359(5): Summary of Results for Newtonian Gravitation

The velocity fields are (F subscript denotes spacetime or matter or vacuum):

$$\underline{v}_{F1} = \left(\frac{mG}{(X^2+Y^2)^{3/2}}\right)^{1/2}\left(-Y\underline{i}+X\underline{j}\right)\ ms^{-1} \quad -(1)$$

$$\underline{v}_{F2} = \left(\frac{mG}{(X^2+Z^2)^{3/2}}\right)^{1/2}\left(-Z\underline{i}+X\underline{k}\right)\ ms^{-1} \quad -(2)$$

$$\underline{v}_{F3} = \left(\frac{mG}{(Y^2+Z^2)^{3/2}}\right)^{1/2}\left(-Z\underline{j}+Y\underline{k}\right)\ ms^{-1} \quad -(3)$$

The accelerations due to gravity are:

$$\underline{g}_1 = -\frac{mG}{(X^2+Y^2)^{3/2}}\left(X\underline{i}+Y\underline{j}\right)\ ms^{-2} \quad -(4)$$

$$\underline{g}_2 = -\frac{mG}{(X^2+Z^2)^{3/2}}\left(X\underline{i}+Z\underline{k}\right)\ ms^{-2} \quad -(5)$$

$$\underline{g}_3 = -\frac{mG}{(Y^2+Z^2)^{3/2}}\left(Y\underline{j}+Z\underline{k}\right)\ ms^{-2} \quad -(6)$$

The Newtonian acceleration due to gravity is:

$$\underline{g} = -\frac{mG}{2(X^2+Y^2+Z^2)^{3/2}}\left((X^2+Y^2)^{3/2}\underline{g}_1+(X^2+Z^2)^{3/2}\underline{g}_2+(Y^2+Z^2)^{3/2}\underline{g}_3\right). \quad -(7)$$

Therefore:

2) $$\underline{g} = -mG\left(\frac{x\,\underline{i} + y\,\underline{j} + z\,\underline{k}}{(x^2+y^2+z^2)^{3/2}}\right) \quad -(8)$$

$$= -mG\frac{\underline{r}}{r^3} = -\frac{mG\,\underline{e}_r}{r^2} \quad -(9)$$

Q.E.D. Here:

$$r^2 = x^2 + y^2 + z^2 ; \quad \underline{r} = r\,\underline{e}_r . \quad -(10)$$

Kambe Charges of Spacetime, Aether or Vacuum.

These are:

$$q_{F1} = \underline{\nabla}\cdot\underline{g}_{F1} = \frac{5mG}{(x^2+y^2)^{3/2}}\, s^{-2} \quad -(11)$$

$$q_{F2} = \underline{\nabla}\cdot\underline{g}_{F2} = \frac{5mG}{(x^2+z^2)^{3/2}}\, s^{-2} \quad -(12)$$

$$q_{F3} = \underline{\nabla}\cdot\underline{g}_{F3} = \frac{5mG}{(y^2+z^2)^{3/2}}\, s^{-2} \quad -(13)$$

Vorticities of Spacetime (Units of Frequency)

$$\underline{w}_{F1} = \underline{\nabla}\times\underline{v}_{F1} = \frac{1}{2}\left(\frac{mG}{(x^2+y^2)^{3/2}}\right)^{1/2}\underline{k}\; s^{-1} \quad -(14)$$

$$\underline{w}_{F2} = \underline{\nabla}\times\underline{v}_{F2} = \frac{1}{2}\left(\frac{mG}{(x^2+z^2)^{3/2}}\right)^{1/2}\underline{j}\; s^{-1} \quad -(15)$$

$$\underline{W}_{F3} = \underline{\nabla} \times \underline{v}_{F3} = \frac{1}{2}\left(\frac{mG}{(Y^2+Z^2)^{3/2}}\right)^{1/2} \underline{i} \; s^{-1} \quad -(16)$$

The three gravitomagnetic fields are therefore:

$$\underline{\Omega}_1 = \underline{W}_{F1} \quad -(17)$$

$$\underline{\Omega}_2 = \underline{W}_{F2} \quad -(18)$$

$$\underline{\Omega}_3 = \underline{W}_{F3} \quad -(19)$$

in units of s^{-1}. By reference to UFT303 (the engineering model): $(i = 1, \ldots, 3)$:

$$\underline{\nabla} \times \underline{g}_{Fi} + \frac{\partial \underline{\Omega}_{Fi}}{\partial t} = \underline{0} \quad -(20)$$

which is the ECE2 gravitational field equation equivalent to the Faraday law of induction. Eq. (20) is also a tautology that follows from the Cartan definitions:

$$\underline{g}_{Fi} = -\frac{\partial \underline{v}_{Fi}}{\partial t} - \underline{\nabla} h_{Fi} \quad -(21)$$

and

$$\underline{W}_{Fi} = \underline{\nabla} \times \underline{v}_{Fi} \quad -(22)$$

with:

$$i = 1, 2, 3. \quad -(23)$$

Here h_{Fi} are enthalpies of spacetime.

Application to Planar Orbits.

The planar Newtonian orbit is the conic section:

$$r = \frac{\alpha}{1 + \epsilon \cos\theta} \quad -(24)$$

4) in plane polar coordinates (r, θ). Here α is the half right latitude and ϵ is the eccentricity.
Consider the orbit to be defined in the XY plane.
Then the above calculations reduce to:

$$\underline{v}_F = \left(\frac{mG}{(X^2+Y^2)^{3/2}} \right)^{1/2} \left(-Y\underline{i} + X\underline{j} \right) \quad -(25)$$

$$\underline{g}_F = -\frac{mG(X\underline{i} + Y\underline{j})}{(X^2+Y^2)^{3/2}} \quad -(26)$$

$$q_F = \frac{5mG}{(X^2+Y^2)^{3/2}} \quad -(27)$$

$$\underline{w}_F = \frac{1}{2}\left(\frac{mG}{(X^2+Y^2)^{3/2}} \right)^{1/2} \underline{k} \quad -(28)$$

So:

$$\underline{g}_F = -\frac{mG}{r^2}\underline{e}_r \quad -(29)$$

$$q_F = \frac{5mG}{r^3} \quad -(30)$$

$$\underline{w}_F = \frac{1}{2}\left(\frac{mG}{r^3} \right)^{1/2} \underline{k} \quad (31)$$

where

$$r^2 = X^2 + Y^2 \quad -(32)$$

From eq. (25):

$$v_F^2 = \frac{MG}{r} \quad -(33)$$

This result is true for a circular orbit simply because of the assumption:

$$x^2 + y^2 = r^2 \quad -(34)$$

For the more general conic section orbit:

$$X = r\cos\theta = \frac{\alpha\cos\theta}{1+\epsilon\cos\theta} \quad -(35)$$

$$Y = r\sin\theta = \frac{\alpha\sin\theta}{1+\epsilon\cos\theta} \quad -(36)$$

and

$$x^2 + y^2 = \frac{\alpha^2}{(1+\epsilon\cos\theta)^2} \quad -(37)$$

Eqs. (1) to (23) are true in general, for any Newtonian orbit.

For a hyperbolic spiral orbit:

$$X = r\cos\theta = r_0\frac{\cos\theta}{\theta} \quad -(38)$$

$$Y = r\sin\theta = r_0\frac{\sin\theta}{\theta} \quad -(39)$$

So

$$x^2 + y^2 = \frac{r_0^2}{\theta^2} \quad -(40)$$

and Eqs. (1) to (23) are also true for a whirlpool galaxy