1)

The Resonant Ampère Maxwell Law

Notes for Paper 53, Part 8.

As shown in Appendices J and K of the monograph:

$$\underline{\nabla} \times \underline{B}^a - \frac{1}{c^2} \frac{\partial \underline{E}^a}{\partial t} = \mu_0 \underline{J}^a \quad -(1)$$

where:

$$\underline{J}^a = J_x^a \underline{i} + J_y^a \underline{j} + J_z^a \underline{k}. \quad -(2)$$

To isolate the Riemann term eq. (1) is developed as:

$$\boxed{\underline{\nabla} \times \underline{B}^a + \underline{\omega}'^a{}_b \times \underline{B}^b - \frac{1}{c^2}\left(\frac{\partial \underline{E}^a}{\partial t} + \omega'^a{}_{0b} \underline{E}^b\right) = \mu_0 \underline{J}^{a\prime}} \quad -(3)$$

where:

$$J_x^{a\prime} = -\frac{A^{(0)}}{\mu_0}\left(R^a{}_0{}^{10} + R^a{}_2{}^{12} + R^a{}_3{}^{13}\right)$$

$$J_y^{a\prime} = -\frac{A^{(0)}}{\mu_0}\left(R^a{}_0{}^{20} + R^a{}_1{}^{21} + R^a{}_3{}^{23}\right)$$

$$J_z^{a\prime} = -\frac{A^{(0)}}{\mu_0}\left(R^a{}_0{}^{30} + R^a{}_1{}^{31} + R^a{}_2{}^{32}\right)$$

$$-(4)$$

We first check eq. (3) for units. We obtain in S.I.:

2).

$$A^{(0)} = J s C^{-1} m^{-1} = \text{volt}\, C^{-1}$$
$$R = m^{-2}$$
$$\mu_0 = J s^2 C^{-2} m^{-1}$$
$$J = A m^{-2} = C s^{-1} m^{-2}$$

So:

$$J = \frac{J s C^{-1} m^{-1} m^{-2}}{J s^2 C^{-2} m^{-1}} = C s^{-1} m^{-2}$$

Next note that the elements of the Riemann tensor appearing in eq. (4) are precisely those of the Schwarzschild metric (vol. 2). In a unified field theory these are perturbed by electromagnetism as in the LHS of eq. (3).

Magnetostatic Ampère Law

It is assumed that in magnetostatics the electric field is zero. So we obtain the resonant Ampère Law:

$$\boxed{\underline{\nabla} \times \underline{B}^a + \underline{\omega}'^a{}_b \times \underline{B}^b = \mu_0 \underline{J}^{a'}} \quad -(5)$$

where:

$$\underline{B}^a = \underline{\nabla} \times \underline{A}^a - \underline{\omega}^a{}_b \times \underline{A}^b \quad -(6)$$

Therefore :

3)

$$\boxed{\underline{\nabla} \times (\underline{\nabla} \times \underline{A}^a) - \underline{\omega}'^a{}_b \times (\underline{\omega}^b{}_c \times \underline{A}^c) = \mu_0 \underline{J}^{a\prime}} \quad -(7)$$

This is the Ampère Law of Magnetostatics in a generally covariant unified field theory.

Finally use the vector identity:

$$\underline{\nabla} \times (\underline{\nabla} \times \underline{A}^a) = -\nabla^2 \underline{A}^a + \underline{\nabla} (\underline{\nabla} \cdot \underline{A}^a) \quad -(8)$$

to find that eq. (7) is a linear inhomogeneous differential equation:

$$\boxed{\nabla^2 \underline{A}^a - \underline{\nabla} (\underline{\nabla} \cdot \underline{A}^a) + \underline{\omega}'^a{}_b \times (\underline{\omega}^b{}_c \times \underline{A}^c) = -\mu_0 \underline{J}^{a\prime}}$$

$$-(9)$$

with resonance solutions, Q.E.D.

4) The terms in eq. (9) are as follows:

1) "Force term": $\nabla^2 \underline{A}^a$.

2) "Damping term": $-\underline{\nabla}(\underline{\nabla} \cdot \underline{A}^a)$.

3) "Hooke's Law Term": $\underline{\omega}'^a{}_b \times (\underline{\omega}^b{}_c \times \underline{A}^c)$.

4) "Driving term": $-\mu_0 \underline{J}^{a\prime}$.

This means that the equation will show all the known properties of linear inhomogeneous differential equations: amplitude resonance, potential and kinetic energy resonance, Q factors, phase effects and transient effects. At resonance the magnetic field causes resonantly amplified changes in the Riemann elements defined in eq. (4). According to design these can cause an increase or decrease in gravity.

The standard model gives a Poisson type equation:

$$\nabla^2 \underline{A}^a = -\mu_0 \underline{J}^{a\prime} \quad -(10)$$

which is the limit of eq. (9) when there is no spin connection and when:

$$\nabla(\underline{\nabla} \cdot \underline{A}^a) = 0. \quad -(11)$$