1(2): Particular Solutions of the Antisymmetry Laws

· For electromagnetism, the antisymmetry laws are:

$$(\partial_1 + \omega_1) A_2 = -(\partial_2 + \omega_2) A_1 \quad - (1)$$
$$(\partial_1 + \omega_1) A_3 = -(\partial_3 + \omega_3) A_1 \quad - (2)$$
$$(\partial_2 + \omega_2) A_3 = -(\partial_3 + \omega_3) A_2 \quad - (3)$$

which translate into:

$$\left(\frac{\partial}{\partial Y} - \omega_Y\right) A_Z = -\left(\frac{\partial}{\partial Z} - \omega_Z\right) A_Y \quad - (4)$$
$$\left(\frac{\partial}{\partial Z} - \omega_Z\right) A_X = -\left(\frac{\partial}{\partial X} - \omega_X\right) A_Z \quad - (5)$$
$$\left(\frac{\partial}{\partial X} - \omega_X\right) A_Y = -\left(\frac{\partial}{\partial Y} - \omega_Y\right) A_X \quad - (6)$$

1) The following is a particular solution of eqs. (4) to (6):

$$\frac{\partial A_Z}{\partial Y} = -\frac{\partial A_Y}{\partial Z} \quad - (7)$$
$$\frac{\partial A_X}{\partial Z} = -\frac{\partial A_Z}{\partial X} \quad - (8)$$
$$\frac{\partial A_Y}{\partial X} = -\frac{\partial A_X}{\partial Y} \quad - (9)$$

from which A_X, A_Y and A_Z may be found. Eqs. (7) to (9) imply:

$$-\omega_Y A_Z = \omega_Z A_Y \quad - (10)$$
$$-\omega_Z A_X = \omega_X A_Z \quad - (11)$$
$$-\omega_X A_Y = \omega_Y A_X \quad - (12)$$

from which ω_X, ω_Y and ω_X may be found.

2) The following is another particular solution:

2)
$$\frac{\partial A_z}{\partial y} = \omega_z A_y \quad - (13)$$
$$\frac{\partial A_x}{\partial z} = \omega_x A_z \quad - (14)$$
$$\frac{\partial A_y}{\partial x} = \omega_y A_x \quad - (15)$$
which imply:
$$\frac{\partial A_y}{\partial z} = \omega_y A_z \quad - (16)$$
$$\frac{\partial A_z}{\partial x} = \omega_z A_x \quad - (17)$$
$$\frac{\partial A_x}{\partial y} = \omega_x A_y \quad - (18)$$

Eqs. (13) to (18) are six equations in six unknowns.
These equations can be used with others available equations