FEA Using the Anti-Symmetry Formulation of ECE EM Theory

Note 3: Energy Extraction from the Vacuum

The Equations

In Note 1 of this series, the following system of equations was chosen as the modeling framework for a conductive material embedded in a general three dimensional non-conductive region.

From equations (149) through (151) of "The Antisymmetry Law of Cartan Geometry: Applications to Electromagnetism and Gravitation"[1] we have

$$\omega_0 \underline{A} = -\frac{\partial}{\partial t}(\underline{\nabla}\,\psi) \qquad (149)$$

$$\left(-\nabla^2 + \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right)(\underline{A} - \underline{\nabla}\psi) = \frac{1}{2}\,\mu_0\,\underline{\mathrm{J}} + \frac{1}{2\varepsilon_0}\int \underline{\nabla}\rho\,dt \qquad (150)$$

$$\left(-\nabla^2 + \frac{1}{c^2}\frac{\partial^2}{\partial t^2}\right)(\underline{\nabla}\,\Phi - \underline{\omega}\,\Phi) = \frac{1}{2}\,\mu_0\frac{\partial \underline{J}}{\partial t} + \frac{1}{2\varepsilon_0}\underline{\nabla}\rho \qquad (151)$$

The first thing that was immediately apparent was that we cannot have

$\varphi = 0$ nor

$\underline{\mathbf{A}} = 0$

unless we are prepared to have a relationship between current and charge that looks like

$$\underline{\nabla}\rho + \frac{1}{c^2}\frac{\partial \underline{\mathbf{J}}}{\partial t} = 0. \qquad (1)$$

which means that if there is no charge density gradient, then current ceases to flow in a time varying manner.

We also noted that equation (1) when applied to equation (151) and to the combination of (149) and (150) also indicate that

[1] The Antisymmetry Law of Cartan Geometry: Applications to Electromagnetism and Gravitation M. W. Evans, D. W. Lindstrom, and H. Eckardt; A.I.A.S / T.G.A.; Paper 134

$$\underline{\nabla}\phi - \underline{\boldsymbol{\omega}}\phi = 0$$
$$\frac{\partial \underline{\mathbf{A}}}{\partial t} + \omega_0 \underline{\mathbf{A}} = 0 \qquad (2)$$

These are the equations for the background radiation[2].

We thus had to insist that in order to guarantee a solution, that

$$\varphi \neq 0$$
$$\underline{\mathbf{A}} \neq 0$$

globally except in specific regions where the solution variable became zero.

In an earlier publication [3] an off-set was introduced into some of the solution variables appearing in the divisor of an equation, that caused a singularity when they became zero. The magnitude of the resulting induced "spin field" was directly related to the size of this offset.

Given this, the following is proposed:

1. It is proposed firstly to set ϕ and $\underline{\mathbf{A}}$ equal to the value of the background potentials whenever the fields $\underline{\mathbf{E}}$ and $\underline{\mathbf{B}}$ are simultaneously zero as previously postulated as state of the field of the vacuum[2].

2. The background value will also be used for field variables ϕ and $\underline{\mathbf{A}}$ whenever these are defined to be zero by way of fixed boundary conditions.

3. To avoid singularities in the solution, it is proposed to use background values for ϕ and $\underline{\mathbf{A}}$ whenever either of these cross zero.

4. It is also proposed, that if the background field as calculated in the earlier publication [2] is used as the value for the field variables ϕ and $\underline{\mathbf{A}}$ whenever $\underline{\mathbf{E}}$ and $\underline{\mathbf{B}}$ become zero simultaneously, then this represents the "real" amount of induced field, and in fact represents the mechanism for extraction of energy from the vacuum.

From Note 2 of this series, we have that

$$\underline{\mathbf{A}} = -\frac{1}{\omega_0}\frac{\partial \psi}{\partial t} \qquad (3)$$

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[2] Solution of the ECE Vacuum Equations
H. Eckardt and, D. W. Lindstrom; A.I.A.S / T.G.A.; Paper 134

[3] Two-Dimensional Finite Element Scheme for Conductive Material Using ECE Quasi-static Electromagnetic Theory – Part 1 Distributed Driving Potential; Douglas W. Lindstrom; A.I.A.S. / T.G.A.