318(3): Spin Connection Resonance in ECE2

In this note, ECE2 theory is used to consider a possible mechanism for spin connection resonance in the Coulomb law. In ECE2 this is:

$$\underline{\nabla} \cdot \underline{E} = \underline{\kappa} \cdot \underline{E} = \rho / \epsilon_0 \quad -(1)$$

where:

$$\underline{\kappa} = 2 \left(\frac{\underline{q}}{r^{(0)}} - \underline{\omega} \right) \quad -(2)$$

in the notation of previous papers. In general:

$$\underline{E} = -\underline{\nabla} \phi - \frac{\partial \underline{A}}{\partial t} + 2 \left(c \omega_0 \underline{A} - \phi \underline{\omega} \right) \quad -(3)$$

The aim is to find Euler Bernoulli resonance from these equations. By antisymmetry:

$$-\underline{\nabla} \phi + 2 c \omega_0 \underline{A} = -\frac{\partial \underline{A}}{\partial t} - 2 \phi \underline{\omega} \quad -(4)$$

In the absence of a magnetic potential:

$$\underline{E} = -\underline{\nabla} \phi - 2 \phi \underline{\omega} \quad -(5)$$

$$= -2 \underline{\nabla} \phi = 4 \phi \underline{\omega}$$

so

$$\underline{\nabla} \cdot \underline{E} = \underline{\kappa} \cdot \underline{E} = \rho / \epsilon_0$$

$$= -2 \nabla^2 \phi = 4 \phi \underline{\kappa} \cdot \underline{\omega} \quad -(6)$$

$$= 8 \phi \underline{\kappa} \cdot \left(\frac{\underline{q}}{r^{(0)}} - \underline{\omega} \right)$$

2) It follows that:

$$\nabla^2 \phi + 4\phi \underline{\kappa} \cdot \underline{\omega} = \frac{4\phi}{r^{(0)}} \underline{v} \cdot \underline{\kappa}. \quad -(7)$$

In order to find an Euler Bernoulli structure use:

$$\underline{E} = -\underline{\nabla} \phi - 2\phi \underline{\omega} \quad -(8)$$

so

$$\underline{\nabla} \cdot \underline{E} = -\nabla^2 \phi - 2\phi \underline{\nabla} \cdot \underline{\omega} = \rho / \epsilon_0 \quad -(9)$$

i.e

$$\nabla^2 \phi + (2\underline{\nabla} \cdot \underline{\omega})\phi = -\rho / \epsilon_0 \quad -(10).$$

In the Z axis: $-(11)$

$$\frac{\partial^2 \phi}{\partial Z^2} + k_0^2 \phi = A \cos kZ = -\rho / \epsilon_0$$

So the current density ρ is defined by:

$$\rho = -\epsilon_0 A \cos(kZ) \quad -(12)$$

via a circuit design. The solution of eq. (11) is:

$$\phi = \frac{A \cos kZ}{k_0^2 - k^2} \quad -(13)$$

3) and at the point:

$$k = k_0 \quad -(14)$$

the scalar potential becomes infinite:

$$\phi \rightarrow \infty \quad -(15)$$

Similar considerations exactly apply to gravitation. The equivalent of eq. (11) in gravitation is:

$$\frac{\partial^2 \Phi}{\partial Z^2} + k_0^2 \Phi = A \cos kZ$$

$$= -4\pi G \rho_m \quad -(16)$$

So at

$$k = k_0 \quad -(17)$$

the gravitational potential becomes infinite:

$$\Phi \rightarrow \infty. \quad -(18)$$

So a mass m would experience theoretically infinite attraction to a mass M.

318(2): Antisymmetry, Equivalence Principles and Electromagnetic Effects in ECE2.

The relevant equations are:

$$\underline{\nabla} \cdot \underline{E} = \underline{\kappa} \cdot \underline{E} = \rho / \epsilon_0 \quad -(1)$$

and

$$\underline{\nabla} \cdot \underline{g} = 4\pi G \rho_m \quad -(2)$$
$$= \underline{\kappa} \cdot \underline{g}$$

in previous notation.

- The field potential relations are:

$$\underline{E} = -\underline{\nabla} \phi - \frac{\partial \underline{A}}{\partial t} + 2 \left(c\omega_0 \underline{A} - \phi \underline{\omega} \right) \quad -(3)$$

and

$$\underline{g} = -\underline{\nabla} \Phi - \frac{\partial \underline{Q}}{\partial t} + 2 \left(c\omega_0 \underline{Q} - \Phi \underline{\omega} \right) \quad -(4)$$

Antisymmetry Laws

- These are:

$$-\underline{\nabla} \phi + 2c\omega_0 \underline{A} = -\frac{\partial \underline{A}}{\partial t} - 2\phi \underline{\omega} \quad -(5)$$

and

$$-\underline{\nabla} \Phi + 2c\omega_0 \underline{Q} = -\frac{\partial \underline{Q}}{\partial t} - 2 \Phi \underline{\omega} \quad -(6)$$

In the absence of a magnetic potential $\underline{A}$ and gravitomagnetic potential $\underline{Q}$:

2)
$$\underline{E} = -\underline{\nabla}\phi = -2\phi\,\underline{\omega} \quad -(7)$$

and
$$\underline{g} = -\underline{\nabla}\,\underline{\Phi} = -2\,\underline{\Phi}\,\underline{\omega} \quad -(8)$$

Eqs (7) and (8) are the classical equivalence principles of Newtonian gravitation and electrostatics. So the equivalence principles are given immediately by antisymmetry.

Multiplying both sides of eq. (8) by a test mass m gives:
$$\underline{F} = m\underline{g} = -m\underline{\nabla}\,\underline{\Phi} = -2m\,\underline{\Phi}\,\underline{\omega} \quad -(9)$$

In classical dynamics:
$$\underline{\Phi} = \frac{MG}{r} \quad -(10)$$

where M is the mass of an object that attracts m. So we obtain the Newtonian equivalence principle:
$$\underline{F} = m\underline{g} = -\frac{mMG}{r^2}\,\underline{e}_r = -\frac{2mMG}{r}\,\underline{\omega} \quad -(10)$$

with
$$\underline{\omega} = \frac{1}{2r}\,\underline{e}_r \quad -(11)$$

3) In classical electrodynamics in the limit of electrostatics:

$$\underline{F} = e\underline{E} = -e\underline{\nabla}\phi = -2e\phi\underline{\omega} \quad -(12)$$

In classical electrostatics:

$$\phi = \frac{e_1}{4\pi\epsilon_0 r} \quad -(13)$$

so

$$\underline{F} = e\underline{E} = -\frac{e e_1}{4\pi\epsilon_0 r^2}\underline{e}_r = -2\frac{e_1}{4\pi\epsilon_0 r}\underline{\omega} \quad -(14)$$

So

$$\underline{\omega} = \frac{1}{2r}\underline{e}_r \quad -(15)$$

Self for Newtonian attraction and electrostatics.

In terms of magnitude:

$$g = -2\Phi\omega \quad -(16)$$

$$E = -2\phi\omega \quad -(17)$$

So

$$\boxed{\underline{g} = \left(4\pi\epsilon_0 G\frac{M}{e}\right)\underline{E}} \quad -(18)$$

where:

$$G = (6.6726 \pm 0.0005) \times 10^{-11}\ Nm^2 kg^{-2}$$

$$\epsilon_0 = 8.854188 \times 10^{-12}\ J^{-1}C^2m^{-1}$$

$$4\pi\epsilon_0 = 1.112650 \times 10^{-10}\ J^{-1}C^2m^{-1}$$

It follows that:

4)

$$3.712134 \times 10^{-21}$$

$$\underline{g} = \cancel{9.851612 \times 10^{-22}} \frac{\underline{M}}{e} \underline{E} \quad -(19)$$

This means that the acceleration due to gravity $\underline{g}$ can be expressed in terms of an electric field strength $\underline{E}$ in volts m^{-1}. At sea level the standard acceleration due to gravity is:

$$g = 9.80665 \, ms^{-2} \quad -(20)$$

and the mass of the earth is:

$$\underline{M} = 5.972 \times 10^{24} \, kg \quad -(21)$$

the acceleration due to gravity is defined by:

$$g = -\frac{MG}{r^2} = -\frac{e}{4\pi\epsilon_0 r^2} \quad -(22)$$

where r is the radius of the earth:

$$r = 6371 \, km = 6.371 \times 10^6 \, m \quad -(23)$$

In the laboratory however, considering a mass $\underline{M}$ of one kilogram charged by one coulomb:

$$\underline{g} = 9.851612 \times 10^{-22} \underline{E} \quad -(24)$$

The total force present is:

$$\begin{aligned} \underline{F} &= 2(m\Phi + e\phi)\underline{\omega} \\ &= \underline{F_1} + \underline{F_2} \end{aligned} \quad -(25)$$

5) and in the standard model it is assumed that there is an attraction between two masses, and an attraction or repulsion between two charges. It is assumed that there is no interaction between charge and mass. In order for such an interaction to exist eq. (25) would have to be:

$$\underline{F} = \underline{F}_1 + \underline{F}_2 + \underline{F}_{12} \quad -(26)$$

where $\underline{F}_{12}$ allows interaction between charge and mass. This means that $\underline{E}$ could be expressed in terms of $\underline{\Phi}$ and $\underline{\Omega}$, and $\underline{g}$ could be expressed in terms of ϕ and $\underline{A}$.

Finally consider eq. (1):

$$\underline{\nabla} \cdot \underline{E} = \underline{\kappa} \cdot \underline{E} = \rho / \epsilon_0 \quad -(27)$$

with acceleration due to gravity:

$$\underline{g} = g_r \, \underline{e}_r = -\frac{MG}{r^2} \, \underline{e}_r \quad -(28)$$

Then:

$$\frac{\partial g_r}{\partial r} = \frac{2MG}{r^3} = 2 g_r \left(\frac{1}{r^{(0)}} q_r - \omega_r \right) \quad -(29)$$

$$= -\frac{2MG}{r^2} \left(\frac{1}{r^{(0)}} q_r - \omega_r \right)$$

So:

b) $$\omega_r - \frac{1}{r^{(0)}} q_r = \frac{1}{r} \quad -(30)$$

From eq. (15):

$$\omega_r = \frac{1}{2r} \quad -(31)$$

so

$$\frac{1}{r^{(0)}} q_r = -\frac{1}{2r} \quad -(32)$$

The radial tetrad component is therefore:

$$\boxed{q_r = -\frac{1}{2}\frac{r^{(0)}}{r}} \quad -(33)$$

and the radial spin connection is:

$$\boxed{\omega_r = \frac{1}{2r}} \quad -(34)$$

where:

$$r^{(0)} = \frac{W^{(0)}}{A^{(0)}} \quad -(35)$$