the general science journal

Nahhas' Newtonian derivation of Planet Mercury advance of perihelion of 43'' seconds of an arc century

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This article is a study of Joe Nahhas' derivation of Planet Mercury advance of perihelion based on Newtonian Physics.

By the application of Time dependent Newtonian equation (as discovered by Joe Nahhas) [1] it is possible to obtain for the Planet Mercury its 43''.0 of an arc per century.

This is contrary to mainstream belief in relativity that states Newtonian Physics cannot derive the Planet Mercury's 43''.0 of an arc per century [2], however it is possible as this article will now explain, based on Nahhas article for this calculation [3].

Nahhas gives:

Location **r** -------->>Exp (ì w t) -------->> **S**= **r** Exp (ì wt)
Orbit **r** -------->> light aberrations ------>> Visual Orbit **S**; Exp = Exponential (1)

This means for radius r if multiply by Exp(iwt) are converting to the time dependent Newtonian equation domain:

r is in the Newtonian time independent domain and can map to the Newtonian time dependent domain by multiplying by Exp (iwt).

As dealt with in previous article [1] the Newtonian time dependent equation has been missed, and only the Newtonian time independent equation was being considered, and (1) gives us how to connect these two types of equations.

In the Newtonian time dependent domain we are dealing with the more general scenario of Newtonian Physics – which Joe calls the Visual domain – i.e. it is the domain of things changing with time that we see in daily experience. From this Newtonian time dependent domain we can reduce to the Newtonian time independent domain quite easily; where in that domain it is a snapshot of the time dependent domain.

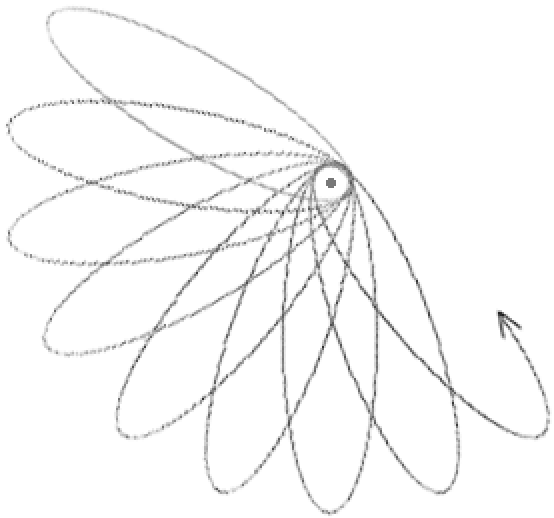

fig.1 Diagram of the elliptical orbit of Mercury about the Sun rotates very slowly relative to the system connected with the Sun. The small effect is that the direction of the perihelion changes by 43 arc-seconds per century.

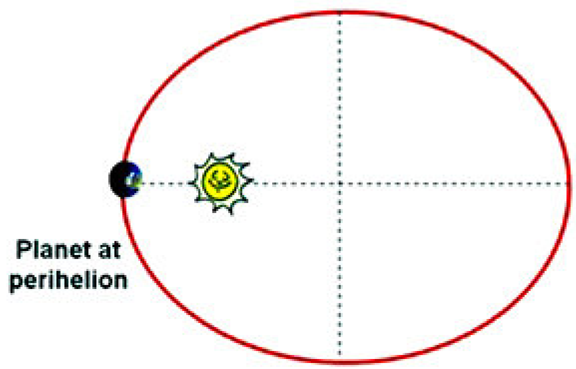

fig.2 if there is no rotation as in fig.1 we would have a perfect ellipse being formed.

For the planet Mercury we have an ellipse but the ellipse changes as per the diagram above, and that change occurs in the time dependent domain; because the time independent domain was not considering that effect. The time independent domain was ignoring the effect over time that the ellipse changes and treating the ellipse as if it were fixed in time with the planet always taking the same path in that ellipse.

The relevant equation is:

$wt = \arctan (v/c)$ (2)

This comes from the aberration of starlight [4] $\tan\theta$ = earth orbital speed/light speed, and $\theta = wt$.

We have Kepler's Law [5] as:

Areal velocity is constant: $r^2 \theta' = h$ (3)

We have $h = 2\pi\, a\, b/T$; $b = a\sqrt{(1-\varepsilon^2)}$; a = mean distance value; ε = eccentricity, all from Kepler.

Now we need to deal with this in the Newtonian time dependent equation.

Nahhas replaces the equation:

$\theta = wt = \arctan(v/c)$ (2)

The existing equation treats θ as a real number, Nahhas is now going to treat it as a complex number.

According to Nahhas: theta (θ) is one angle composed of two parts = time independent part + wt ; w is not zero.

θ = time independent part if $w = 0$

To see that look at the problem like this

1- In Newton equation θ is the angle measured from the horizontal axis going counter clock wise
2- If the axes does not rotate then there is no advance of perihelion of Mercury and $w = 0$
3- If axes start rotating then this new addition is wt = light aberration. (Arc tan (v/c) = wt)

In light aberrations examples pre- Nahhas, they were only looking at the case $\theta = wt$ they did not add the time independent rotation angle.

What "they" should have looked at was:

Total angle theta = time independent theta + time dependent theta

Because that would have been the more general case.

But the case "they" looked at was only the time dependent theta ($\theta = \arctan v/c$) case.

Newton's solution then was $w = 0$ and there was was no time dependent theta when axes start moving an additional angle came out and that is light aberrations angle and that is the one you called theta and I called wt

So treating now as complex numbers, Nahhas writes:

$r^2 \theta' = h = S^2 w'$ (4)

We have:

$S = r \exp(i\, wt)$

$h = [r^2 \text{Exp}(2iwt)]\, w'$ time evolving case

while

$h=r^2\theta'$ static case (when theta is only the time independent theta)

If we refer back to the diagrams. Fig.1 is the "time evolving case" and fig.2 is the "static case".

Now:

$w' = (\theta') \exp[-2(i\, wt)]$

so that $h = S^2 w'$ becomes:

$[r^2 \text{Exp}(2iwt)]\, (\theta') \exp[-2(i\, wt)] = r^2 \theta'$

i.e. equation (4) is maintained.

The static case $h=r^2\theta'$ (time independent theta) is just the ellipse once (fig.2)

The evolving case $h = [r^2 \text{Exp}(2iwt)]\, w'$ is the ellipse changing (fig 1).

According to Nahhas: S is visual of r.

I don't fully agree with this, or rather I don't fully agree with what I think I understand by what Nahhas refers to as "visual."

r is fixed on one ellipse, and S case is changing ellipse.

It seems that Nahhas thinks changing ellipse (fig 1) is only an optical effect—that the real orbit of Mercury around sun from sun-centered frame is an ellipse with the ellipse changing as only the result of an optical effect of aberration as seen by us on earth. I think the evolution of the ellipse around sun-centered frame is a real effect; so that from the sun-centered frame (fig.1) there is rotation of the ellipse. However, the whole issue hinges on what Nahhas means by "visual" in the mapping (4) above.

According to Nahhas : "The problem in all of physics is measurements
when astronomers say space-time curvature caused the elliptical orbit of Planet mercury to rotate I say NO space-time did not cause nothing because it does not exist
what you see is the effect called light aberrations we are not using a tape measure to measure the orbit of mercury and this use of light reflected of mercury introduces visual effects actual location r and visual location is S , r did not change."

So he is seemingly saying it is only a visual effect for the change of ellipse. I can't see that reasoning. I would think it a real effect. Nahhas disagrees with space-time curvature because he can model the same phenomenon by Newtonian Physics. Unfortunately space-time curvature math model has taken a hold as far as I am concerned, so what we have is two alternative viable models.

The essential part of Newtonian Physics different from General Relativity for the issue we are dealing with in this article (there are other differences) is that Newtonian Physics is based on Euclidean geometry and General Relativity is non-Euclidean geometry. Just concentrating on that difference of geometries, and not other issues of light speed (et al.), from pure mathematics both geometries are mathematically consistent. This in my perspective means that both geometries can be used to form valid mathematical models that can fit physical reality of observations.

i.e. both Euclidean mathematical model and a non-Euclidean mathematical model would work for the physics of Mercury and other physics situations; as far as I am concerned.

Of course there are other issues such as although both theories use different geometries, they might have mistakes in using their respective geometries which need correcting to make their maths consistent.

From my understanding of Nahhas, I think he completely rejects spacetime geometry of General Relativity. His view is that he can do the calculation without need of that spacetime geometry so it is not needed. Whereas my view is you can probably do the calculation either way, barring math mistakes.

Leaving the final word on this to Nahhas, according to Nahhas: "r did not change but its measurement changes and it is S depending of the value of its speed compared to light speed v/c."

Anyway, picking up from:

$h = [r^2 \text{Exp}(2iwt)]\, w'$ time evolving case

Then:

$w' = (h/r^2)\,[\text{cosine } 2(wt) - i \text{ sine } 2(wt)]$

$w' = (h / r^2) [1 - 2\text{sine}^2 (wt) - i \sin 2(wt)]$

And $w' = w'(x) + i\, w'(y)$;

so

$w'(x) = (h / r^2) [1 - 2\text{sine}^2 (wt)]$

I am happy with his algebra up to here (bearing in mind I use h_{new} above, whereas he uses h), but then he writes:

$\Delta w' = w'(x) - (h / r^2)$ * - invalid

To this I raise an objection. He is now as far as I can deduce only looking at the w'(x) part for some reason, so really means small change in w'(x) and he should be writing that as:

$\Delta w'(x) = w'(x) - (h / r^2)$

not what he has written.

He could then be referring to the value of w'(x) for t =t, minus w'(x) for t =0,
then

$w'(x) - (h / r^2) [1 - 2\text{sine}^2 (0)] = w'(x) - (h/r^2)$

This is then :

$\Delta w'(x) = w'(x) - (h / r^2)$

and that becomes:

$\Delta w'(x) = (h/r^2) [1 - 2\text{sine}^2 (wt)] - (h/r^2)$

$\Delta w'(x) = - 2(h/r^2)\, \text{sine}^2 (wt)$

$= - 2(h / r^2) (v/c)^2$; (from earlier $wt = \arctan (v/c)$)

Nahhas then writes :

$w T = \arctan (v/c)$

But really he means $wt = \arctan(v/c)$ where taking t as period T.

Then :

(h/r^2) (Perihelion/Periastron) = $[2\pi a.a\sqrt{(1-\varepsilon^2)}]/Ta^2(1-\varepsilon)^2$

$= [2\pi\sqrt{(1-\varepsilon^2)}]/T(1-\varepsilon)^2$

$\Delta w(x)' = [w'(x) - h/r^2]$

$= -4\pi \{[\sqrt{(1-\varepsilon^2)}]/T(1-\varepsilon)^2\} \text{sine}^2 (v/c)$ radian per second

Which Nahhas is multiplying by x $180/\pi$ to convert radians into degrees, and multiplies by 36526days (as one century), and multiplies by 3600 (the seconds in degree).

i.e. multiplies by:

{[180/π;degrees]x[100years=36526days;century]x[3600;seconds in degree]

And he then writes:

$\Delta w'' = (-720x36526x3600/T) \{[\sqrt{(1-\varepsilon^2)}/(1-\varepsilon)^2\} [\text{sine arc tan}(v/c)]^2$
Seconds of arc per century.

And I think he means $\Delta w(x)'$ not $\Delta w(x)''$ and not $\Delta w''$

The circumference of an ellipse is:

$2\pi a(1 - \varepsilon^2/4 + 3/16(\varepsilon^2)^2 - --.) \approx 2\pi a(1-\varepsilon^2/4)$; R

$=a(1-\varepsilon^2/4)$ $v=\sqrt{[G m M/(m+M) a(1-\varepsilon^2/4)]}$

$\approx \sqrt{[GM/a(1-\varepsilon^2/4)]}$; m<<M; Solar system

Then using the following data in these equations:

G=6.673x10^-11;

M=2x10^30kg;

m=.32x10^24kg

$\varepsilon = 0.206$;

T=88days;

c = 299792.458 km/sec;

a = 58.2km/sec

Calculations yields:

v =48.14km/sec;

$[\sqrt{(1-\varepsilon^2)}]\,(1-\varepsilon)^2 = 1.552$

Δ w'(x)= (-720x36526x3600/88) x (1.552) [sine arc tan(48.14/299792)]^2

=43.0"/century

The advance of the Perihelion of Mercury from Newtonian Physics.

References

[1] Newtonian time dependent equation: synthesis of relativity and quantum physics, Roger Anderton http://www.wbabin.net/science/anderton29.pdf

[2] See for instance: The Renaissance of General Relativity, Clifford M Will, http://academic.cengage.com/resource_uploads/static_resources/0534493394/4891/Ch01-Essay.pdf : "The explanation of the anomalous perihelion shift of Mercury's orbit was an early triumph of general relativity. This had been an unsolved problem in celestial mechanics for over half a century,… "

[3] Planet Mercury: Advance of Perihelion of 43" Seconds of an Arc per Century, by Professor Joe Nahhas http://www.wbabin.net/physics/nahhas4.pdf

[4] See for instance: Science for the Citizen, Lancelot Hogben, George Allen and Unwin, London.1959 p 350where tan a = earth's orbital speed/ speed of light; where above we use theta instead of "a".

[5] Kepler's laws of planetary motion at wikipedia 01-04-2009 http://en.wikipedia.org/wiki/Kepler's_laws_of_planetary_motion, gives Kepler's second law as: $\frac{d}{dt}(\frac{1}{2}r^2\dot{\theta}) = 0$ where $\frac{1}{2}r^2\dot{\theta}$ is the "areal velocity".

Updated 15 April 2009: because I did not fully understand what was meant by equation (4).