(2): Scheme of Computation for Electrostatics and Magnetostatics

The antisymmetry laws for electrostatics are:

$$\underline{E} = -\underline{\nabla}\phi + \underline{\omega}\phi = -\frac{\partial \underline{A}}{\partial t} - \omega_0 \underline{A} \quad -(1)$$

$$\frac{\partial A_Z}{\partial Y} + \frac{\partial A_Y}{\partial Z} = \omega_Y A_Z + \omega_Z A_Y \quad -(2)$$

$$\frac{\partial A_X}{\partial Z} + \frac{\partial A_Z}{\partial X} = \omega_Z A_X + \omega_X A_Z \quad -(3)$$

$$\frac{\partial A_Y}{\partial X} + \frac{\partial A_X}{\partial Y} = \omega_X A_Y + \omega_Y A_X \quad -(4)$$

and they must all be obeyed. Eqs. (2) to (4) form an exactly determined set. If any equations are added, then there is no solution. Therefore the consideration of antisymmetry in electrostatics can be worked out as follows.

Electrostatics is defined by:

$$\underline{\nabla} \times \underline{E} = \underline{0}. \quad -(5)$$

By Faraday's law of induction at the ECE2 level:

$$\underline{\nabla} \times \underline{E} + \frac{\partial \underline{B}}{\partial t} = \underline{0}, \quad -(6)$$

therefore eq. (5) implies:

$$\frac{\partial \underline{B}}{\partial t} = \underline{0}. \quad -(7)$$

There may be a magnetic flux density present in electrostatics:

$$\underline{B} \neq \underline{0} \quad -(8)$$

but it must obey eq. (7).

By definition:

$$\phi(\underline{x}') = \frac{1}{4\pi\epsilon_0}\int \frac{\rho(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x' \quad -(9)$$

$$\underline{A}(\underline{x}') = \frac{1}{4\pi\epsilon_0}\int \frac{\underline{J}(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x' \quad -(10)$$

where $\rho(\underline{x}')$ is the charge density and $\underline{J}(\underline{x}')$ is the current density. These quantities can be measured experimentally for a given material or circuit, so $\phi(\underline{x}')$ and $\underline{A}(\underline{x}')$ can be determined experimentally. In general, eqs. (9) and (10) must be solved numerically.

Note carefully that no distinction can be made between the vector potential in eq. (1), and in eq. (2) to (4). In eqs. (1) to (4), the vector potential is defined by eq. (10), and the scalar potential by eq. (9).

Eq. (1) means that:

$$-\underline{\nabla}\int \frac{\rho(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x' + \underline{\omega}\int \frac{\rho(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x'$$

$$= -\omega_0 \int \frac{\underline{J}(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x' \quad -(11)$$

Therefore at the ECE2 level the existence of charge density implies the existence of current density, and vice versa. In the standard model, the same is true and

$$\underline{E} \text{ (standard model)} = -\underline{\nabla}\phi - \frac{\partial \underline{A}}{\partial t} \quad -(12)$$

where ϕ and $\underline{A}$ are defined by eqs. (9) and (10). In the standard model however, $\underline{E}$ is not associated with $\underline{A}$. On the ECE2 level:

$$\underline{E} = -\omega_0 \underline{A}, \quad -(13)$$

$$\underline{\nabla} \cdot \underline{E} = \rho / \epsilon_0 \quad -(14)$$

$$\underline{\nabla} \times \underline{E} = \underline{0} \quad -(15)$$

therefore

$$\underline{\nabla} \cdot (\omega_0 \underline{A}) = -\rho / \epsilon_0 \quad -(16)$$

$$\underline{\nabla} \times (\omega_0 \underline{A}) = \underline{0} \quad -(17)$$

in which the charge density is known experimentally. By vector algebra, eqs. (16) and (17) are:

$$\omega_0 \underline{\nabla} \times \underline{A} + \underline{A} \times \underline{\nabla}\omega_0 = \underline{0} \quad -(18)$$

$$\omega_0 \underline{\nabla} \cdot \underline{A} + \underline{\nabla}\omega_0 \cdot \underline{A} = -\rho / \epsilon_0 \quad -(19)$$

Eqs. (18) and (19) form an exactly determined set of four equations in four unknowns: ω_0, A_X, A_Y and A_Z.

They can be solved by computer algebra for any given ρ.

Having found $\underline{A}$ and ω_0 in this way, $\underline{E}$ can be found from eq. (13). From eqs. (10) and (11) ...

$$\underline{E} = -\frac{\omega_0}{4\pi\epsilon_0}\int \frac{\underline{J}(\underline{x}')}{|\underline{x}-\underline{x}'|}\, d^3x' \quad -(20)$$

Therefore if $\underline{A}$ can be found experimentally from eq. (10), ω_0 can be found by solving eqs. (18) and (19) by computer algebra. Conversely, if $\underline{A}$ and ω_0 can be found from eqs. (18) and (19), $\underline{J}(\underline{x}')$ can be found from eq. (10).

Having found A_x, A_y and A_z, the spin connection components can be found from eqs. (2) to (4), so the spin connection vector can be found:

$$\underline{\omega} = \omega_x \underline{i} + \omega_y \underline{j} + \omega_z \underline{k} \quad -(21)$$

The scalar spin connection ω_0 can be found from:

$$\underline{E} = -\underline{\nabla}\phi + \underline{\omega}\phi = -\omega_0 \underline{A} \quad -(22)$$

if ϕ, $\underline{\omega}$ and $\underline{A}$ are known.

Finally, the vacuum four-current density is calculated from:

$$J^\mu(vac) = \frac{1}{\mu_0}\left(\frac{1}{c}\underline{\nabla}\cdot(\underline{\omega}\phi),\ \underline{\nabla}\times(\underline{\omega}\times\underline{A})\right) \quad -(23)$$

having found $\underline{\omega}$, ϕ and $\underline{A}$ in any material matter.

In ECE2 electrostatics there exists a magnetic flux density:

$$\underline{B} = \underline{\nabla} \times \underline{A} - \underline{\omega} \times \underline{A} \quad -(24)$$

with the property:

$$\frac{\partial \underline{B}}{\partial t} = \underline{0} \quad -(25)$$

The total electric field strength is

$$\underline{E}\,(\text{total}) = \underline{E}\,(\text{material}) + \underline{E}\,(\text{vacuum}) \quad -(26)$$

and the total magnetic flux density is:

$$\underline{B}\,(\text{total}) = \underline{B}\,(\text{material}) + \underline{B}\,(\text{vacuum}) \quad -(27)$$

in which:

$$\underline{E}\,(\text{material}) = -\underline{\nabla}\,\phi \quad -(28)$$

$$\underline{E}\,(\text{vacuum}) = \underline{\omega}\,\phi \quad -(29)$$

$$\underline{B}\,(\text{material}) = \underline{\nabla} \times \underline{A} \quad -(30)$$

$$\underline{B}\,(\text{vacuum}) = \underline{\omega} \times \underline{A} \quad -(31)$$

If it is assumed that:

$$\frac{\partial \underline{A}}{\partial t} = \underline{0} \quad -(32)$$

then eqs. (28) and (30) are the same as in the standard model, but eqs (29) and (31) do not exist in the standard model (Maxwell Heaviside theory). In MH theory the vacuum has no structure.

ECE2 magnetostatics must obey the same antisymmetry laws (1) to (4) as ECE2 electrostatics.

) These antisymmetry laws do not exist in the standard model of physics. As shown in UFT 131 the standard model is entirely refuted by the antisymmetry laws.

Magnetostatics is defined by:

$$\underline{\nabla} \cdot \underline{B} = 0 \quad -(33)$$

$$\underline{\nabla} \times \underline{B} = \mu_0 \underline{J} \quad -(34)$$

$$\frac{\partial \underline{E}}{\partial t} = \underline{0} \quad -(35)$$

Electrostatics is defined by:

$$\underline{\nabla} \cdot \underline{E} = \rho / \epsilon_0 \quad -(36)$$

$$\underline{\nabla} \times \underline{E} = \underline{0} \quad -(37)$$

$$\frac{\partial \underline{B}}{\partial t} = \underline{0} \quad -(38)$$

Therefore in magnetostatics there exists an electric field strength $\underline{E}$ with the property (35).

Note carefully that the scalar and vector potentials (9) and (10) are the same in electrostatics and magnetostatics.