %.

It is clear that the present formula of potential energy holds true only for small values of 'h' and shows diverging error with large values. Thus it is an approximation of a general formula given below.

5. GENERALIZATION OF THE FORMULA OF POTENTIAL ENERGY AND THE LAW OF CONSERVATION

For the generalization of the law of conservation of mechanical energy, we express the formula of Total Energy = P.E+K.E in the form of potential energy as the expression of kinetic energy can be converted into potential energy. The exact potential energy of the body at a height 'h' is given by

$$mhg(1+h/R)^{-2} = mgh - 2mgh^2/R + 3mgh^3/R^2 - 4mgh^4/R^3 + ..., \text{etc.}$$

Thus we have the following few approximations of the general formula of potential energy for a generalized classical mechanics and gravitation.

First approximation = mgh.
Second approximation = $mgh-2mgh^2/R$.
Third approximation = $mgh-2mgh^2/R+3mgh^3/R^2$.

Fourth approximation = $mgh-2mgh^2/R+3mgh^3/R^2-4mgh^4/R^3$ + ... etc.

When we consider total energy of the stationary body at a height 'h', then it is expressible in the form of potential energy as P.E. = mgh. Thus it is nothing but the first approximation of the general formula $mgh(1+h/R)^{-2}$ for the potential energy. Consequently the ordinary law of conservation of mechanical energy is generalized.

6. THE CLASSICAL INTERPRETATION: THE TWO DRIFTS EXIST

Now consider a body in the gravitational field of the earth at a height of 1000km (=h , say) from the surface.

If the radius of the earth = 6370km
and at the surface, the value of a = g = 9.81m/sec^2,
then $g/_{(at-h)}$ = 7.3284626 m/sec^2
$g/t_{(0,h)}$ = 0.0050111211 m/sec^3
t = 495.20603 sec.
v = 4243.5348m/sec.
Whereas for the Galilean, we have
t' = 451.52363 secs,
v' = 4429.4469m/sec.

Thus the absolute error in the old classical mechanics, as regards the total time of fall and final velocity on the surface of earth is given by

| t - t' | = 43.6824 secs,
and | v - v' | = 185.9121m/sec.

In figure 1, the well-known problem of advance of perihelion is shown.

In figure 2, A' is drift of aphelion. It is shown with error in case of time and velocity as given above.

Moreover, the methods of improvements of the given approximation are of great help for more accurate results. [6]
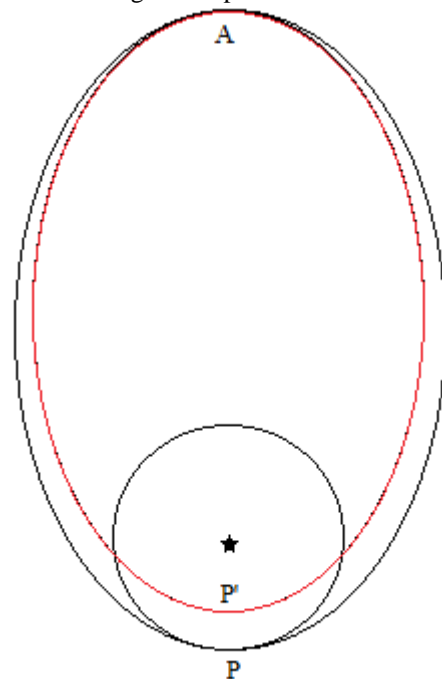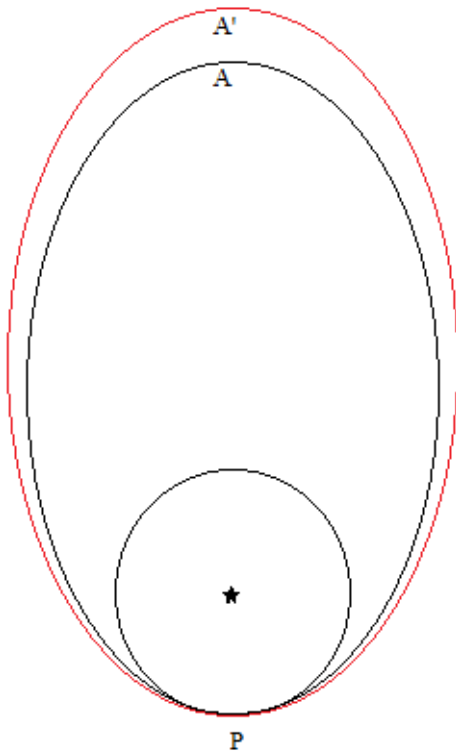

Figure 1

Figure 2

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