Pseudo Scalar $I = \boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z}$

Magnetic Field Bi-Vector $B = \boldsymbol{B}\boldsymbol{\gamma_t} = -B^{x}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} - B^{y}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_y} - B^{z}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_z}$

Electric Field Bi-Vector $E = \boldsymbol{E}\boldsymbol{\gamma_t} = -E^{x}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} - E^{y}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_y} - E^{z}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_z}$

Electromagnetic Field Bi-Vector $F = E + IB = -E^{x}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} - E^{y}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_y} - E^{z}\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_z} - B^{z}\boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} + B^{y}\boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_z} - B^{x}\boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z}$

Four Current Density $J = J^{t}\boldsymbol{\gamma_t} + J^{x}\boldsymbol{\gamma_x} + J^{y}\boldsymbol{\gamma_y} + J^{z}\boldsymbol{\gamma_z}$

Geom Derivative of Electomagnetic Field Bi-Vector

$$
\begin{aligned}
\boldsymbol{\nabla} F = {} & \left(\partial_{x}E^{x} + \partial_{y}E^{y} + \partial_{z}E^{z}\right)\boldsymbol{\gamma_t} \\
& + \left(-\partial_{z}B^{y} + \partial_{y}B^{z} - \partial_{t}E^{x}\right)\boldsymbol{\gamma_x} \\
& + \left(\partial_{z}B^{x} - \partial_{x}B^{z} - \partial_{t}E^{y}\right)\boldsymbol{\gamma_y} \\
& + \left(-\partial_{y}B^{x} + \partial_{x}B^{y} - \partial_{t}E^{z}\right)\boldsymbol{\gamma_z} \\
& + \left(-\partial_{t}B^{z} + \partial_{y}E^{x} - \partial_{x}E^{y}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} \\
& + \left(\partial_{t}B^{y} + \partial_{z}E^{x} - \partial_{x}E^{z}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_z} \\
& + \left(-\partial_{t}B^{x} + \partial_{z}E^{y} - \partial_{y}E^{z}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z} \\
& + \left(\partial_{x}B^{x} + \partial_{y}B^{y} + \partial_{z}B^{z}\right)\boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z}
\end{aligned}
$$

Maxwell Equations

$$\boldsymbol{\nabla} F = J$$

Div E and Curl H Equations

$$
\begin{aligned}
\left\langle \nabla F\right\rangle_{1} - J = 0 = {} & \left(-J^{t} + \partial_{x}E^{x} + \partial_{y}E^{y} + \partial_{z}E^{z}\right)\boldsymbol{\gamma_t} \\
& + \left(-J^{x} - \partial_{z}B^{y} + \partial_{y}B^{z} - \partial_{t}E^{x}\right)\boldsymbol{\gamma_x} \\
& + \left(-J^{y} + \partial_{z}B^{x} - \partial_{x}B^{z} - \partial_{t}E^{y}\right)\boldsymbol{\gamma_y} \\
& + \left(-J^{z} - \partial_{y}B^{x} + \partial_{x}B^{y} - \partial_{t}E^{z}\right)\boldsymbol{\gamma_z}
\end{aligned}
$$

Curl E and Div B equations

$$
\begin{aligned}
\left\langle \nabla F\right\rangle_{3} = 0 = {} & \left(-\partial_{t}B^{z} + \partial_{y}E^{x} - \partial_{x}E^{y}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} \\
& + \left(\partial_{t}B^{y} + \partial_{z}E^{x} - \partial_{x}E^{z}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_z} \\
& + \left(-\partial_{t}B^{x} + \partial_{z}E^{y} - \partial_{y}E^{z}\right)\boldsymbol{\gamma_t} \wedge \boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z} \\
& + \left(\partial_{x}B^{x} + \partial_{y}B^{y} + \partial_{z}B^{z}\right)\boldsymbol{\gamma_x} \wedge \boldsymbol{\gamma_y} \wedge \boldsymbol{\gamma_z}
\end{aligned}
$$