196(2): Precessing Elliptical Orbit from the ECE Field Equations

The relevant field equation is:

$$\underline{\nabla} \cdot \underline{g} = 8\pi G \rho_m \quad -(1)$$

where g is given by UFT 131, eq. (9.56):

$$g^{a}_{01} = \Phi^{(0)} \left(\partial_0 q^{a}_{1} - \partial_1 q^{a}_{0} + \omega^{a}_{01} - \omega^{a}_{10} \right) \quad -(2)$$

By antisymmetry:

$$g^{a}_{01} = -2\Phi^{(0)} \left(\partial_1 q^{a}_{0} + \omega^{a}_{10} \right) \quad -(3)$$

In vector notation:

$$\underline{g} = -\left(\underline{\nabla} \phi + \phi \underline{\omega} \right) \quad -(4)$$

where

$$\phi = 2\Phi^{(0)} \quad -(5)$$

The force is defined as:

$$\underline{F} = m \underline{g} \, . \quad -(6)$$

Assume that:

$$\phi = -\frac{MG}{r} \quad -(7)$$

then:

$$F = |\underline{F}| = -\frac{mMG}{r^2} - \frac{\omega m M G}{r} \quad -(8)$$

From UFT 194 the force needed for a precessing elliptical

) orbit is:

$$F = -\frac{L^2 x^2}{\alpha m r^2} - \frac{L^2(1-x^2)}{m r^3} \quad -(9)$$

where L is the total angular momentum and where:

$$\alpha = \frac{L^2}{m M G} \quad -(10)$$

The precessing elliptical orbit is:

$$r = \frac{\alpha}{1 + \epsilon \cos(x\theta)} \quad -(11)$$

where ϵ is the eccentricity.

From eqs (8) and (9):

$$\boxed{\omega = \frac{\alpha}{r^2}(1 - x^2)} \quad -(12)$$

The precessing elliptical orbit is produced by spin connection vector whose magnitude is given by eq (12). Note that ω is negative valued because $x > 1$.

This is a much simpler description of the precession than line element GR.