...(1): Calculation of the Angular Frequency of Spacetime Rotation for the Earth's Precession.

Consider the de Sitter rotation:

$$\phi' = \phi + \omega_1 t \quad -(1)$$

It follows as in UFT411 that the relativistic precession is:

$$\Delta\phi = \frac{2\pi}{c^2}\left(v_N^2 + r^2\left(\omega_1^2 + 2\omega\omega_1\right)\right) \quad -(2)$$

$$\longrightarrow \omega_1 T$$

in the classical limit.

Therefore for small precessions and small deviations from the Newtonian theory:

$$\boxed{\Delta\phi = \frac{2\pi}{c^2}\left(v_N^2 + r^2\left(\omega_1^2 + 2\omega\omega_1\right)\right) = \omega_1 T} \quad -(3)$$

to an excellent approximation. Here $\Delta\phi$ is the observed non-Newtonian precession, v_N is the orbital linear velocity, r is the orbital radius and ω is the orbital angular velocity. The time T is that taken to complete one orbit.

Eq. (3) is an equation for the angular velocity ω_1 of frame rotation.

In precise analogy consider the relativistic kinetic energy of the ECE2 covariant theory:

$$T = (\gamma - 1) mc^2 \longrightarrow \frac{1}{2} m v_N^2 \quad -(4)$$

where the Lorentz factor in the non-rotating frame is:

$$\gamma = \left(1 - \frac{v_N^2}{c^2}\right)^{-1/2} \quad -(5)$$

For small deviations from the Newtonian theory:

$$\left(\left(1 - \frac{v_N^2}{c^2}\right)^{-1/2} - 1\right) mc^2 = \frac{1}{2} m v_N^2 \quad -(6)$$

To an excellent approximation. Eqs. (3) and (6) are derived with a similar philosophy, but a relativistic theory reduces to a classical limit. The validity of Eq. (6) can be proven by use of the series expansion:

$$\left(1 - \frac{v_N^2}{c^2}\right)^{-1/2} \sim 1 + \frac{1}{2} \frac{v_N^2}{c^2} + \dots \quad -(7)$$

for

$$v_N << c \quad -(8)$$

From eqs. (6) and (7):

$$\frac{1}{2} m v_N^2 = \frac{1}{2} m v_N^2 \quad -(9)$$

Q.E.D.

In general eq. (3) is a quadratic in ω_1 and can be solved for ω_1 using computer algebra. For small precessions:

$$\omega_1 << \omega \quad -(10)$$

so eq. (3) reduces to:

$$\frac{2\pi}{c^2}\left(v_N^2 + 2r^2\omega\omega_1\right) = \omega_1 T \quad -(11)$$

So:

$$\omega_1 = \frac{v_N^2}{\frac{c^2 T}{2\pi} - 2r^2\omega} \quad -(12)$$

For Earth:

$$T = 365.25 \text{ days} = 3.156 \times 10^7 \text{ s} \quad -(13)$$

$$\langle r \rangle = 1.496 \times 10^{11} \text{ m} \quad -(14)$$

$$\langle v_N \rangle = 2.978 \times 10^4 \text{ m s}^{-1} \quad -(15)$$

$$\epsilon = 0.0167 \quad -(16)$$

so the Earth's orbit is almost circular. Therefore to a very good approximation, its orbital angular velocity is:

$$\omega = \frac{v_N}{r} = 1.991 \times 10^{-7} \text{ rad s}^{-1} \quad -(17)$$

It follows from these data that

$$\frac{c^2 T}{2\pi} = 4.515 \times 10^{23} \text{ m}^2 \text{s}^{-1} \quad -(18)$$

and

$$2r^2\omega = 8.912 \times 10^{15} \text{ m}^2 \text{s}^{-1} \quad -(19)$$

so

$$\frac{c^2 T}{2\pi} \gg 2r^2\omega \quad -(20)$$

and to an excellent approximation:

$$\omega_1 = 2\pi \frac{v_N^2}{c^2 T} \text{ radians s}^{-1} \quad -(21)$$

i.e.

$$\boxed{\omega_1 = \frac{2\pi}{T}\left(\frac{v_N^2}{c^2}\right)} \quad -(22)$$

) Eq. (22) is consistent with the fact that the precession is:

$$\Delta\phi = 2\pi \frac{v_N^2}{c^2} \quad -(23)$$

and

$$\Delta\phi = \omega_1 T \quad -(24)$$

The orbital angular velocity is:

$$\omega = \frac{2\pi}{T} \quad -(25)$$

so

$$\boxed{\omega_1 = \omega\left(\frac{v_N^2}{c^2}\right)} \quad -(26)$$

and in the classical limit:

$$\omega_1 \rightarrow 0 \quad -(27)$$

self consistently, Q.E.D. In the classical limit there is no frame rotation, and the Newtonian theory is recovered.

These calculations give:

$$\boxed{\omega_1 = 1.964 \times 10^{-15} \text{ rad s}^{-1}} \quad -(28)$$

From eq. (25):

$$\omega = 1.99 \times 10^{-7} \text{ rad s}^{-1} \quad -(29)$$

which compares with:

$$\omega = 1.991 \times 10^{-7} \text{ rad s}^{-1} \quad -(30)$$

) for eq. (17), Q.E.D.

So

$$\omega_1 \ll \omega \quad -(31)$$

and the approximation (12) is self consistent, Q.E.D.

The ECE2 covariant precession from eq. (28)

$$\boxed{\begin{aligned}\Delta\phi &= \omega_1 T \quad -(32)\\ &= 6.20 \times 10^{-8} \text{ radians per earth orbit.}\end{aligned}}$$

The observed precession of the Earth, according to Marion and Thornton chapter 7, is:

$$\Delta\phi(\text{exp}) = (2.424 \pm 0.058) \times 10^{-7} \quad -(33)$$

radians per earth year

The experimentally observed total precession of the Earth is however:

$$\begin{aligned}\Delta\phi(\text{total}) &= 11{,}450'' \text{ per Earth century}\\ &= 114.50'' \text{ per Earth year}\\ &= 114.50 \times 4.84814 \times 10^{-6} \quad -(34)\\ &= 5.551 \times 10^{-4} \text{ radians per Earth year}\end{aligned}$$

This is 2,290 times larger than the claim (33) by Marion and Thornton.

The reason for the enormous discrepancy between eqs. (34) and (33) is well known. Almost all of

) the observed eq. (34) is attributed to the Newtonian influence of other planets. Eq. (33) is attributed to non Newtonian effects! Clearly, frame rotation is a non Newtonian procedure.

So the theoretical result (32) must be compared with eq. (33).

Considering the many assumptions made in reducing eq. (34) to eq. (33), the ECE2 covariant equation (3) gives satisfactory agreement with the data. The main problem with the usual nineteenth century procedure is that almost all of the actually observable precession (34) is attributed to the Newtonian influence of other planets. For correct self consistency, the influence of other planets must also be calculated with a non Newtonian theory. This was first pointed out by Myles Mathis, and this major blunder is either not known to the dogmatic astronomers, or is ignored in violation of Baconian science.

For what it is worth, the Einstein theory gives:

$$\Delta\phi \, (\text{Einstein}) = 1.86 \times 10^{-7} \text{ radians per Earth year.} \quad -(35)$$

and this is obviously not precise agreement with the dubious experimental claim (33). The solar system is one of the worst places in the universe to test a precession theory, because of the complications introduced by the presence of planets, asteroids and other objects. In the next note, eq. (3) will be tested against the Hulse Taylor binary pulsar and the S2 star system.