356(7): Calculation of Aether Velocity Field for the Vector Potential of a Material.

The general equation is:

$$\underline{W}(\text{material}) = \left(\frac{\rho_m}{\rho}\right)(\text{material})\ \underline{v}\ (\text{vacuum}) \quad -(1)$$

Here $\underline{W}$ is the ECE2 vector potential of the material. Therefore the vacuum, spacetime or aether velocity field is given by:

$$\boxed{\underline{v}(\text{vacuum}) = \left(\frac{\rho}{\rho_m}\right)(\text{material})\ \underline{W}(\text{material})} \quad -(2)$$

The Kambe magnetic field or vortex is then:

$$\underline{B}\ (\text{vacuum}) = \underline{\nabla} \times \underline{v}(\text{vacuum}) \quad -(3)$$

and the Kambe electric field is:

$$\underline{E}\ (\text{vacuum}) = \left(\left(\underline{v}\cdot\underline{\nabla}\right)\underline{v}\right)(\text{vacuum}) \quad -(4)$$

The vacuum $\underline{B}$ and $\underline{E}$ fields induce material $\underline{B}$ and $\underline{E}$ fields as follows:

$$\underline{B}\ (\text{material}) = \frac{\rho_m}{\rho}\ (\text{material})\ \underline{B}\ (\text{vacuum}) \quad -(5)$$

$$\underline{E}\ (\text{material}) = \frac{\rho_m}{\rho}\ (\text{material})\ \underline{E}\ (\text{vacuum}) \quad -(6)$$

Examples of potentials are as follows, the above general equations apply to each type of potential, each considered to be a material potential.

) Simple Potential

$$\underline{W} = \frac{B^{(0)}}{2} \left(-Y \underline{i} + X \underline{j} \right) \quad -(7)$$

Plane Wave Potential

$$\underline{W} = \frac{W^{(0)}}{\sqrt{2}} \left(\underline{i} - i \underline{j} \right) e^{i(\omega t - \underline{\kappa} \cdot \underline{r})} \quad -(8)$$

Magnetostatics

$$\left(\underline{\nabla} \times \underline{B} = \mu_0 \underline{J} \right) (\text{material}) \quad -(9)$$

$$\left(\underline{\nabla} \cdot \underline{B} = 0 \right) (\text{material}) \quad -(10)$$

So:

$$\underline{W}(\text{material}) = \left(\frac{\mu_0}{4\pi} \int \frac{\underline{J}(\underline{r}')}{|\underline{r} - \underline{r}'|} d^3 r' \right) (\text{material}) \quad -(11)$$

a) Current loop (Jackson eq. (5.36))

$$W_\phi(r, \theta) = \frac{\mu_0 I a}{4\pi} \int_0^{2\pi} \frac{\cos\phi' \, d\phi'}{(a^2 + r^2 - 2ar\sin\theta\cos\phi')^{1/2}} \quad -(12)$$

in the material.

) An approximation to eq. (12) is: $-(13)$

$$W_\phi(r, \theta) \sim \frac{\mu_0 I a^2 r \sin\theta}{4(a^2 + r^2)^{3/2}} \left(1 + \frac{15 a^2 r^2 \sin^2\theta}{8(a^2 + r^2)^2} + \cdots \right)$$

in the material

) Centre Fed Linear Antenna (Jackson Eq. (9.55))

$$\underline{W} = \frac{\mu_0}{4\pi} 2I \frac{e^{ikr}}{kr} \left(\frac{\cos\left(\frac{kd}{2}\cos\theta\right) - \cos\left(\frac{kd}{2}\right)}{\sin^2\theta} \right) \underline{k} \quad -(14)$$

Nuclear Dipole Potential

$$\underline{W} = \frac{\mu_0}{4\pi r^3} \underline{m}_N \times \underline{r} \quad -(15)$$

where $\underline{m}_N$ is the nuclear dipole moment.

From each of these material potentials the velocity field of the spacetime can be computed from eq. (2), the spacetime vortex or magnetic field from eq. (3), the spacetime electric field from eq. (4) and the induced material electric and magnetic fields from eqs. (5) and (6). These are electric and magnetic fields due to spacetime.