356(9): Solutions of the Antisymmetry Equations

The vector antisymmetry equations are:

$$\frac{\partial A_Z}{\partial Y} + \frac{\partial A_Y}{\partial Z} = \omega_Y A_Z + \omega_Z A_Y \quad -(1)$$

$$\frac{\partial A_X}{\partial Z} + \frac{\partial A_Z}{\partial X} = \omega_Z A_X + \omega_X A_Z \quad -(2)$$

$$\frac{\partial A_Y}{\partial X} + \frac{\partial A_X}{\partial Y} = \omega_X A_Y + \omega_Y A_X \quad -(3)$$

(co author Horst Eckardt) These have

By computer algebra the unique solutions:

$$\omega_X = -\frac{1}{2A_Y A_Z}\left[A_X\left(\frac{\partial A_Z}{\partial Y}+\frac{\partial A_Y}{\partial Z}\right) - A_Y\left(\frac{\partial A_Z}{\partial X}+\frac{\partial A_X}{\partial Z}\right) - A_Z\left(\frac{\partial A_Y}{\partial X}+\frac{\partial A_X}{\partial Y}\right)\right] \quad -(4)$$

$$\omega_Y = \frac{1}{2A_X A_Y}\left[A_X\left(\frac{\partial A_Z}{\partial Y}+\frac{\partial A_X}{\partial Z}\right) - A_Y\left(\frac{\partial A_Z}{\partial X}+\frac{\partial A_X}{\partial Z}\right) + A_Z\left(\frac{\partial A_Y}{\partial X}+\frac{\partial A_X}{\partial Y}\right)\right] \quad -(5)$$

$$\omega_Z = \frac{1}{2A_X A_Y}\left[A_X\left(\frac{\partial A_Z}{\partial Y}+\frac{\partial A_X}{\partial Z}\right) + A_Y\left(\frac{\partial A_Z}{\partial X}+\frac{\partial A_X}{\partial Z}\right) - A_Z\left(\frac{\partial A_Y}{\partial X}+\frac{\partial A_X}{\partial Y}\right)\right] \quad -(6)$$

The system is exactly determined. If any more equations are added the system becomes overdetermined and has an infinite number of solutions, i.e. no solution. Eqs. (1) to (6) can be expressed in any coordinate system. Therefore in any problem of electrodynamics, the spin connections are always defined by eqs. (4) to (6). This is named "conservation of antisymmetry". The standard model of physics does not conserve antisymmetry.

2) The ECE2 equations of magnetostatics are:

$$\underline{\nabla} \cdot \underline{B} = 0 \quad - (7)$$

$$\underline{\nabla} \times \underline{B} = \mu_0 \underline{J} \quad - (8)$$

and

$$\underline{B} = \underline{\nabla} \times \underline{A} - \underline{\omega} \times \underline{A}. \quad - (9)$$

From eq. (8):

$$\underline{A} = \frac{\mu_0}{4\pi} \int \frac{\underline{J}(\underline{x}')}{|\underline{x} - \underline{x}'|} d^3x' \quad - (10)$$

Therefore $\underline{A}$ can be found from any current density $\underline{J}(\underline{x}')$ using eq. (10). Examples are a circular current loop and a magnetized sphere. However, using the computer, $\underline{A}$ can be found numerically for any $\underline{J}$. Having found $\underline{A}$, the spin connection $\underline{\omega}$ can be found from eqs. (4) to (6).

However, $\underline{B}$ is constrained by eq. (1), so

$$\underline{\nabla} \cdot (\underline{\omega} \times \underline{A}) = 0 \quad - (11)$$

because:

$$\underline{\nabla} \cdot (\underline{\nabla} \times \underline{A}) = 0 \quad - (12)$$

It follows from eq. (11) that:

$$\underline{\nabla} \times \underline{\alpha} = \underline{\omega} \times \underline{A} \quad - (13)$$

where $\underline{\alpha}$ is the vacuum vector potential. It can also be named the aether vector potential, or spacetime vector potential. This concept does not exist in the standard model.

3) It follows that:

$$\underline{\nabla} \cdot \underline{B} = \underline{\nabla} \cdot \left(\underline{\nabla} \times \underline{A} - \underline{\nabla} \times \underline{\alpha} \right) = 0, \quad -(14)$$

so Eq. (1) is obeyed.

The vacuum current density $\underline{J}_{vac}$ is defined by:

$$\underline{\alpha} = \frac{\mu_0}{4\pi} \int \frac{\underline{J}_{vac}(\underline{x}')}{|\underline{x} - \underline{x}'|} d^3x \quad -(15)$$

and

$$\underline{\nabla} \times \underline{B}_{vac} = \mu_0 \underline{J}_{vac} \quad -(16)$$

where $\underline{B}_{vac}$ is the vacuum or aether magnetic flux density. It follows that:

$$\boxed{\begin{aligned} \underline{J}_{vac} &= \frac{1}{\mu_0} \underline{\nabla} \times \left(\underline{\nabla} \times \underline{\alpha} \right) \\ &= \frac{1}{\mu_0} \underline{\nabla} \times \left(\underline{\omega} \times \underline{A} \right) \end{aligned}} \quad -(17)$$

The quantity $\underline{\omega} \times \underline{A}$ can be calculated from eqs. (1) to (11) and (10), in which $\underline{A}$ is calculated from the material current density $\underline{J}$.

This is a completely self consistent and rigorous procedure which obeys the conservation of antisymmetry. It shows that conservation of antisymmetry implies the existence of a vacuum current density $\underline{J}(vac)$