80(2): Consider ECE2 Electrostatics and Gravitation

If the gravitational potential is denoted Φ and the electromagnetic potential by ϕ, the hamiltonian is:

$$H = \gamma m c^2 - e\phi - m\Phi \quad -(1)$$

and the lagrangian is:

$$\mathcal{L} = -\frac{mc^2}{\gamma} + e\phi + m\Phi \quad -(2)$$

where e and m are the charge and mass of a test particle, and where:

$$\gamma = \left(1 - \frac{v_0^2}{c^2}\right)^{-1/2} \quad -(3)$$

The field equations in previous notation are:

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

$$\underline{\nabla}\cdot\underline{E} = \underline{\kappa}\cdot\underline{E} = \rho/\epsilon_0 \quad -(5)$$

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

$$\underline{\nabla}\cdot\underline{B} = 0 \quad -(7)$$

and

$$\underline{g} = -\underline{\nabla}\Phi + \underline{\omega}\Phi = -\frac{\partial \underline{Q}}{\partial t} - \omega_0 \underline{Q} \quad -(8)$$

$$\underline{\nabla}\cdot\underline{g} = \underline{\kappa}\cdot\underline{g} = 4\pi G \rho_m \quad -(9)$$

$$\underline{\Omega} = \underline{\nabla}\times\underline{Q} - \underline{\omega}\times\underline{Q} \quad -(10)$$

$$\underline{\nabla}\cdot\underline{\Omega} = 0 \quad -(11)$$

In the Biefeld Brown effect, asymmetric electrodes are used to provide lift. Therefore a static

2) electric field $\frac{E}{2}$ produces a change in g.

Consider the equations:

$$-\nabla^2 \phi + \underline{\nabla} \cdot (\phi \underline{\omega}) = \rho / \epsilon_0 \quad - (12)$$

$$-\nabla^2 \Phi + \underline{\nabla} \cdot (\Phi \underline{\omega}) = 4\pi G \rho_m \quad - (13)$$

and assume that the spin connection vector $\underline{\omega}$ is the same in eqs. (12) and (13). The potential energy is

$$U = e\phi + m\Phi \quad - (14)$$

so

$$-\nabla^2 U + \underline{\nabla} \cdot (U \underline{\omega}) = e\rho / \epsilon_0 + 4\pi m G \rho_m, \quad - (14)$$

and the total force on a particle of charge e and mass m is:

$$\underline{F} = -\underline{\nabla} U \quad - (15)$$

The electromagnetic potential can be found by solving eq. (12) numerically for a given $\underline{\omega}$. Similarly the gravitational potential can be found by solving eq. (13) for a given $\underline{\omega}$.

By adding ~~eqs.~~ (12) and (13) it is found that there are cross effects such as:

$$\boxed{-\nabla^2 \Phi + \underline{\nabla} \cdot (\Phi \underline{\omega}) = \frac{e}{m} \rho / \epsilon_0 + \cdots} \quad - (14)$$

Eq. (14) shows that the gravitational potential Φ is affected by the electrostatic charge density ρ.

3) This is a simple explanation for the Biefeld Brown effect. Henry found Φ, the acceleration due to gravity is given by:

$$\underline{g} = -\underline{\nabla}\Phi + \underline{\omega}\,\Phi = -\frac{\partial \underline{Q}}{\partial t} - \omega_0 \underline{Q} \quad -(15)$$

The spin connection can be chosen to give:

$$\underline{g} = \underline{0} \quad -(16)$$

using

$$\underline{\nabla}\Phi = \underline{\omega}\,\Phi \quad -(17)$$

Eqs. (14) and (17) can be solved simultaneously for $\underline{\omega}$ and Φ.

Counter gravitation is defined by:

$$\underline{g} = -\underline{\nabla}\Phi + \underline{\omega}\,\Phi > \underline{0} \quad -(18)$$

Equations for Numerical Integration

If a small perturbation from the inverse square law is assumed, the potential energy is:

$$U = -\frac{mMG}{r} - \frac{e_1 e_2}{4\pi\epsilon_0 r} \quad -(19)$$

in previous UFT paper notation. Eq. (4) in Cartesian coordinates is:

$$E_X = -\frac{e_2}{4\pi\epsilon_0 (X^2+Y^2)^{1/2}}\left(\frac{X}{X^2+Y^2} - \omega_X\right) \quad -(20)$$

$$E_Y = -\frac{e_2}{4\pi\epsilon_0 (X^2+Y^2)^{1/2}}\left(\frac{Y}{X^2+Y^2} - \omega_Y\right) \quad -(22)$$

4) Using the units analysis:

$$F = mg = eE \quad -(23)$$

it follows that:

$$\ddot{X} = -\frac{A}{(X^2+Y^2)^{1/2}}\left(\frac{X}{X^2+Y^2} - \omega_X\right) \quad -(24)$$

$$\ddot{Y} = -\frac{A}{(X^2+Y^2)^{1/2}}\left(\frac{Y}{X^2+Y^2} - \omega_Y\right) \quad -(25)$$

where

$$A := mG + \frac{e_1 e_2}{4\pi\epsilon_0 m} \quad -(26)$$

It also follows that:

$$\left(\frac{d}{dt} + \omega_0\right)\left(\frac{eA_X}{m} + Q_X\right) = \frac{A}{(X^2+Y^2)^{1/2}}\left(\frac{X}{X^2+Y^2} - \omega_X\right) \quad -(27)$$

$$\left(\frac{d}{dt} + \omega_0\right)\left(\frac{eA_Y}{m} + Q_Y\right) = \frac{A}{(X^2+Y^2)^{1/2}}\left(\frac{Y}{X^2+Y^2} - \omega_Y\right) \quad -(28)$$

The lagrangian is:

$$\mathcal{L} = -\frac{mc^2}{\gamma} + \left(mMG + \frac{e_1 e_2}{4\pi\epsilon_0}\right)\frac{1}{(X^2+Y^2)^{1/2}} \quad -(29)$$

and the hamiltonian is:

$$H = \gamma mc^2 - \left(mMG + \frac{e_1 e_2}{4\pi\epsilon_0}\right)\frac{1}{(X^2+Y^2)^{1/2}} \quad -(30)$$

5) Using the numerical methods of UFT378, the planar orbit can be found of a particle of mass m and charge e_1 orbiting a particle of mass M and charge e_2.

This is an orbital of a Sommerfeld atom, provided that the Sommerfeld quantization is used. On the classical level, solving eqs. (27) to (30) can produce some very interesting orbits of an electron around a proton, or a charge e_1 around a charge e_2. A particle of charge and mass e_1 and m_1 is considered to be orbiting a particle of charge e_2 and m_2 in a plane. The analysis can easily be extended to three dimensions.

From eqs. (6) and (7):

$$\underline{\nabla} \cdot (\underline{\omega} \times \underline{A}) = \underline{0} \qquad (31)$$

and from eqs. (10) and (11):

$$\underline{\nabla} \cdot (\underline{\omega} \times \underline{Q}) = \underline{0} \qquad (32)$$

Therefore:

$$\underline{A} \cdot (\underline{\nabla} \times \underline{\omega}) = \underline{\omega} \cdot (\underline{\nabla} \times \underline{A}) \qquad (33)$$

and

$$\underline{Q} \cdot (\underline{\nabla} \times \underline{\omega}) = \underline{\omega} \cdot (\underline{\nabla} \times \underline{Q}) \qquad (34)$$

In the approximation:

$$\underline{\Phi} = -\frac{mMG}{r} \qquad (35)$$

the gravitational spin connection vector $\underline{\omega}$ can be found
from eq. (13) for a given mass density ρ_m. The
gravitational vector potential $\underline{a}$ can be found from
eq. (34).

The electromagnetic spin connection vector $\underline{\omega}$ can
be found from the Coulomb approximation:

$$\phi = -\frac{e_1 e_2}{4\pi\epsilon_0 r} \quad -(36)$$

by solving eq. (12) for a given charge density ρ. Given
the spin connection vector, the electromagnetic vector potential
$\underline{A}$ can be found from eq. (33).

Knowing Φ and $\underline{a}$, the timelike component
ω_0 of the spin connection four vector can be found from
eq. (8) for gravitation. Knowing ϕ and $\underline{A}$, the
component ω_0 can be found for electromagnetism.

Finally there exist antisymmetry conditions:

$$\left.\begin{aligned}(\partial_2+\omega_2)a_3 &= -(\partial_3+\omega_3)a_2\\ (\partial_3+\omega_3)a_1 &= -(\partial_1+\omega_1)a_3\\ (\partial_1+\omega_1)a_2 &= -(\partial_2+\omega_2)a_1\end{aligned}\right] \quad -(37)$$

and

$$\left.\begin{aligned}(\partial_2+\omega_2)A_3 &= -(\partial_3+\omega_3)A_2\\ (\partial_3+\omega_3)A_1 &= -(\partial_1+\omega_1)A_3\\ (\partial_1+\omega_1)A_2 &= -(\partial_2+\omega_2)A_1\end{aligned}\right] \quad -(38)$$

Eqs. (34) and (37) provide six equations
in six unknowns, so $\underline{a}$ and $\underline{\omega}$ can be determined.

7) Similarly, eqs. (38) and (33) provide six equations in six unknowns, so $\underline{\omega}$ and $\underline{A}$ can be found.

Scheme of Computation in General

1) Find $\underline{\omega}$ and $\underline{A}$ from eqs. (33) and (38).
2) Find $\underline{\omega}$ and $\underline{Q}$ from eqs. (34) and (37).
3) Find ϕ from eq. (12), knowing $\underline{\omega}$ and ρ.
4) Find $\underline{\Phi}$ from eq. (13), knowing $\underline{\omega}$ and ρ_m.
5) Solve eq. (14) for $\underline{\Phi}$, knowing $\underline{\omega}$ and ρ, this is the Biefeld Brown effect.
6) Find the gravitational ω_0 from eq. (15).
7) Find the electromagnetic ω_0 from eq. (4).

Scheme of Computation in the Coulomb Limit

8) Find $\underline{\omega}$ from eqs. (33) and (38)
9) Use $\phi = -\dfrac{e_1 e_2}{4\pi\epsilon_0 r}$
10) Find the charge density ρ needed for this result.
11) Repeat for gravitation.