General Relativity Applied to Electricity, an Introduction. v3.

Ken S. Tucker, January 15, 2014.

Abstract

This article applies General Relativity (GR) to energy stored in a charge configuration termed, "potential energy of a system of charges", as it affects gravitation and space-time. All mass and energy is expressible as, and convertible to electrical energy, as grams are equivalent to electron-volts.
The analysis predicts gravitational radiation to be radiated and propagated as Electro-Magnetic Radiation (EMR), therefore gravitational radiation is equivalent to EMR.

GR Applied to a Charge Couple

Consider charges 'a' and 'b' in isolation, each detectable only by relation to other charges, separated by a Cartesian Radius R, assumed to be measured by a light signal with a constant velocity c and assumes c is in a perfect vacuum, conventionally expressed,

$$Mc^2 = ab/R,$$

M is the Mass of the electrical couple. The Cartesian R is expressible by time,

$$R = ct = x^0, \qquad \text{Equation (1),}$$

in place of R, the refinement of a physical light Signal is used, wherein the velocity of light is not constant but instead subject to the effect of the charges, refined to,

$$Mc^2 = ab/S \qquad \text{Equation (1a).}$$

Let G be Newton's gravitational constant, $K = G/c^4$, and r be an arbitrary radius from mass M to a point in space, the time metric tensor component of a Mass is,

$$g_{00} = 1 - 2GM/rc^2 = 1 - 2K(ab/S)/r. \qquad \text{Equation (2).}$$

Conventionally, the g_{00} defines the "rate of time at a point", however the 1983 redefinition of time requires it be measured over a length so that, $Time = Length/c$ interval, with the Length and Time each being small intervals > zero. The Time interval nows requires two points defining the Length.

The 'space time interval' is conventionally written,

$ds^2 = g_{\mu\nu} dx^\mu \ dx^\nu$, that becomes clearer written as,

$$ds^2 = (dS_{time})^2 - (dS_{space})^2 .$$

For brevity, setting $dS = dS_{time}$ and in view of Equation (1),

$$dS^2 = g_{00} dx^0 dx^0 = g_{00} dR^2 .$$

<u>Charge Couple Relation</u>

Consideration of a simple pair of charges gives straight forward conceptualization and can be summed to macroscopic bodies applications.

Setting $r = S$ in Equation (2), charges a and b relate to each as,

$g_{00} = 1 - 2Kab/S^2$, and $S^2 = S^2 g_{00} + 2K\, ab$, Equation (3)

Solving g_{00} in terms of R and S provides, $R^2 = S^2 g_{00}$, and

$S^2 = R^2 + 2K\, ab$, Equation (4),

and $dR/dS = S/R$.

Equation (4) predicts the Signal distance depends on polarity. For a given R , S (repulsion) $>$ S (attraction), producing a greater Coulomb magnitude of attractive force than repulsive force though calculated at the same locations, due to the different Signal distance. The speed of light propagates more slowly in a greater energy density between repulsive charges than attractive charges explaining gravitation as a secondary electrical effect in GR.

<u>GR expressed using Planck's constant</u>

Planck's constant h is expressible in terms of charge 'e' employing the von Klitzing constant R_K as, $h = R_K\, e^2$ The product of charges 'a' and 'b' give $ab = \pm e^2$, yielding $ab = \pm h/R_k$ where the sign depends on the relative polarity of 'a' and 'b' By expressing g_{oo} (Equation 2), in terms of Planck's constant, proves its general applicability to all ponderable matter and energy.

In view of Equation (2), the g_{OO} now takes the form,

$$g_{OO} = 1 - 2Kh/(R_K\, Sr).$$

G- wave equivalence to EMR

Expressing the Electric field of charge b at location of charge a as,

$E_b = b/S^2$, produces,

$g_{00} = 1 - 2K\,a\,E_b$ with a time derivative w.r.t. x^0,

$g_{00,0} = -\,2Ka\,\partial E_b/\partial x^0$.

The term $\partial E_b/\partial x^0$ is the Maxwell Equation predicting EMR, commonly written as $1/c\ \partial E/\partial t$. For example, a wave propagating in direction $\boldsymbol{x}$ is characterized by,

$g_{22,0} = -\,g_{33,0}$ and therefore, $K\,\partial E_y/\partial(ct) = -\,K\ \partial E_z/\partial(ct)$

proving propagation of gravitational radiation is equivalent to and measurable as EMR.

The Einstein Field Equation_ Applied to Generally Electric Relativity.

We'll use the conventional Einstein Equation
$G_{uv} = -\,8\pi\ (G/c^2)T_{uv}$,
(For ref. see S. Wienberg, "Gravitation and Cosmology, chapter 7),
Wherein G_{uv} is the curvature and T_{uv} the energy density.

The static field component
$G_{00} = -\,8\pi\,(G/c^2)T_{00}$
will provide sufficient proof of General Electric Relativity as follows.

Employing Poisson's Equation with Φ the gravitational potential,
$\nabla^2\,\Phi = 4\pi\,G\rho,\ \ \rho = T_{00}$ the energy density

Equation(1a), $Mc^2 = ab/s$, gives, the gravitational potential at distance "s",
$\Phi = G\ (ab/s^2)/c^2$
The time metric is $g_{00} = 1 - 2\Phi/c^2$ and the curvature is expressed by,

$G_{00} = \nabla^2 g_{00} = -\,2\nabla^2\Phi/c^2 = -\,2\nabla^2 G(ab/s^2)/c^4 = -\,8\pi(G/c^2)T_{00}$
as was to be proven.

Study sponsored by Conception Dynamics.