2(5): Review of the Complete Set of Equations and General Methodology for Solution

Wave and Continuity Equations

$$\Box \phi = \rho / \epsilon_0 \quad -(1)$$

$$\Box \mathbf{A} = \mu_0 \mathbf{J} \quad -(2)$$

$$\frac{\partial \rho}{\partial t} + \nabla \cdot \mathbf{J} = 0 \quad -(3)$$

) Field Equations

$$\nabla \cdot \mathbf{B} = 0 \quad -(4)$$

$$\nabla \times \mathbf{E} + \frac{\partial \mathbf{B}}{\partial t} = \mathbf{0} \quad -(5)$$

$$\nabla \cdot \mathbf{E} = \rho / \epsilon_0 \quad -(6)$$

$$\nabla \times \mathbf{B} - \frac{1}{c^2}\frac{\partial \mathbf{E}}{\partial t} = \mu_0 \mathbf{J} \quad -(7)$$

$$\frac{1}{c^2}\frac{\partial^2 \phi}{\partial t^2} = \nabla \cdot (\boldsymbol{\omega} \phi) \quad -(8)$$

3) The Conservation of Antisymmetry

Trace

$$\frac{1}{c^2}\left(\frac{\partial}{\partial t} + \omega_0\right)\phi = (\nabla - \boldsymbol{\omega}) \cdot \mathbf{A} \quad -(9)$$

Scalar

$$\mathbf{E} = -\nabla \phi + \boldsymbol{\omega} \phi = -\frac{\partial \mathbf{A}}{\partial t} - \omega_0 \mathbf{A} \quad -(10)$$

Vector

$$\mathbf{B} = \nabla \times \mathbf{A} - \boldsymbol{\omega} \times \mathbf{A} \quad -(11)$$

$$\frac{\partial A_Z}{\partial Y} + \frac{\partial A_Y}{\partial Z} = \omega_Y A_Z + \omega_Z A_Y \quad -(12)$$

$$\frac{\partial A_X}{\partial Z} + \frac{\partial A_Z}{\partial X} = \omega_Z A_X + \omega_X A_Z \quad -(13)$$

2)
$$\frac{\partial A_y}{\partial x} + \frac{\partial A_x}{\partial y} = \omega_x A_y + \omega_y A_x \quad -(14)$$

4) The Fields due to Vacuum Interaction

$$\underline{E}(vac) = \underline{\omega}\,\phi \quad -(15)$$

$$\underline{B}(vac) = -\underline{\omega} \times \underline{A} \quad (16)$$

General Method of Solution

1) The most fundamental experimental quantities are ρ and $\underline{J}$. These are made up of the material plus vacuum contributions. The vacuum contribution is always present. They are linked by the continuity equation (3)

2) In electrodynamics in general these give ϕ and $\underline{A}$ from eqs. (1) and (2). In the special case of the Coulomb law:

$$\phi = \frac{1}{4\pi\epsilon_0} \int \frac{\rho(\underline{x}')}{|\underline{x} - \underline{x}'|} d^3x' \quad -(17)$$

For a current loop:

$$\underline{A} = \frac{\mu_0}{4\pi} \int \frac{\underline{J}(\underline{x}')}{|\underline{x} - \underline{x}'|} d^3x' \quad -(18)$$

3) Use vector antisymmetry, eqs. (12) to (14), to find $\underline{\omega}$, the vector spin connection.

4) Find $\underline{E}$ from eq. (16), given ϕ and $\underline{\omega}$.

5) The material $\underline{E}$ is $\underline{E} = -\underline{\nabla}\phi$, the vacuum $\underline{E}$ is $\underline{E} = \underline{\omega}\,\phi$.

3)

6) Find $\underline{B}$ from eq. (11). The material $\underline{B}$ is:
$\underline{B} = \underline{\nabla} \times \underline{A}$, the vacuum $\underline{B}$ is $\underline{B}(\text{vac}) = -\underline{\omega} \times \underline{A}$.

7) Find ω_0 from trace antisymmetry eq. (9), given ϕ, $\underline{\omega}$ and $\underline{A}$.

8) Find $\partial \underline{A} / \partial t$ from scalar antisymmetry, eq. (10).

9) Find $\partial^2 \phi / \partial t^2$ from eq. (8).

10) Solve the homogeneous field equations (4) and (5) using

$$\underline{\nabla} \times \underline{A}_1 := -\underline{\omega} \times \underline{A} \quad - (19)$$

$$\underline{A}(\text{total}) = \underline{A} + \underline{A}_1 \quad - (20)$$

$$\underline{B} = \underline{\nabla} \times \underline{A}(\text{total}) \quad - (21)$$

$$\underline{E} := -\underline{\nabla} \phi + \underline{\omega} \phi = -\underline{\nabla} \phi - \frac{\partial \underline{A}}{\partial t}(\text{total}) \quad - (22)$$

i.e.

$$\frac{\partial \underline{A}(\text{total})}{\partial t} = -\underline{\omega} \phi \quad - (23)$$

The standard Maxwell Heaviside theory defines:

$$\underline{E} = -\underline{\nabla} \phi - \partial \underline{A} / \partial t \quad - (24)$$

$$\underline{B} = \underline{\nabla} \times \underline{A} \quad - (25)$$

with

$$\omega^\mu = \left(\frac{\omega_0}{c}, \underline{\omega} \right) = 0 \quad - (26)$$

So there is no interaction with the vacuum. In consequence the conservation of antisymmetry reduces to:

4)

$$\frac{1}{c^2}\frac{\partial \phi}{\partial t} = \underline{\nabla} \cdot \underline{A} \quad -(27)$$

$$\underline{E} = -\underline{\nabla}\phi = -\frac{\partial A}{\partial t} \quad -(28)$$

and

$$\frac{\partial A_Z}{\partial Y} + \frac{\partial A_Y}{\partial Z} = 0 \quad -(29)$$

$$\frac{\partial A_X}{\partial Z} + \frac{\partial A_Z}{\partial X} = 0 \quad -(30)$$

$$\frac{\partial A_Y}{\partial X} + \frac{\partial A_X}{\partial Y} = 0 \quad -(31)$$

In general in the standard model, eqs. (27) to (31) are not true, so the MH theory violates antisymmetry. This was first shown in UFT 131 ff. In a plane wave for example:

$$\underline{\nabla} \cdot \underline{A} = 0 \quad -(32)$$

but

$$\frac{\partial \phi}{\partial t} \neq 0. \quad -(33)$$

In a plane wave:

$$\frac{\partial A_X}{\partial Z} \neq 0, \text{ but } \frac{\partial A_Z}{\partial X} = 0 \quad -(34)$$

and so on.

In the conventional Coulomb law:

$$\underline{E} = -\underline{\nabla}\phi \quad -(35)$$

and in general this is not equal to $-\partial \underline{A} / \partial t$.