318(4): A Theory of Counter Gravitation in ECE2

Consider the electromagnetic and gravitational potential equations of the previous note:

$$\left(\nabla^2 + \kappa_0^2\right)\phi = -\rho/\epsilon_0 \quad -(1)$$

and

$$\left(\nabla^2 + \kappa_0^2\right)\Phi = -4\pi G\rho_m \quad -(2)$$

where

$$\kappa_0^2 = 2\,\underline{V}\cdot\underline{\omega} \quad -(3)$$

For simplicity assume that:

$$\rho = \frac{e_1}{V} \quad -(4)$$

and

$$\rho_m = \frac{M}{V} \quad -(5)$$

where V is a given sample volume. The total potential energy of the system is:

$$U = e\phi + m\Phi \quad -(6)$$

where:

$$\left(\nabla^2 + \kappa_0^2\right)U = -\frac{1}{V}\left(\frac{e e_1}{\epsilon_0} + 4\pi G m M\right) \quad -(7)$$

2) The acceleration due to gravity is:

$$\underline{g} = -\frac{1}{m}\left(\underline{\nabla}\, U + 2U\underline{\omega}\right) \quad -(8)$$

In order to produce counter gravitation $\underline{g}$ must be made less negative, i.e. less attractive

Now define:

$$A\cos(\underline{k}\cdot\underline{r}) = -\frac{1}{V}\left(\frac{ee_1}{\epsilon_0} + 4\pi G m M\right) \quad -(9)$$

Then:

$$\left(\nabla^2 + k_0^2\right) U = A\cos(\underline{k}\cdot\underline{r}) \quad -(10)$$

which is an undamped Euler Bernoulli equation with solution:

$$U = \frac{A\cos(\underline{k}\cdot\underline{r})}{k_0^2 - k^2} \quad -(11)$$

In the Z axis:

$$U = \frac{A\cos k_Z Z}{k_0^2 - k^2} \quad -(12)$$

From eqs (8) and (12), the acceleration

3) due to gravity in the z-axis is:

$$g_z = \frac{A}{m(k_0^2 - k^2)} \left(k_z \sin(k_z z_1) - \omega_z \cos(k_z z_1)\right) \quad -(13)$$

At the point:

$$k_z \sin(k_z z_1) = \omega_z \cos(k_z z_1) \quad -(14)$$

it follows that:

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

i.e gravity has been reduced to zero:

using $\sin^2(k_z z) + \cos^2(k_z z) = 1$ $-(16)$

it follows from eqs. (14) and (16) that:

$$\cos(k_z z) = \left(1 + \left(\frac{\omega_z}{k_z}\right)^2\right)^{-1/2} \quad -(17)$$

and

$$\sin(k_z z) = \left(1 + \left(\frac{k_z}{\omega_z}\right)^2\right)^{-1/2} \quad -(18)$$

For small k_z:

4)

$$\sin(k_z Z) \sim k_z Z \quad -(19)$$

So eqs. (18) and (19) give:

$$k_z^2 Z^2 \left(1 + \left(\frac{k_z}{\omega_z}\right)^2\right) = 1 \quad -(20)$$

which can be solved numerically to give an estimate of k_z in terms of Z and ω_z. For small k_z eq. (20) is the condition for vanishing gravitation.