Natural unit:

$$\text{GeV} \cdot \text{cm} = 0.506768 \times 10^{14}$$
$$\text{GeV} \cdot \text{sec} = 1.519255 \times 10^{24}$$
$$\text{Tesla} = 196 \text{ eV}^2$$
$$\text{K} = 0.861735 \times 10^{-4} \text{ eV}$$
$$Q_{\text{electron}} = 1.6 \times 10^{-19} \text{ C}$$
$$\alpha_{\text{em}} = \frac{Q^2_{\text{electron}}}{4\pi\epsilon_0} = \frac{q_e^2}{4\pi} = \frac{1}{137.04}$$

$\phi, \vec{A}$ 를 구했으므로, $\vec{E}$ 와 $\vec{B}$ 를 구하는 것은

$$\vec{E} = -\vec{\nabla}\phi - \frac{\partial \vec{A}}{\partial t}$$
$$\vec{B} = \vec{\nabla} \times \vec{A}$$

로 부터. 좀 복잡하다. 공식에 r' 이 나타나므로.

Maxwell's equations:

$$\nabla \cdot \mathbf{E} = \frac{\rho}{\epsilon_0} \qquad \nabla \cdot \mathbf{B} = 0$$

$$\nabla \times \mathbf{E} = -\frac{\partial \mathbf{B}}{\partial t} \qquad c^2 \nabla \times \mathbf{B} = \frac{\mathbf{j}}{\epsilon_0} + \frac{\partial \mathbf{E}}{\partial t}$$

답은

Their solutions:

$$\mathbf{B} = \nabla \times \mathbf{A}$$

$$\mathbf{E} = -\nabla\phi - \frac{\partial \mathbf{A}}{\partial t}$$

$$\phi(1, t) = \frac{1}{4\pi\epsilon_0} \int \frac{\rho(2, t - r_{12}/c)}{r_{12}} dV_2$$

$$\mathbf{A}(1, t) = \frac{1}{4\pi\epsilon_0 c^2} \int \frac{\mathbf{j}(2, t - r_{12}/c)}{r_{12}} dV_2$$

$$\mathbf{E}(\mathbf{r}, t) = \frac{q}{4\pi\epsilon_0} \left[\frac{\mathbf{e}_{r'}}{r'^2} + \frac{r'}{c} \frac{d}{dt} \left(\frac{\mathbf{e}_{r'}}{r'^2} \right) + \frac{1}{c^2} \frac{d^2}{dt^2} \mathbf{e}_{r'} \right]$$

$$\vec{B} = \frac{1}{c} \hat{e}_{r'} \times \vec{E}$$

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