411(5): Comparison of the Einstein and Classical Theories of Precession.

As in previous UFT papers the Einstein theory is based on

$$\frac{d^2u}{d\phi^2} + u = \frac{1}{\alpha} + \delta u^2 \quad -(1)$$

where

$$u = \frac{1}{r}, \quad \frac{1}{\alpha} = \frac{Gm^2M}{L^2}, \quad \delta = \frac{3MG}{c^2} \quad -(2)$$

Computation in previous UFT papers has shown that eq. (1) fails catastrophically under well defined conditions, in that m collides with M.

Eq. (1) can be solved analytically with a method given in Marion and Thornton, 3rd. edition, chapter 7.9. It is a method based on trial functions. The function:

$$u = u_1 = \frac{1}{\alpha}\left(1 + \epsilon\cos\phi\right) \quad -(3)$$

produces the result:

$$\frac{d^2u}{d\phi^2} + u = \frac{1}{\alpha} + \frac{\delta}{\alpha^2}\left(1 + \epsilon\cos\phi\right)^2 \quad -(4)$$

The function:

$$u_1 = \frac{1}{\alpha}\left(1 + \epsilon\cos\phi\right) \quad -(5)$$

is a solution of:

$$\frac{d^2u_1}{d\phi^2} + u_1 = \frac{1}{\alpha} \quad -(6)$$

but is not a solution of eq. (1). To obtain a solution of eq. (1) use:

$$u = u_1 + u_p \quad -(7)$$

where u_p is a particular integral.

It is seen that:

$$\frac{d^2u_1}{d\phi^2}+u_1 = \frac{1}{\alpha}+\frac{\delta}{\alpha^2}\left(1+2\epsilon\cos\phi+\epsilon^2\cos^2\phi\right)$$

$$= \frac{1}{\alpha}+\frac{\delta}{\alpha^2}\left(1+2\epsilon\cos\phi+\frac{\epsilon^2}{2}\left(1+\cos 2\phi\right)\right) \quad -(8)$$

If u_p is chosen by inspection:

$$u_p = \frac{\delta}{\alpha^2}\left[1+\frac{\epsilon^2}{2}+\epsilon\phi\sin\phi-\frac{\epsilon^2}{6}\cos 2\phi\right] \quad -(9)$$

it follows that:

$$\frac{du_p}{d\phi} = \frac{\delta}{\alpha^2}\left[\epsilon\sin\phi+\epsilon\phi\cos\phi+\frac{\epsilon^2}{3}\sin 2\phi\right] \quad -(10)$$

and

$$\frac{d^2u_p}{d\phi^2} = \frac{\delta}{\alpha^2}\left[\epsilon\cos\phi-\epsilon\phi\sin\phi+\epsilon\cos\phi+\frac{2\epsilon^2}{3}\cos 2\phi\right] \quad -(11)$$

So

$$\frac{d^2u_p}{d\phi^2}+u_p = \frac{\delta}{\alpha^2}\left(1+2\epsilon\cos\phi+\frac{\epsilon^2}{2}\left(1+\cos 2\phi\right)\right)$$

$$= \frac{\delta}{\alpha^2}\left(1+\epsilon\cos\phi\right)^2 \quad -(12)$$

So if

$$u = u_1+u_p \quad -(13)$$

then

$$\frac{d^2u}{d\phi^2}+u = \frac{1}{\alpha}+\frac{\delta}{\alpha^2}\left(1+\epsilon\cos\phi\right)^2 \quad -(14)$$

$$= \frac{1}{\alpha}+\frac{\delta}{\alpha^2}u_1^2$$

3) This is an approximation to the result (1). The accurate form of eq. (14) is:

$$\frac{d^2}{d\phi^2}(u_1+u_p)+u_1+u_p=\frac{1}{\alpha}+\delta(u_1+u_p)^2 \quad -(15)$$

This is approximated by:

$$\frac{d^2}{d\phi^2}(u_1+u_p)+u_1+u_p=\frac{1}{\alpha}+\delta u_1^2 \quad -(16)$$

so it is assumed that:

$$u_p \ll u_1 \quad -(17)$$

This is true only for very small

$$\delta=\frac{3mG}{c^2} \quad -(18)$$

and

$$\frac{\delta}{\alpha^2} \ll 1 \quad -(19)$$

In this approximation:

$$u \sim u_1+u_p=\left[\frac{1}{\alpha}(1+\epsilon\cos\phi)+\frac{\delta\epsilon}{\alpha^2}\phi\sin\phi\right]+\left[\frac{\delta}{\alpha^2}\left(1+\frac{\epsilon^2}{2}\right)-\frac{\delta\epsilon^2}{6\alpha^2}\cos 2\phi\right] \quad -(20)$$

This can be graphed by computer algebra and does not in general give a precessing orbit.

4) The Einstein theory collapses at this point, but special pleading is used as follows to try to rescue the situation. This dubious procedure is given on page 269 of MT third edition and is reproduced as follows for the sake of argument. The first term in the second set of brackets of eq. (20) is a constant, and the second term in the brackets is regarded by Marion and Thornton as "a small and periodic disturbance", so neither term gives precession.

These claims can be checked by computer algebra for various δ and α^2.

The first set of brackets is described as the secular term:

$$u_{secular} = \frac{1}{\alpha}\left(1 + \epsilon\cos\phi + \frac{\delta\epsilon}{\alpha}\phi\sin\phi\right) \quad -(21)$$

$$= \frac{1}{\alpha}\left(1+\epsilon\cos\phi\right) + \frac{\delta\epsilon}{\alpha^2}\phi\sin\phi$$

$$= u_1 + \frac{\delta\epsilon}{\alpha^2}\phi\sin\phi$$

in the approximation:

$$\delta/\alpha^2 \ll 1 \quad -(22)$$

The correction term:

$$u_c = \frac{\delta\epsilon}{\alpha^2}\phi\sin\phi \quad -(23)$$

can be graphed using computer algebra. It can be seen by inspection that as:

$$\phi \rightarrow \infty \quad -(24)$$

5) then:

$$u_c \rightarrow \infty \quad -(25)$$

because:

$$0 \leqslant \sin\phi \leqslant 1 \quad -(26)$$

Therefore the Einstein theory collapses completely at this point because there is no upper bound on ϕ. The upper bound of $\sin\phi$ is 1.

Very special pleading is used by Marion and Thornton by using:

$$1 + \epsilon\cos\left(\phi - \frac{\delta}{\alpha}\phi\right) = 1 + \epsilon\left(\cos\phi\cos\frac{\delta}{\alpha}\phi + \sin\phi\sin\frac{\delta\phi}{\alpha}\right)$$

$$\sim 1 + \epsilon\cos\phi + \frac{\delta\epsilon}{\alpha}\phi\sin\phi \quad -(27)$$

using the assumption that δ is small, so:

$$\cos\left(\frac{\delta}{\alpha}\phi\right) \sim 1 \quad -(28)$$

$$\sin\left(\frac{\delta}{\alpha}\phi\right) \sim \frac{\delta}{\alpha}\phi \quad -(29)$$

Therefore the secular term becomes:

$$u_{secular} \sim \frac{1}{\alpha}\left(1 + \epsilon\cos\left(\phi x\right)\right) \quad -(30)$$

where

$$x = 1 - \frac{\delta}{\alpha} \quad -(31)$$

The x sub theory of ECE has developed eq. (30) in great detail. It gives a precessing orbit if and only if

6)

$$x - 1 \rightarrow 0 \quad -(32)$$

i.e.

$$\delta / \alpha \ll 1 \quad -(33)$$

otherwise eq. (30) gives very intricate orbits which are never observed experimentally.

At this point the Einstein orbital theory collapses again. However Maria and Thomas ignore all these flaws, and proceed by arguing that for one orbit:

$$\phi - \frac{\delta}{\alpha}\phi = 2\pi \quad -(34)$$

So

$$\phi = \frac{2\pi}{1 - \delta/\alpha} \sim 2\pi\left(1 + \frac{\delta}{\alpha}\right) \quad -(35)$$

under condition (33).

The precession is therefore:

$$\Delta\phi = 2\pi\frac{\delta}{\alpha} \quad -(36)$$

where

$$x = \frac{\delta}{\alpha} = \frac{3MG}{c^2\alpha} \quad -(37)$$

Finally Maria and Thomas claim without any justification (see UFT410) that this theory is always very precise.

No rational or enlightened thinker would accept such a theory. The most devastating criticism of it is that

$$u_{\text{secular}} = u_1 + \frac{\delta \epsilon}{\alpha^2}\phi \sin\phi - (38)$$

$$\rightarrow \infty$$

as

$$\phi \Rightarrow \infty - (39)$$

and after sufficient revolutions:

$$\frac{\delta \epsilon}{\alpha^2}\phi \sin\phi \gg u_1 - (40)$$

and the orbit ceases completely to be a conic section. This is a recitation of disaster.

This disaster for EGR can be easily illustrated by computer algebra.

The Classical Theory of Precession

As shown in the previous note, the frame rotation:

$$\phi' = \phi + \omega t - (41)$$

produces the orbit:

$$r = \frac{\alpha'}{1 + \epsilon' \cos(\phi + \omega_1 t)} - (42)$$

At the perihelion:

$$\phi + \omega_1 t = 2\pi - (43)$$

so

$$\phi = 2\pi - \omega_1 t. - (44)$$

The precession is defined by:

$$\Delta\phi = 2\pi - (2\pi - \omega_1 t) - (45)$$

$$= \omega_1 t$$

8) If the time taken for one orbit is T, then after one orbit:

$$\boxed{\Delta \phi = \omega_1 T} \quad -(46)$$

So any precession is described by ω_1, the angular velocity of frame rotation.

This is a far simpler and much more elegant theory than the Einstein theory, and contains no errors. The orbit shrinks by:

$$r^2 = \frac{L'}{m\left(\omega + \omega_1 + T \frac{d\omega_1}{dt}\right)} \quad -(47)$$

where ω is the orbital angular velocity and ω_1 is the angular velocity of frame rotation. The time T is found from Kepler's third law.

The ECE2 covariant unified field theory is needed to show that the origin of ω_1 is spacetime torsion. This is missing completely from the Einstein theory.