Review of the ECE Theory and SCR Papers published by The Alpha Institute of Advanced Studies.

1. Introduction

I have been asked by Matt Watts to provide a synopsis of the Einstein Cartan Evans (ECE) theory, a unified theory that predicts far more than the presently accepted Einstein General Relativity (GR). In particular this theory unifies gravitation and electromagnetism but more importantly from our point of view it predicts the extraction of energy from space, or more exactly space-time. In this latter role it offers more than Einstein's curved space-time by introducing space-time torsion and it is this torsion aspect that supplies the link to extracting energy from space, space can be considered to have spin. This hitherto unknown aspect of space introduces spin-connection resonance (SCR) into the electromagnetic field equations as additional terms.

Like Einstein's GR, ECE is a geometric theory and it has evolved from GR via Cartan's geometry into its present form due to the work of Myron Evans, hence its name ECE. It involves the specialised tensor arithmetic used by Einstein and others that is gobbledygook to most practical engineers and scientists, and certainly to me (but not to Myron Evans!). Fortunately Horst Eckardt has converted Evan's tensor equations into vector equations that relate to electromagnetic phenomena, and that is safe territory for me since I have spent my entire working life using similar equations. I accept that even those vector identities are beyond the scope of some experimenters, I admit I still have problems realizing what some of them really mean. And going back to the space-time concept, I have difficulty accepting the geometric theories, I prefer something more tangible involving real things like electrons and other particles. So my understanding of geometric curvature and spin of space-time is that this is really a clever way of describing effects that actually come from the particles that exist in vacuum space, like photons, virtual photons, neutrinos and so on. These whiz through space at light velocity and exist at enormous number density, so any observable effects come from the averaging over space and time of a large number of these space particles. And since our standards for measuring space-time (Einstein's rods and clocks) are influenced, nay even controlled by the space particles themselves, then I can see the geometric curvature of space-time as an elegant way of describing something that is actually spatial variations in the space particle density or other characteristic. This may be an incorrect interpretation, but does allow space to have spin since the space particles themselves have spin.

So this paper is *not* a synopsis of the ECE theory. It is my perception of what the theory means and any reader should note that my perception could be wrong

2. Paper 74. Spin Connection Resonance in magnetic Motors.

This paper attempts to explain why in certain experiments a magnet assembly has been made to rotate continuously without any form of input power. Tantalisingly its reference {14} to these experiments does not give details, the reference merely states "D. Saunders, communications and video demonstrations from various websites (Dec. 2006)." However I have personally witnessed the Yildiz motor at a demonstration carried out at Delft University, so I am convinced that such motors do exist and they do work. The condition necessary for a motor to self-run requires two features, the first being a resonance condition. This is not a resonance in the time domain, but in the spatial domain. The magnet assembly must have a periodic structure, which immediately suggests an array of magnets having uniform separation. Thus in the spatial domain this array can have a wave number (inverse distance) K_0 which to me suggests that $K_0 = \frac{1}{d}$ where d is the separation between magnets. The resonance condition is given as $K_0 = K$ (their equation 39) where K is a wave number of space-time. Thus space-time in the vicinity if the magnets must also have a periodic structure, and that must have the same spatial period as the magnets. The second feature is a so-called driving term, which is given in their equation 34 as $R_z \cos(K_0 z)$ for the z direction (and similarly for other directions) where R_z is the space-time curvature in the z direction. This driving term is at first sight also purely spatial but on further reading it appears that it could necessitate a time varying aspect in that R_z varies with time.

The later part of the report written by Eckardt says the space-time curvature R can be created electromagnetically since electromagnetic fields exhibit curvature as well as torsion. So our driving term is now a magnetic field, but exactly how this relates to R is not explained. He does go on to say that such fields can be enhanced by a resonance (presumably the condition determined by their $K_0 = K$) that is induced by a homogenous current. This current is the fictitious magnetic current first introduced by Sears[1], which is the analogue of the Maxwell electric displacement current. Just as conduction current can be considered to flow through the dielectric of a capacitor when its voltage is changing as given by

$$J_D = \frac{\partial D}{\partial t} \tag{1}$$

where J is the current density and D the electric displacement, so we can imagine a magnetic current flowing when the magnetic flux is changing given by

$$J_B = \frac{\partial B}{\partial t} \tag{2}$$

where we have used J_D and J_B for the two current densities (see for example Nussbaum[2]) while Eckardt used J and j (we use j later as the imaginary operator $\sqrt{-1}$). Eckardt makes the assumption that certain magnetic materials can have a magnetic conductivity σ_m as an analogue to electrical conductivity σ and related to J_B by $J_B = \sigma_m B$ in the same manner that we have $J_D = \sigma E$ in conductors. Then he says "magnets having a suitable material constant σ_m create a homogenous current by their permanent magnet field." In my opinion this is nonsense when a permanent magnet field is constant hence $J_B = 0$. However soft ferromagnetic materials can exhibit such a constant as explained below, and there is the possibility of permanent magnets having a degree of softness either built in from manufacture or created by suitable conditioning.

If we rewrite (1) to include the both the permittivity ε and the conductivity σ of the dielectric we obtain

$$J_D = \frac{\partial D}{\partial t} + \sigma E \tag{3}$$

where E is the electric field (electric potential gradient). Similarly for (2) we obtain

$$J_B = \frac{\partial B}{\partial t} + \sigma_m H \tag{4}$$

where H is the magnetic field (magnetic potential gradient) and σ_m is the magnetic conductivity. Note that this σ_m is slightly different to Eckardt's who used $\sigma_m B$ for the second term. Now we know from dynamic magnetic domain analysis that the changing flux Φ flowing through a coil of N turns that is connected to a load resistor R_{load} creates a back mmf U given by $U = -\frac{N^2}{R_{load}}\frac{d\Phi}{dt}$ and since $\Phi = BA$ where A is the area containing the flux, this becomes $U = -\frac{N^2 A}{R_{load}}\frac{dB}{dt} = -\frac{N^2 A}{R_{load}} J_B$.

Rearranging this gives

$$J_B = -\frac{U R_{load}}{N^2 A} \tag{5}$$

Comparing this dimensionally with the second term in (4) and since the dimension of U is amps and of H is amps/m we conclude that the dimension of σ_m is Ohms/m. Note that if we wish to use $\sigma_m B$

as the second term in (4) to get Eckardt's equation (42), we must divide σ_m by the permeability μ (as did Eckardt) whence its dimension becomes Ohms/Henry. L/R is a well-recognised time constant hence Eckardt's σ_m does indeed have a dimension of inverse time, but by presenting it in that manner he hid the true connection to the material characteristics.

We arrived at the dimensions by considering a load resistor connected to a coil, but if we consider the power loss to be within the material we would arrive at the same conclusion, hence σ_m is connected to the loss characteristic of the material. This is usually characterized by making the relative permeability μ_R a tensor expressed as

$$\mu_R = \mu' + j\mu'' \qquad (6)$$

where the imaginary term represents the loss. We then find that the "magnetic conductivity" σ_m in (4) is given by

$$\sigma_m = \omega\mu_0\mu'' \qquad (7)$$

which meets our dimensional requirement of Ohms/m. Dividing by μ_0 gives us Eckardt's σ_m as $\omega\mu''$ which has dimension of inverse time because μ'', being relative, is dimensionless.

Calun et al[3] has given formula taken from Nakamura[4] that decompose the magnetic susceptibility spectra into spin rotational and domain wall components, and I have related these to the tensor (6) in my paper[5]. Thus there *is* an aspect of σ_m that relates to time, spin and movement within the ferromagnetic material but this is not made clear in the paper under review. Using those internal features of the materials in rotating machinery is problematical since their frequencies are generally much too high, but they could be applied to solid-state systems, so the ECE theory could apply there.

To be continued.

References

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