M(4): Resonance Condition for the Gravitational Potential

The ECE wave equation is:

$$\square \Phi = R\Phi \quad -(1)$$

here Φ is the gravitational potential and R the scalar curvature. The solution of Eq. (1) is:

$$\Phi = \Phi_0 \exp\left(i\left(\omega t - \underline{\kappa}\cdot\underline{r}\right)\right) \quad -(2)$$

where:

$$\frac{\omega^2}{c^2} - \kappa^2 = R \quad -(3)$$

For gravitostatics it is assumed that:

$$\Phi = \Phi_0 \exp\left(-i\underline{\kappa}_0\cdot\underline{r}\right) \quad -(4)$$

and

$$\left(\nabla^2 + R\right)\Phi = 0 \quad -(5)$$

where

$$R = \kappa_0^2. \quad -(6)$$

A small driving force of electromagnetic origin is applied to the gravitational system consisting of a mass m attracted by a mass M. Therefore Eq. (5) becomes the Euler Bernoulli equation:

$$\left(\nabla^2 + R\right)\Phi = A\cos\underline{\kappa}\cdot\underline{r} \quad -(7)$$

In one dimension:

$$\left(\frac{\partial^2}{\partial Z^2} + R\right)\Phi = A\cos\kappa_Z Z \quad -(8)$$

if the electromagnetic driving force is applied along the Z axis.

) The solution of Eq. (8) is:

$$\underline{\Phi} = \frac{A \cos \kappa_Z Z}{\kappa_0^2 - \kappa_Z^2} \quad -(9)$$

and counter gravitation occurs under the condition:

$$\kappa_0 = \kappa_Z \quad -(10)$$

when

$$\underline{\Phi} \rightarrow \infty \quad -(11)$$

In ECE2:

$$\underline{g} = -\underline{\nabla}\,\underline{\Phi} - \frac{\partial \underline{Q}}{\partial t} \quad -(12)$$

and

$$\underline{\nabla} \cdot \underline{g} = 4\pi G \rho_m \quad -(13)$$

where $\underline{Q}$ is the gravitational vector potential. This does not exist in the standard model of physics. Here G is Newton's constant and ρ_m is the source mass density.

So

$$-\nabla^2 \underline{\Phi} - \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} = 4\pi G \rho_m \quad -(14)$$

If it is assumed that:

$$\underline{Q} = \underline{0} \quad -(15)$$

then:

$$\nabla^2 \underline{\Phi} = -4\pi G \rho_m \quad -(16)$$

From eqs. (7) and (16):

$$-4\pi G \rho_m + \kappa_0^2 \underline{\Phi} = A \cos \underline{\kappa} \cdot \underline{r} \quad -(17)$$

In one dimension:

$$-4\pi G\rho_m + \kappa_0^2 \Phi = A\cos\kappa_Z Z \quad -(18)$$

m Eqs. (9) and (18):

$$\frac{-4\pi G\rho_m + \kappa_0^2 A\cos\kappa_Z Z}{\kappa_0^2 - \kappa_Z^2} = A\cos\kappa_Z Z \quad -(19)$$

$$-(20)$$

i.e. $\kappa_0^2 A\cos\kappa_Z Z = (\kappa_0^2 - \kappa_Z^2)(A\cos\kappa_Z Z + 4\pi G\rho_m)$

From eqs. (10) and (20) the resonance condition is

$$\cos\kappa_Z Z = 0 \quad -(21)$$

i.e.

$$\boxed{\kappa_Z Z = \frac{\pi}{2}} \quad -(22)$$

Finally assume that: $\kappa_Z = \frac{\omega}{c}$ $-(23)$

then:

$$\boxed{\omega Z = \frac{\pi}{2} c} \quad -(24)$$

If Z is one metre then: $-(25)$

$$\omega = 4.709 \times 10^8 \text{ radians per second}$$

This result seems to be too simple, because a mass held one metre above the surface of the earth is not elevated by irradiating it by e/m radiation.

The origin of the problem is that Φ has been assumed to be a wave in eq. (1). Therefore it has been assumed that there exist gravitational waves. In order for such waves to exist the gravitational vector potential $\underline{Q}$ has to be non-zero, and the gravitomagnetic field must exist. Additionally, in analogy with the Maxwell displacement current, gravitational waves need the existence of the "Maxwell displacement current" of ECE2, i.e. $\partial \underline{g} / \partial t$.

So the two relevant equations are:

$$(\nabla^2 + R)\, \Phi = A \cos \underline{\kappa} \cdot \underline{r} \quad -(26)$$

and

$$\nabla^2 \Phi + \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} = -4\pi G \rho_m \quad -(27)$$

Therefore:

$$R\, \Phi - \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} - 4\pi G \rho_m = A \cos \underline{\kappa} \cdot \underline{r} \quad -(28)$$

In one dimension:

$$\frac{\kappa_0^2 A \kappa_Z Z}{\kappa_0^2 - \kappa_Z^2} - 4\pi G \rho_m - \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} = A \cos \kappa_Z Z \quad -(29)$$

$$\kappa_0^2 A \kappa_Z Z = (\kappa_0^2 - \kappa_Z^2)\left(A \cos \kappa_Z Z + \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} + 4\pi G \rho_m \right)$$

However, it is clearer to use:

$$\nabla^2 \Phi = -\kappa_Z^2 \Phi \quad -(30)$$

in eq. (27), so:

$$-\kappa_z^2 \underline{\Phi} + \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} = -4\pi G \rho_m \quad -(31)$$

where

$$\underline{\Phi} = \frac{A \cos \kappa_z Z}{\kappa_0^2 - \kappa_z^2} \quad -(32)$$

so

$$A \frac{\kappa_z^2 \cos \kappa_z Z}{\kappa_0^2 - \kappa_z^2} = \underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} + 4\pi G \rho_m \quad -(33)$$

so at resonance:

$$\boxed{\underline{\nabla} \cdot \frac{\partial \underline{Q}}{\partial t} \rightarrow \infty} \quad -(34)$$

when:

$$\kappa_0 = \kappa_z \quad -(35)$$

and

$$\underline{\Phi} \rightarrow \infty. \quad -(36)$$

In order for this method to work the electromagnetic frequency ω_z must be tuned to a characteristic frequency $\omega_0 = \kappa_0 c$.

If it is assumed that $\underline{g}$ is not a wave, then

$$\underline{g} = -\underline{\nabla} \underline{\Phi} \quad -(37)$$

More generally,

$$\underline{g} = -\underline{\nabla}\underline{\Phi} - 2\underline{\Phi}\,\underline{\omega} + 2c\omega_0 \underline{Q} - \frac{\partial \underline{Q}}{\partial t} \quad -(38)$$