Review of: "On the existence of precession of planets' orbits in Newtonian gravity"

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Potential competing interests: No potential competing interests to declare.

The main achievement of the article is the calculation of precession of mercury in the Newtonian framework. In general, we take reduced mass to tackle the planetary motion and normally we neglect the mass of the planet when compared to the mass of the sun. Differently, the author considered the reaction of planet mercury in the gravitational field of the sun and consequently estimated advance of perihelion shift in the purview of Newtonian dynamics.

When the planet is slightly perturbed in the plane of the orbit, the author assumed the radius of rotation of the planet $r(t) = r_0(t)+x(t)$. Upon differentiating twice with respect to time we get

$$\ddot{r} = \ddot{r}_0 + \ddot{x}$$

However, it was assumed that r_0 is not a function of time but a constant and obtained

$$\ddot{r} = \ddot{x}$$

in equation (7). The function $F_{c0}(r_0+x)$ was expanded as $F_{c0}(r_0+x) = F_{c0}(r_0)+ (dF_{c0}(r_0)/dr_0)x$, and a harmonic solution for x was found. Now, the orbital time period T_0 is equated to the time period of oscillation of the planet around r_0. It seems, the time periods are not necessarily equal.

Alternatively, one can think, the perturbation or deviation of the planet from its path can be either +x or -x and if we consider

$$F_{c0}(r_0 \pm x)$$

the expansion is

$$F_{c0}(r_0 \pm x) = \frac{[F_{c0}(r_0 + x) + F_{c0}(r_0 - x)]}{2} = F_{c0}(r_0) + \frac{1}{2} F''_{c0}(r_0) x^2$$

We will not get the harmonic solution and the things would be different.

In equation (15), Ma_s must be equal to an attractive force and therefore, it must be equal to $-Gm/r_0^2$. However, a_s and a_p are opposite in direction. The calculation then gives the effective or relative acceleration $a= -G(M-m)/ r_0^2$ and therefore the weak force in equation (19) and in (32), is a repulsive force and definitely such additional repulsive terms may be responsible for the effects like advance of perihelion. The remaining calculation then yields

$$\Delta\phi = -\frac{\pi m}{M}$$

and I do not know how to account this negative sign.

In section 4, the gravitational potential acting on the planet is considered with an additional potential and obtaining $\Delta\varphi$ is quite interesting. Again, with repulsive potential V(r) the result becomes

$$\Delta\phi = -\frac{4m}{Me}$$

There are some typographical errors, for example, in equation (8) $\dot{F}_{c0}$ is a derivative of r_0 not x and at some places reduced mass μ is used instead of M.