General Relativity Applied to Electricity, an Introduction v3

Ken S. Tucker

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,

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

Conventionally, the g_{00} defines the "rate of time at a point", however the 1983 redefinition of time requires it to be measured over a length so that, $Time = Length/c$ interval, with the Length and Time each being small intervals > zero. The Time interval now requires two points defining the Length.
The 'space interval' is conventionally written, $ds^2 = g_{uv} dx^u dx^v$, 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),

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

Charge Couple Relation

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

$S^2 = R^2 + 2Kab$, 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.

GR expressed using Planck's Constant

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_{00} Equation (2), in terms of Planck's constant, proves its general applicability to all ponderable matter and energy.
The view of Equation (2), the g_{00} now takes the form,

$g_{00} = 1 - 2Kh/(R_K Sr)$.

G-wave equivalence to EMR

Expressing the Electric field of charge 'b' at location of charge 'a' as,
$E_b = b/S^2$, produces

$g_{00} = 1 - 2Ka\, E_b$ 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 x is characterized by,

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

providing propagation of gravitational radiation is equivalent to and measurable to EMR.

<u>The Einstein Field Equation Applied to Generally Electric Relativity</u>

We'll use the conventional Einstein Equation

$G_{uv} = -\, 8\pi (G/c^2) T_{uv}$, (Weinberg 1972, 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,

$\nabla^2 \Phi = 4\pi G\rho,\ \ \rho = T_{OO}$ the energy density

Equation (1a), $Mc^2 = ab/s$, gives, the gravitational potential at distance " s ",

$\Phi = (ab/s^2)/c^2$

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.

References

1. Weinberg,S. 1972 Gravitation And Cosmology: Principles And Applications Of General Theory Of Relativity