SPIN CONNECTION RESONANCE IN COUNTER GRAVITATION

by

Horst Eckardt

Alpha Institute for Advanced Study (horsteck@aol.com, www.aias.us),

and

Myron W. Evans,

British Government, Treasury

and Alpha Institute for Advanced Study (emyrone@aol.com , www.aias.us).

ABSTRACT

The equations for counter gravitation are developed in objective, or generally covariant, physics. The latter is represented by Einstein Cartan Evans (ECE) field theory and based on Cartan geometry (Riemann geometry extended with torsion). It is shown that the effect of counter gravitation can be greatly enhanced at spin connection resonance. The equation for resonance is solved numerically, and numerical results also obtained for counter gravitational resonance in the Newtonian force. The latter is greatly enhanced at resonance in a direction opposite to the force due to gravity, resulting in counter gravitation.

Keywords: Counter gravitation, spin connection resonance, Einstein Cartan Evans (ECE) unified field theory, objective physics, generally covariant unified field theory.

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1. INTRODUCTION

It is well known that both the Newton and Coulomb inverse square laws hold to high precision in the laboratory, so the interaction between the two laws must be insignificant under normal laboratory conditions. If two interacting charged masses are considered, the interaction between them is the sum of the electrostatic interaction between charges (the dominant term by many orders of magnitude in the laboratory) and the gravitational interaction between the two masses. The interaction term is very small, and has never been measured in the laboratory. Nevertheless, a generally covariant unified field theory such as the Einstein Cartan Evans (ECE) theory {1-21} allows for the existence of interaction terms because in general the gravitational and electromagnetic fields may interact in ECE theory. Their interaction is controlled by the homogeneous current of ECE theory, which is defined in Section 2. In order to develop counter gravitational technology, the very small interaction term must be amplified by resonance. The equation controlling resonance is developed in Section 2, and solved numerically in Section 3 for the scalar potential of the electrostatic field and for the Newtonian force. At resonance, termed "spin connection resonance" (SCR) the electric field induced Newtonian force may be amplified by the necessary many orders of magnitude in a direction opposite to the force due to gravity. This must be the basis of practical counter gravitation. Without resonance, the electric field induced Newtonian force is far too small to be measured and far too small to be of any practical utility. This much is obvious from the precision of the Coulomb and Newton inverse square laws under laboratory conditions, but artifactual claims about counter gravitation continue to proliferate. In this paper we make a fresh start by developing resonant counter gravitational technology based on circuit designs governed by resonance equations. The gravitational field between two charged masses in the laboratory is very well known to be many orders of magnitude smaller than the electric field, so claims about large cross effects are obvious experimental artifacts.

2. HOMOGENEOUS CURRENT AND RESONANCE EQUATIONS

The interaction of electromagnetism and gravitation in ECE theory {1-21} is described by the homogeneous current:

$$j^a = \frac{A^{(0)}}{\mu_0}\left(R^a{}_b \wedge q^b - \omega^a{}_b \wedge T^b\right) \quad -(1)$$

and the geometrical condition for interaction of the two fields is therefore:

$$R^a{}_b \wedge q^b \neq \omega^a{}_b \wedge T^b. \quad -(2)$$

Here $R^a{}_b$ is the curvature form, q^b is the tetrad form, $\omega^a{}_b$ is the spin connection form and T^b is the torsion form. If condition (2) is fulfilled the electromagnetic field can affect the gravitational field on the classical level, and vice versa. An example is polarization effects due to light deflected by gravity {1-21}. The homogeneous current is governed by the homogeneous field equation of ECE theory:

$$d \wedge F^a = \mu_0 j^a \quad -(3)$$

where

$$F^a = d \wedge A^a + \omega^a{}_b \wedge A^b. \quad -(4)$$

Here A^a is the electromagnetic potential form, defined by:

$$A^a = A^{(0)} q^a \quad -(5)$$

and F^a is the electromagnetic field form, defined by:

$$F^a = A^{(0)} T^a. \quad -(6)$$

The factor $cA^{(0)}$ has the units of volts, where c is the speed of light, and $cA^{(0)}$ is the primordial voltage present in the universe. In Eq. (3) μ_0 is the vacuum permeability in S.I. units. The Hodge dual {1-21} of Eq. (3) is:

$$d \wedge \tilde{F}^a = \mu_0 J^a = \mu_0 \tilde{j}^a \quad -(7)$$

and the objective or generally covariant Coulomb Law is part of Eq. (7), in which the Hodge dual current, the inhomogeneous current, is:

$$\tilde{j}^a = \frac{A^{(0)}}{\mu_0} \left(\tilde{R}^a{}_b \wedge q^b - \omega^a{}_b \wedge \tilde{T}^b \right). \quad -(8)$$

For a given initial driving voltage $cA^{(0)}$, the inhomogeneous current, and the quantity $\tilde{R}^a{}_b \wedge q^b - \omega^a{}_b \wedge \tilde{T}^b$ are greatly amplified at SCR. This means that the effect of the electromagnetic field on the gravitational field is greatly amplified, and for the Coulomb law, the effect of the electric field on the Newtonian force is greatly amplified. Such an effect does not exist in the standard model, because in the latter, the classical electromagnetic field is Lorentz covariant only, and not generally covariant as needed for objectivity in physics.

From Eqs. (3) and (4) the structure of the resonance equation is:

$$d \wedge \left(d \wedge A^a + \omega^a{}_b \wedge A^b \right) = \mu_0 j^a \quad -(9)$$

and its Hodge dual gives another resonance equation. It has been shown {1-21} that the Newtonian force between two masses m_1 and m_2 is:

$$f^a = -m_1 m_2 G \left(R^a{}_b \wedge q^b - \omega^a{}_b \wedge T^b \right) \quad -(10)$$

where G is the Newton constant. The Newtonian force is therefore:

$$\tilde{j}^a = -m_1 m_2 \mu_0 G / A^{(0)} \; j^a . \quad (11)$$

When the electromagnetic and gravitational fields are independent:

$$R^a{}_b \wedge q^b = \omega^a{}_b \wedge T^b \quad (12)$$

the only contribution to $\tilde{j}^a$ {1-21} is from the source mass, so:

$$\tilde{j}^a = \frac{A^{(0)}}{\mu_0} \left(\tilde{R}^a{}_b \wedge q^b \right)_{source} \quad (13)$$

Under this condition it has been shown {1-21} that the Coulomb law is:

$$\underline{\nabla} \cdot \underline{E}^a = -\phi^{(0)} R^a{}_i{}^{i0} , \quad (14)$$

$$i = 1, 2, 3$$

where:

$$\phi^{(0)} = c A^{(0)} . \quad (15)$$

The curvature elements appearing in Eq. (14) are those due to the source mass, the mass carrying the source charge. It has also been shown { 1-21 } that the electric field in ECE theory is in general a vector boson defined by:

$$a = 1, 2, 3 \quad (16)$$

so there are three equations of type (14):

$$\underline{\nabla} \cdot \underline{E}^1 = -\phi^{(0)} R^1{}_i{}^{i0} \quad (17)$$

$$\underline{\nabla} \cdot \underline{E}^2 = -\phi^{(0)} R^2{}_i{}^{i0} \quad -(18)$$

$$\underline{\nabla} \cdot \underline{E}^3 = -\phi^{(0)} R^3{}_i{}^{i0}. \quad -(19)$$

Here, summation over repeated indices is implied, so:

$$R^1{}_i{}^{i0} = R^1{}_1{}^{10} + R^1{}_2{}^{20} + R^1{}_3{}^{30} \quad -(20)$$

and so on. In Eqs. (17) to (20) the Riemann form elements are generated purely by the source mass, so:

$$\underline{\nabla} \cdot \underline{E}^a = \mu_0 \tilde{j}^a = -\phi^{(0)} R^a{}_i{}^{i0}. \quad -(21)$$

If the electric field induces a Newtonian force, the Coulomb law is changed to:

$$\underline{\nabla} \cdot \underline{E}^a = \mu_0 \tilde{j}^a = -\phi^{(0)} \left(R^a{}_i{}^{i0} + \omega^a{}_{ib} T^{bi0} \right). \quad -(22)$$

The effect of the electric field on the elements $R^a{}_i{}^{i0}$ is given by $\omega^a{}_{ib} T^{bi0}$.

Therefore the complete Coulomb Law becomes:

$$\underline{\nabla} \cdot \underline{E}^a = \mu_0 \left(\tilde{j}^a_{source} + \tilde{j}^a_{int} \right) \quad -(23)$$

where the interaction current is defined by:

$$\tilde{j}^a_{int} = -\frac{\phi^{(0)}}{\mu_0} \left(R^a{}_i{}^{i0} + \omega^a{}_{ib} T^{bi0} \right)_{int}. \quad -(24)$$

The interaction current in the absence of SCR is very tiny, and has never been measured experimentally. Claims to the contrary are clearly artifactual, because otherwise the Coulomb Law would not hold to very precision in the laboratory, contrary to well known {22} and accurately reproducible and repeatable experimental data on the Coulomb Law.

The interaction Coulomb Law can therefore be written as:

$$\underline{\nabla} \cdot \underline{E}^{a} = - \underline{\omega}^{a}{}_{b\,int} \cdot \underline{E}^{b} \quad -(25)$$

where:

$$\underline{\omega}^{a}{}_{b\,int} \cdot \underline{E}^{b} \sim 0. \quad -(26)$$

Here $\omega^{a}{}_{b\,int}$ is the interaction spin connection. This is non-zero if and only if the electric field induces changes in the Newtonian force. Such changes do not exist in the standard model. For simplicity of argument only it is assumed that the indices a and b are the same, so Eq. (25) is simplified to:

$$\underline{\nabla} \cdot \underline{E} = - \underline{\omega}_{int} \cdot \underline{E}. \quad -(27)$$

The electric field can be defined {1-21} as:

$$\underline{E} = - (\underline{\nabla} + \underline{\omega}) \phi \quad -(28)$$

where $\underline{\omega}$ is the spin connection in the absence of interaction between the electric field and Newtonian gravitation. A positive sign has been adopted for illustration only in Eq. (28) for , but in general {1-21}:

$$\omega_r = 0, \pm \frac{1}{r} \quad -(29)$$

in spherical polar coordinates.

In the absence of interaction between the electric field and the Newtonian force {1-21}:

$$\frac{d^2\phi}{dr^2} + \frac{1}{r}\frac{d\phi}{dr} - \frac{1}{r^2}\phi = -\rho/\epsilon_0 \quad -(30)$$

but in the presence of interaction:

$$\frac{d^2\phi}{dr^2} + \frac{1}{r}\frac{d\phi}{dr} - \frac{1}{r^2}\phi - \underline{\omega}_{int} \cdot (\underline{\nabla} + \underline{\omega})\phi = -\rho/\epsilon_0 \quad -(31)$$

i.e. there is an extra term due to the interaction spin connection $\underline{\omega}_{int}$. Eq. (31) is the resonance equation:

$$\frac{d^2\phi}{dr^2} + \left(\frac{1}{r} - \omega_{int}\right)\frac{d\phi}{dr} - \left(\frac{1}{r^2} + \frac{\omega_{int}}{r}\right)\phi = -\rho/\epsilon_0 \quad -(32)$$

and is solved numerically in Section 3 for various models of the interaction spin connection. Here ρ is the charge density and ϵ_0 is the vacuum permeability.

Resonant counter gravitation works by amplifying ϕ at resonance from Eq. (32) it is seen form Eq. (25) that the interaction term is amplified, meaning that the effect of the electric field on the Newtonian force is maximized in a direction opposite to the gravitational field of the Earth.

The basic structure of the interaction Coulomb Law is:

$$\underline{\nabla} \cdot \underline{E}^a = \rho^a/\epsilon_0 - \underline{\omega}^a{}_{b\,int} \cdot \underline{E}^b, \quad a = 1, 2, 3. \quad -(33)$$

If it is assumed for the sake of simplicity of development that only the diagonal elements of the interaction spin connection exist:

$$(\underline{\nabla} + \underline{\omega}^1{}_{1\,int}) \cdot \underline{E}^1 = \rho^1 / \epsilon_0 \quad -(34)$$

etc.

where the vector electric boson {1-21} is defined by:

$$\left.\begin{aligned} \underline{E}^1 &= -\underline{\nabla}\phi + \underline{\omega}\phi \\ \underline{E}^2 &= -\underline{\nabla}\phi \\ \underline{E}^3 &= -\underline{\nabla}\phi - \underline{\omega}\phi \end{aligned}\right\} \quad -(35)$$

Therefore there are three resonance equations in general:

$$(\underline{\nabla} + \underline{\omega}^1{}_{1\,int}) \cdot (-\underline{\nabla}\phi + \underline{\omega}\phi) = \rho^1/\epsilon_0 \quad -(36)$$

$$(\underline{\nabla} + \underline{\omega}^2{}_{2\,int}) \cdot (-\underline{\nabla}\phi) = \rho^2/\epsilon_0 \quad -(37)$$

$$(\underline{\nabla} + \underline{\omega}^3{}_{3\,int}) \cdot (-\underline{\nabla}\phi - \underline{\omega}\phi) = \rho^3/\epsilon_0 . \quad -(38)$$

The labels on the charge densities indicate that there are three different charge densities

present in general. If it is assumed that:

$$\rho = \rho^1 = \rho^2 = \rho^3 \quad -(39)$$

and that:

$$\underline{\omega}_{int} = \underline{\omega}^1{}_{1\,int} = \underline{\omega}^2{}_{2\,int} = \underline{\omega}^3{}_{3\,int} \quad -(40)$$

the three resonance equations simplify to:

$$\nabla^2\phi + \underline{\omega}_{int} \cdot \underline{\nabla}\phi - \underline{\nabla}\cdot(\underline{\omega}\phi) - \underline{\omega}_{int}\cdot\underline{\omega}\phi = -\rho/\epsilon_0 \quad -(41)$$

$$\nabla^2 \phi + \underline{\omega}_{int} \cdot \underline{\nabla} \phi = -\rho / \epsilon_0 \quad -(42)$$

$$\nabla^2 \phi + \underline{\omega}_{int} \cdot \underline{\nabla} \phi + \underline{\nabla} \cdot (\underline{\omega} \phi) + \underline{\omega}_{int} \cdot \underline{\omega} \phi = -\rho / \epsilon_0 . \quad -(43)$$

The resonance patterns from these three equations are obtained numerically and discussed in Section 3. The ability of the electric field to affect the Newtonian force is represented by the interaction spin connection $\underline{\omega}_{int}$. Off resonance this effect is very tiny, as argued, but at resonance its effect may be amplified enough to make counter gravitation feasible.

The effect of the electric field on the Newtonian force is conveniently demonstrated through the Hodge dual of Eq. (10):

$$\tilde{f}^a = -m_1 m_2 G \left(\tilde{R}^a{}_b \wedge q^b - \omega^a{}_b \wedge \tilde{T}^b \right) . \quad -(44)$$

In the absence of any effect of the electric field on the Newtonian force:

$$\tilde{f} = -m_1 m_2 G \left(R^0{}_1{}^{10} + R^0{}_2{}^{20} + R^0{}_3{}^{30} \right) \quad -(45)$$

which is the ordinary Newtonian force between m_1 and m_2, the well known inverse square distance dependence being given by:

$$\frac{1}{r^2} = R^0{}_1{}^{10} + R^0{}_2{}^{20} + R^0{}_3{}^{30} . \quad -(46)$$

In the presence of interaction, the Newtonian force due to the electric field is:

$$\tilde{f}^{a} = -m_1 m_2 G \omega^{a}{}_{ib} T^{bi} \quad -(47)$$

and simplifies to:

$$\tilde{f} = -m_1 m_2 G \underline{\omega}_{int} \cdot \underline{T} \quad -(48)$$

where $\underline{T}$ is a torsion vector defined by:

$$\underline{E} = \phi \quad \underline{T} = \underline{\nabla}\phi, \ (\underline{\nabla} \pm \underline{\omega})\phi. \quad -(49)$$

Thus:

$$\left.\begin{aligned} (\underline{\nabla} \pm \underline{\omega})\phi &= \underline{T}\phi, \\ \underline{\nabla}\phi &= \underline{T}\phi \end{aligned}\right\} \quad -(50)$$

and:

$$\left.\begin{aligned} \tilde{f} &= -m_1 m_2 G \underline{\omega}_{int} \cdot \frac{1}{\phi}(\underline{\nabla} \pm \underline{\omega})\phi, \\ &\quad -m_1 m_2 G \underline{\omega}_{int} \cdot \frac{1}{\phi}\underline{\nabla}\phi \end{aligned}\right\} \quad -(51)$$

where:

$$\frac{d^2\phi}{dr^2} + \left(\frac{1}{r} - \omega_{int}\right)\frac{d\phi}{dr} - \left(\frac{1}{r^2} + \frac{\omega_{int}}{r}\right)\phi = -\frac{\rho}{\epsilon_0}. \quad -(52)$$

Threfore to maximize the effect of the electric field on the Newtonian force at SCR, the following term must be maximized:

$$\tilde{f} = -m_1 m_2 G \omega_{int} \frac{\phi'}{\phi} \quad -(53)$$

where

$$\phi' = \frac{d\phi}{dr} \quad -(54)$$

and where:

$$\frac{d\phi'}{dr} + \left(\frac{1}{r} - \omega_{int}\right)\phi' - \left(\frac{1}{r^2} + \frac{\omega_{int}}{r}\right)\phi = \frac{f}{G_0}. \quad -(55)$$

This is illustrated numerically and discussed in detail in Section 3.