1) 115(4): Fundamental Relation between Charge and Mass

In ECE theory:

$$\underline{g} = c^2 \underset{\sim}{T} \quad -(1)$$

and

$$\underline{E} = \phi \underset{\sim}{T} \quad -(2)$$

where $\underset{\sim}{T}$ is a well defined orbital torsion vector, g is acceleration due to gravity and $\underline{E}$ is electric field strength. So ϕ has the units of volts.

Clearly, eqs. (1) and (2) must be applied carefully in a given experimental situation.

Torsion at the Earth's Surface

Experimentally:

$$g = 9.80665 \ m s^{-2} \quad -(3)$$

at the Earth's surface. The mass of the Earth is:

$$M = 5.98 \times 10^{24} \text{ kilograms.} \quad -(4)$$

The fundamental constants are:

$$c = 2.997925 \times 10^{8} \ m \sec^{-1}$$

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

$$G = 6.6726 \times 10^{-11} \ N m^2 kg^{-2}$$

Therefore at the earth's surface:

$$|\underset{\sim}{T}| = \frac{9.80665}{2.997925^2} \times 10^{-18} \ m^{-1} \quad -(5)$$

$$\boxed{|\underset{\sim}{T}| = 1.0911 \times 10^{-16} \ m^{-1}} \quad -(6)$$

2)

This is the earth's orbital torsion. The earth's orbital torsion per unit mass is:

$$\frac{|T|}{m} = \frac{1.0911}{5.98} \times 10^{-40} \; m^{-1} \, kgm^{-1}$$

$$\boxed{T/m = 1.825 \times 10^{-41} \; m^{-1} \, kgm^{-1}} \quad -(7)$$

As can seen, the torsion approaches zero in the weak field limit, but is not identically zero. This is why Newtonian mechanics works well on the earth's surface.

Interpretation of Eq. (2)

The interpretation of eq. (2) is that electric field strength per volt is orbital torsion of spacetime. It is well known experimentally that electric effects in the laboratory are much greater than gravitational effects. The latter can only be observed because of the earth's enormous mass of 5.98×10^{24} kilograms. Gravitational effects between two masses of a kilogram each are completely unobservable if placed a distance of one metre apart.

In contrast, two opposite charges of a coulomb each, one metre apart, will attract very strongly in the laboratory. The reason

3) is that in this situation ($n = M = r = 1$):

$$F(\text{grav}) = G = -6.6726 \times 10^{-11} \text{ newtons} \quad -(8)$$

and (for $e_1 = e_2 = r = 1$):

$$F(\text{electric}) = \frac{1}{4\pi\epsilon_0} = -8.988 \times 10^{10} \text{ newtons.} \quad -(9)$$

So:

$$\boxed{\frac{F(\text{electric})}{F(\text{grav.})} = \frac{8.988}{6.6726} \times 10^{21} = 1.347 \times 10^{21}} \quad -(10)$$

$-(8)$

It is very important to bear this in mind when reviewing claims to counter-gravitation. It is equally important to base any device on a solid theory.

Eq. (2) can be interpreted to mean that the spacetime torsion for an electric field of one volt per metre generated by one volt is one inverse metre. This is sixteen orders of magnitude greater than the torsion (6) at the earth's surface. The torsion at the earth's surface is generated by an enormous mass of 5.98×10^{24} kilograms. Therefore:

$$\boxed{\begin{array}{ll} \text{a) torsion per unit mass of earth} = 1.825 \times 10^{-41} \; m^{-1}\,kgm^{-1} \\ \text{b) torsion per unit volt} = 1.0 \; m^{-1}\,V^{-1} \end{array}} \quad -(11)$$

4) We begin to see why the Coulomb law appears to be wholly independent of mass.

In ECE theory:

$$\underline{\nabla} \cdot \underline{g} = c^2 R = 4\pi G \rho_m \quad -(12)$$

$$\underline{\nabla} \cdot \underline{E} = \rho_e / \epsilon_0 \quad -(13)$$

where ρ_m is mass density in kgm m^{-3} and ρ_e is charge density in $C m^{-3}$.

Therefore:

$$\underline{\nabla} \cdot \underline{E} = \frac{\phi}{c^2} \underline{\nabla} \cdot \underline{g} \quad -(14)$$

from eqs. (1) and (2).

The gravitationally corrected Coulomb law is therefore:

$$\boxed{\underline{\nabla} \cdot \underline{E} = \frac{\rho_e}{\epsilon_0} + \frac{4\pi G \phi \rho_m}{c^2}} \quad -(15)$$

For $\rho_e = \rho_m = \phi = 1$:

$$\underline{\nabla} \cdot \underline{E} = \frac{1}{\epsilon_0} + \frac{4\pi G}{c^2} \quad -(16)$$

5) We have:

$$1/\epsilon_0 \sim 10^{11} \quad — (17)$$

$$4\pi G/c^2 \sim 10^{-28} \quad — (18)$$

So the gravitational correction is 10^{39} orders of magnitude smaller than the coulombic ~~force~~ term. This is for two opposite charges of a coulomb placed on two masses of a kilogram each, are metre apart.

This is entirely in accord with the well known experimental fact that the Coulomb law is very precise in the laboratory. As discussed by Jackson (3rd ed., 1999, page 7) the current precision of the Coulomb law is about:

$$\epsilon = (2.7 \pm 3.1) \times 10^{-16} \quad — (19)$$

where the force is assumed to vary as:

$$1 / r^{2+\epsilon} \quad — (20)$$

Cavendish gave, in 1772:

$$|\epsilon| \leq 0.02 \quad — (21)$$

and Maxwell gave:

$$|\epsilon| \leq 5 \times 10^{-5}. \quad — (22)$$

It is seen that mass has an entirely negligible influence on the Coulomb law.

6) Therefore ECE is in accord with all known data on the Coulomb law.

Conclusion

To have any hope of counter gravitation the apparatus must be based on the new inference based on spin connection resonance. The engineering must be based on the way in which electromagnetism influences gravitation. The latter is given by the structure of dynamics:

$$d \wedge T = R \wedge q - \omega \wedge T \quad -(23)$$

$$d \wedge \tilde{T} = \tilde{R} \wedge q - \omega \wedge \tilde{T} \quad -(24)$$

and the structure of electrodynamics:

$$d \wedge F = A^{(0)} \left(R \wedge q - \omega \wedge T \right) \quad -(25)$$

$$d \wedge \tilde{F} = A^{(0)} \left(\tilde{R} \wedge q - \omega \wedge \tilde{T} \right) \quad -(26)$$

together with:

$$T = d \wedge q + \omega \wedge q \quad -(27)$$

and

$$F = d \wedge A + \omega \wedge A. \quad -(28)$$

An example is the Faraday disk generator, where a mechanical spin produces a torsion T that gives rise to eq. (25). One of eqs.

7) (25) is the Faraday law of induction. If we define the homogeneous current:

$$j := \epsilon_0 A^{(0)} (R \wedge q - \omega \wedge T) \quad -(29)$$

then:

$$d \wedge F = j / \epsilon_0 \quad -(30)$$

$$d \wedge \tilde{F} = \tilde{j} / \epsilon_0 . \quad -(31)$$

The interaction of gravitation and electromagnetism is defined by:

$$\boxed{j \neq 0} \quad -(32)$$

and the resonance equation:

$$\boxed{d \wedge (d \wedge A + \omega \wedge A) = j / \epsilon_0} \quad -(33)$$

and its Hodge dual:

$$\boxed{d \wedge (d \wedge A + \omega \wedge A)_{HD} = \tilde{j} / \epsilon_0} \quad -(34)$$

Energy from Spacetime

This is the Faraday disk generator, which can resonate via eq. (33) and also its Hodge dual.

Counter - Gravitation

Resonance in A from an electromagnetic apparatus in turn produces resonance in q and T. This must be strong enough to counteract a mass of 5.98×10^{24} kilograms. This can only be done

8) by defining the way in which the electromagnetic torsion and gravitational torsion interact through the homogeneous current:

$$j = \epsilon_0 A^{(0)} (R \wedge q - \omega \wedge T) \neq 0 \quad -(35)$$

In the Einstein theory:

$$R \wedge q = 0, \quad T = 0 \quad -(36)$$

so:

$$j = 0. \quad -(37)$$

and there is no spin connection resonance.

For the free electromagnetic field, it is known experimentally that there is no magnetic monopole, so:

$$R \wedge q = \omega \wedge T \quad -(38)$$

$$\tilde{R} \wedge q = \omega \wedge \tilde{T}. \quad -(39)$$

Therefore for counter-gravitation:

$$\boxed{j \neq 0} \quad -(40)$$

Apparatus must be based on the ability to produce electromagnetically an ability torsion in eq. (1) with opposite sign to g.
