318(6): Development of the ECE 2 Theory of Zero Gravitation.

Consider a mass m in the gravitational field of the earth of mass M. In Newtonian dynamics the gravitational potential of m is:

$$\Phi_m = -\frac{mG}{r} \quad -(1)$$

and the gravitational force of attraction is:

$$\underline{F} = M \underline{g}_m = -\frac{mMG}{r^2}\underline{e}_r \quad -(2)$$

where the acceleration due to gravity of m is:

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

$$= -\underline{\nabla}\Phi_m$$

Newtonian dynamics is governed by the Poisson equation:

$$\nabla^2 \Phi_m = -4\pi G \rho_m \quad -(4)$$

ECE2 dynamics is governed however by:

$$(\nabla^2 + k_0^2)\Phi_m = -4\pi G \rho_m \quad -(5)$$

If:

2)

$$A \cos(\underline{k} \cdot \underline{r}) = 4 \pi G \rho_m \quad -(6)$$

eq. (5) becomes an Euler Bernoulli equation:

$$(\nabla^2 + k_0^2) \, \underline{\Phi}_m = A \cos(\underline{k} \cdot \underline{r}) \quad -(7)$$

whose solution is:

$$\underline{\Phi}_m = \frac{A \cos(\underline{k} \cdot \underline{r})}{k_0^2 - k^2} \quad -(8)$$

The acceleration due to the gravity of mass m is:

$$\underline{g}_m = -\underline{\nabla} \, \Phi_m - 2 \underline{\omega} \, \Phi_m \quad -(9)$$

and the gravitational force between m and the mass of the earth, M is:

$$\underline{F} = M \, \underline{g}_m \quad -(10)$$

In the Z axis

$$\underline{\Phi}_m = \frac{A \cos(k_Z Z)}{k_0^2 - k_Z^2} \quad -(11)$$

and

$$-\underline{\nabla} \, \underline{\Phi}_m = -\frac{\partial \underline{\Phi}_m}{\partial Z} = \frac{A k_Z \sin(k_Z Z)}{k_0^2 - k_Z^2} \quad -(12)$$

So:

3)

$$g_Z = \frac{A}{k_0^2 - k_Z^2}\left(\kappa_Z \sin(\kappa_Z Z) - 2\omega_Z \cos(k_Z Z)\right) \quad -(13)$$

Under the condition:

$$\kappa_Z \sin(\kappa_Z Z_1) = 2\omega_Z \cos(k_Z Z) \quad -(14)$$

then:

$$\boxed{g_Z = 0} \quad -(15)$$

and there is no force of gravitation between m and M:

$$\boxed{F_Z = M g_Z = 0} \quad -(16)$$

In order to engineer zero gravitation the gravitational potential of a mass m must be designed to take the form of eq. (8). The gravitational energy of a mass m is:

$$U_m = m \Phi_m \quad -(17)$$

in joules. All forms of energy are convertible, so the driving potential (8) of the Euler Bernoulli equation (7):

$$\Phi_m = \frac{U_m}{m} \quad -(18)$$

4) can be augmented by an electric potential:

$$\phi_e = \frac{U_e}{e} \quad -(19)$$

In this case:

$$(\nabla^2 + k_0^2)\,\Phi_m = -4\pi G \rho_m \quad -(20)$$

$$(\nabla^2 + k_0^2)\,\phi_e = -\frac{\rho_e}{\epsilon_0} \quad -(21)$$

So:

$$(\nabla^2 + k_0^2)\,U_m = -4\pi G m \rho_m \quad -(22)$$

$$(\nabla^2 + k_0^2)\,U_e = -\frac{e\rho_e}{\epsilon_0} \quad -(23)$$

Therefore:

$$(\nabla^2 + k_0^2)(U_m + U_e) = -\left(4\pi m G \rho_m + \frac{e\rho_e}{\epsilon_0}\right) \quad -(24)$$

For a mass m of one kilogram and a charge e of one coulomb in one cubic metre:

$$\frac{e\rho_e}{\epsilon_0} \gg 4\pi m G \rho_m \quad -(25)$$

so:

$$(\nabla^2 + k_0^2)(m\Phi_m + e\phi_e) \sim -\frac{e\rho_e}{\epsilon_0} \quad -(26)$$

5)

where:

$$\underline{g} = -\underline{\nabla}\,\Phi_m - 2\underline{\omega}\,\Phi_m \quad -(27)$$

and

$$\underline{E} = -\underline{\nabla}\,\phi_e - 2\underline{\omega}\,\phi_e \quad -(28)$$

Eq. (26) shows that gravitation can be engineered with a device that produces the Euler Bernoulli driving force:

$$A\cos(\underline{k}\cdot\underline{r}) = -\frac{e\phi_e}{\epsilon_0} \quad -(29)$$

i.e. <u>an</u> onboard device consisting of an <u>oscillating electric charge density</u>.

The relevant Euler Bernoulli equation is:

$$(\nabla^2 + k_0^2)(m\Phi_m + e\phi_e) = A\cos(\underline{k}\cdot\underline{r}) \quad -(30)$$

whose solution is:

$$m\Phi_m + e\phi_e = \frac{A\cos(\underline{k}\cdot\underline{r})}{k_0^2 - k_Z^2} \quad -(31)$$

So:

$$\Phi_m = \frac{1}{m}\left[\frac{A\cos(\underline{k}\cdot\underline{r})}{k_0^2 - k_Z^2} - e\phi_e\right] \quad -(32)$$

6) In the Z axis:

$$\Phi_m = \frac{1}{m}\left[\frac{A\cos(k_Z Z)}{k_0^2 - k_Z^2} - e\phi_e\right] \quad -(33)$$

and

$$-\frac{\partial \Phi_{mZ}}{\partial Z} = \frac{1}{m}\left[\frac{A\kappa_Z \sin(k_Z Z)}{k_0^2 - k_Z^2} - e\frac{\partial \phi_e}{\partial Z}\right] \quad -(34)$$

Therefore:

$$g_Z = -\frac{\partial \Phi_{mZ}}{\partial Z} - 2\omega \Phi_{mZ} \quad -(35)$$

$$= \frac{1}{m}\left[\frac{A}{k_0^2 - k_Z^2}\left(\kappa_Z \sin(k_Z Z) - 2\omega_Z \cos(k_Z Z)\right)\right.$$
$$\left. + e\left(\frac{\partial \phi_e}{\partial Z} - 2\phi_e\right)\right] \quad -(36)$$

and zero gravitation is achieved under the conditions:

$$\kappa_Z \sin(k_Z Z) = 2\omega_Z \cos(k_Z Z) \quad -(37)$$

and

$$\frac{\partial \phi_e}{\partial Z} = 2\phi_e \quad -(38)$$