

Non-Linear ECE Electromagnetism

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Need for Non-Linearity

$$E^a = -\underline{\nabla}\phi^a - \frac{\partial A^a}{\partial t} - \omega_{0b}^a A^b + \omega_b^a \phi^b$$

$$B^a = \underline{\nabla} \times A^a - \omega_b^a \times A^b$$

$$\underline{\nabla} \cdot B^a = 0$$

$$\underline{\nabla} \times E^a + \frac{\partial B^a}{\partial t} = 0$$