) 101(1) :

Interaction of Gravitation and Electromagnetism :

Faraday Law of Induction

One of the easiest ways of investigating the interaction of e/m and gravitation is the ECE Faraday Law of induction :

$$\underline{\nabla} \times \underline{E} + \frac{\partial \underline{B}}{\partial t} = \mu_0 \underline{J}_{int} . \quad -(1)$$

Any device that affects gravitation with an electromagnetic field must produce :

$$\boxed{\underline{J}_{int} \neq \underline{0}} . \quad -(2)$$

For all practical purposes in the laboratory :

$$\underline{J}_{int} = \underline{0} \quad -(3)$$

because experiments show that the Coulomb Law is very precise and unaffected by gravitation.

This situation is changed in theory by spin connection resonance, i.e. Tesla resonance. The simplest example is when there is no magnetic field, then :

$$\underline{\nabla} \times \underline{E} = \mu_0 \underline{J}_{int} \quad -(4)$$

where

$$\underline{E} = -\underline{\nabla} \phi + \underline{\omega} \phi \quad -(5)$$

where $\underline{\omega}$ is the spin connection vector.

2)

From eqns. (4) and (5).

$$\boxed{\underline{\nabla} \times (\underline{\omega}\, \phi) = \mu_0 \underline{J}_{int}} \quad -(6)$$

so $\underline{J}_{int}$ depends directly on $\underline{\omega}$. In Maxwell Heaviside ~~theory~~ (MH), $\underline{\omega}$ does not exist so $\underline{J}_{int}$ does not exist, and no counter-gravitation devices are possible in MH theory.

Expanding eq. (6):

$$\left(\frac{\partial}{\partial Y}(\omega_Z \phi) - \frac{\partial}{\partial Z}(\omega_Y \phi) \right) \underline{i} - \left(\frac{\partial}{\partial X}(\omega_Z \phi) - \frac{\partial}{\partial Z}(\omega_X \phi) \right) \underline{j} + \left(\frac{\partial}{\partial X}(\omega_Y \phi) - \frac{\partial}{\partial Y}(\omega_X \phi) \right) \underline{k} = \mu_0 \underline{J}_{int} \quad -(7)$$

Simplify by assuming

$$\omega_Z = 0, \quad \underline{J}_{int} = J_X \underline{i} + J_Y \underline{j} \quad -(8)$$

Then:

$$\left(\frac{\partial \omega_X}{\partial Z} \right) \phi + \omega_X \left(\frac{\partial \phi}{\partial Z} \right) = \mu_0 J_Y \quad -(9)$$

$$\left(\frac{\partial \omega_Y}{\partial Z} \right) \phi + \omega_Y \left(\frac{\partial \phi}{\partial Z} \right) = -\mu_0 J_X \quad -(10)$$

By differentiating eqns (9) and (10), we decouple the resonator equation as obtained such as:

$$\left(\frac{\partial^2 \phi}{\partial z^2}\right)\omega_x + 2\left(\frac{\partial \omega_x}{\partial z}\right)\left(\frac{\partial \phi}{\partial z}\right) + \left(\frac{\partial^2 \omega_x}{\partial z^2}\right)\phi = \mu_0 \frac{\partial J_i}{\partial z} \quad -(11)$$

This has the structure:

$$\ddot{x} + 2\beta\dot{x} + \omega_0^2 x = A\cos\omega t \quad -(12)$$

with particular integral:

$$x_p(t) = \frac{A\cos(\omega t - \delta)}{((\omega_0^2 - \omega^2)^2 + 4\omega^2\beta^2)^{1/2}} \quad -(13.)$$

$$\delta = \tan^{-1}\left(\frac{2\omega\beta}{\omega_0^2 - \omega^2}\right) \quad -(14)$$

If $x_p(t) = D\cos(\omega t - \delta)$ $\quad -(15)$

the amplitude resonance frequency is:

$$\left.\frac{dD}{d\omega}\right|_{\omega=\omega_R} = 0 \quad -(16)$$

i.e.

$$\omega_R = (\omega_0^2 - 2\beta^2)^{1/2} \quad -(17)$$

Resonance in eq. (11) occurs in ϕ and in ω_x, i.e. in ϕ for a given ω_x and vice-versa. At resonance, either ϕ or ω become very large for a given $\partial J_\nu / \partial X$. The latter plays the role of the driving force on the right hand side of eq. (12).

Therefore at resonance the driving force is greatly amplified and the interaction between gravitation and electromagnetism is greatly amplified. Off resonance it is zero for all practical purposes in the laboratory for many kinds of the conservation laws. In the absence of gravitational torsion the condition (2) means

$$R \wedge q = 0 \qquad — (18)$$

i.e.

$$R_{\sigma\mu\nu\rho} + R_{\sigma\rho\mu\nu} + R_{\sigma\nu\rho\mu} = 0 \qquad — (19)$$

usually known as the Ricci cyclic equation, which is the first Bianchi identity. So for interaction the (19) must be violated. This occurs only if the metric and connection cannot be symmetric, if gravitation is affected by e/m.

5) Gravitational Equivalent of the Faraday Law of Induction

In the absence of interaction between rotation and translation, i.e. absence of interaction between e/m and gravitation this is given by eq. (14) of paper 75:

$$\underline{\nabla} \times \underset{\sim}{T}_L + \frac{1}{c} \frac{\partial \underset{\sim}{T}_s}{\partial t} = \underline{0} \quad - (20)$$

where:

$$\underline{g} = c^2 \underline{T}_L \quad - (21)$$

Here $\underline{T}_L$ is the orbital torsion vector and $\underset{\sim}{T}_s$ is the spin torsion vector. In the presence of interaction

$$\frac{1}{c^2} \underline{\nabla} \times \underline{g} + \frac{1}{c} \frac{\partial T_s}{\partial t} = \underline{J}_{int} \quad - (22)$$

in analogy to eq. (1). So:

$$\boxed{\underline{\nabla} \times \underline{g} = c^2 \underline{J}_{int} - c \frac{\partial T_s}{\partial t}} \quad - (23)$$

In analogy to eq. (5) the acceleration due to gravity can be expressed as:

$$\underline{g} = - \underline{\nabla} \Phi + \underline{\omega} \Phi \quad - (24)$$

and if $\underset{\sim}{T}_s$ is absent:

$$\underline{\nabla} \times \underline{g} = c^2 \underline{J}_{int} \quad - (25)$$

So spin connection resonance can occur from eqs. (24) and (25)