378(5): Gravitational Field Potential Relations

From UFT318 and UFT319 these are:

$$\underline{g} = -\underline{\nabla}\Phi - \frac{\partial \underline{Q}}{\partial t} + 2\left(c\omega_0 \underline{Q} - \Phi\underline{\omega}\right) \quad -(1)$$

where:

$$\underline{\Omega} = \underline{\nabla} \times \underline{Q} \underset{\text{scalar}}{+} 2\underline{\omega} \times \underline{Q} \quad -(2)$$

where Φ is the gravitational potential and $\underline{Q}$ is the gravitational vector potential. Here:

$$U = m\Phi \quad -(3)$$

is the gravitational potential energy. The spin connection four vector is:

$$\omega^{\mu} = \left(\omega_0, \underline{\omega}\right) \quad -(4)$$

The gravitational vector potential $\underline{Q}$ defines a momentum:

$$\underline{p} = m\underline{Q} \quad -(5)$$

Therefore:

$$\underline{F} = m\underline{g} = -\underline{\nabla}U - \frac{\partial \underline{p}}{\partial t} - 2U\underline{\omega} + 2c\omega_0\underline{p} \quad -(5a)$$

By the ECE antisymmetry law:

$$-\underline{\nabla}U - \frac{\partial \underline{p}}{\partial t} = -2U\underline{\omega} + 2c\omega_0\underline{p} \quad -(6)$$

So

$$\underline{F} = m\underline{g} = 2\left(-\underline{\nabla}U - \frac{\partial \underline{p}}{\partial t}\right) = 4\left(c\omega_0\underline{p} - U\underline{\omega}\right) \quad -(7)$$

In the Newtonian limit:

$$\underline{p} = m\underline{a} = \underline{0} \quad -(8)$$

So:

$$\underline{F} = m\underline{g} = -2\underline{\nabla}U = -4U\underline{\omega} \quad -(9)$$

so

$$-\underline{\nabla}U = -2U\underline{\omega} \quad -(10)$$

and

$$\underline{F} = m\underline{g} = -\underline{\nabla}U_0 \quad -(11)$$

where

$$U_0 = -\frac{mG}{r} = 2U \quad -(12)$$

From eqs. (10) and (12):

$$-\frac{1}{2}\underline{\nabla}U_0 = U_0\underline{\omega} \quad -(13)$$

i.e.

$$-\frac{1}{2}\frac{\partial U_0}{\partial r}\underline{e}_r = U_0\underline{\omega} \quad -(14)$$

so

$$\underline{\omega} = -\frac{1}{2}\frac{\underline{r}}{r^2} \quad -(15)$$

and

$$\omega_X = -\frac{X}{2(X^2+Y^2)} \quad -(16)$$

$$\omega_Y = -\frac{Y}{2(X^2+Y^2)} \quad -(17)$$

From previous work:

$$\kappa_X = -\frac{X}{X^2+Y^2} \quad -(18)$$

$$\kappa_Y = -\frac{Y}{X^2+Y^2} \quad -(19)$$

From UFT318 and UFT319:

$$\kappa_0 = 2\left(\frac{q_0}{r^{(0)}} - \omega_0\right) \quad -(20)$$

$$\underline{\kappa} = 2\left(\frac{\underline{q}}{r^{(0)}} - \underline{\omega}\right) \quad -(21)$$

so

$$\kappa_X = -\frac{X}{X^2+Y^2} = \frac{2q_X}{r^{(0)}} + \frac{X}{X^2+Y^2} \quad -(22)$$

$$\kappa_Y = -\frac{Y}{X^2+Y^2} = \frac{2q_Y}{r^{(0)}} + \frac{Y}{X^2+Y^2} \quad -(23)$$

So

$$\frac{q_X}{r^{(0)}} = -\frac{X}{X^2+Y^2} = \kappa_X \quad -(24)$$

$$\frac{q_Y}{r^{(0)}} = -\frac{Y}{X^2+Y^2} = \kappa_Y \quad -(25).$$

<u>Non Newtonian Orbits</u>

In this case:

$$\underline{F} = m\underline{g} = -\underline{\nabla}U - \frac{\partial \underline{p}}{\partial t} \quad -(26)$$

where $\underline{p}$ can be interpreted as an aether momentum.

So:

$$\ddot{X} = -mG\frac{X}{(X^2+Y^2)^{3/2}} - \ddot{X}_{\text{aether}} \quad -(27)$$

$$\ddot{Y} = -mG\frac{Y}{(X^2+Y^2)^{3/2}} - \ddot{Y}_{\text{aether}} \quad -(28)$$

$\therefore$ Two more equations are needed for $\ddot{X}_{aether}$ and $\ddot{Y}_{aether}$. Assume a particular solution of eq. (6):

$$-\underline{\nabla} U = -2U\underline{\omega} \quad - (29)$$

$$-\frac{\partial \underline{p}}{\partial t} = 2c\omega_0 \underline{p} \quad - (30)$$

The eq. (30) gives:

$$\ddot{X}_{aether} = -2c\omega_0 X_{aether} \quad - (31)$$

$$\ddot{Y}_{aether} = -2c\omega_0 Y_{aether} \quad - (32)$$

So eqs. (27), (28), (31) and (32) are four equations in four unknowns: X, Y, X_{aether} and Y_{aether}.

So the non Newtonian orbit can be found for a given ω_0.

Antigravity

This occurs when $\underline{p}$ in eq. (26) is negative so the force $\underline{F}$ can be made to be positive or repulsive.

Zero Gravity

This occurs when:

$$\underline{\nabla} U + \frac{\partial \underline{p}}{\partial t} = \underline{0} \quad - (33)$$