Formule za elektrodinamiku [1]

$$\rho(\mathbf{r}) = \sum_\alpha q_a \delta^{(3)}(\mathbf{r} - \mathbf{r}_\alpha) \tag{1}$$

$$\boldsymbol{\nabla} \cdot \vec{j} + \frac{\partial \rho}{\partial t} = 0 \tag{2}$$

$$\begin{aligned} \mathbf{F} &= q(\mathbf{E} + \mathbf{v} \times \mathbf{B}) \\ \mathbf{F} &= \int \rho \, \mathrm{d}^3 r \, (\mathbf{E} + \mathbf{v} \times \mathbf{B}) \\ &= \int (\rho \mathbf{E} + \mathbf{j} \times \mathbf{B}) \, \mathrm{d}^3 r \end{aligned} \tag{3}$$

$$\mathbf{p} = \int_V \rho(\mathbf{r}) \mathbf{r} \mathrm{d}V \tag{4}$$

$$\phi = \frac{1}{4\pi\epsilon_0} \int_V \frac{\rho(\mathbf{r}\prime)}{|\mathbf{r} - \mathbf{r}\prime|} \mathrm{d}V\prime \tag{5}$$

$$\phi = \frac{1}{4\pi\epsilon_0} \left[\frac{Q}{r} + \frac{\mathbf{r} \cdot \mathbf{p}}{r^3} + \frac{x_i D_{ij} x_j}{2r^5} \right] \tag{6}$$

$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0} \int \frac{\rho(\mathbf{r}\prime) \, \mathrm{d}^3 r\prime}{|\mathbf{r} - \mathbf{r}\prime|} (\mathbf{r} - \mathbf{r}\prime) \tag{7}$$

$$\begin{aligned} D_{ij} &= \int \rho(\mathbf{r})(3x_i x_j - \delta_{ij} r^2) \mathrm{d}V \\ D_{ij} &= \sum_\alpha q_\alpha (3x_i^{(\alpha)} x_j^{(\alpha)} - \delta_{ij}(r^{(\alpha)})^2); \quad \mathrm{Tr}\, \hat{D} = 0 \end{aligned} \tag{8}$$

$$\mathbf{E} = -\boldsymbol{\nabla}\phi \tag{9}$$

$$\mathbf{j} = \rho \mathbf{v} \tag{10}$$

$$\mathbf{A}(\mathbf{r}) = \frac{\mu_0}{4\pi} \int \frac{\mathbf{j}(\mathbf{r}\prime)}{|\mathbf{r} - \mathbf{r}\prime|} \mathrm{d}V\prime \tag{11}$$

$$\mathbf{A}(\mathbf{r}) = \frac{\mu_0}{4\pi} \frac{\mathbf{m} \times \mathbf{r}}{r^3} \tag{12}$$

$$\mathbf{m}(\mathbf{r}) = \frac{1}{2} \int \mathbf{r} \times \mathbf{j}(\mathbf{r}) \mathrm{d}V \tag{13}$$

$$\mathbf{B}(\mathbf{r}) = \boldsymbol{\nabla} \times \mathbf{A} = \frac{\mu_0}{4\pi} \int \frac{\mathbf{j}(\mathbf{r}\prime) \times (\mathbf{r} - \mathbf{r}\prime)}{|\mathbf{r} - \mathbf{r}\prime|^3} \mathrm{d}V\prime \tag{14}$$

$$\mathbf{E} = \frac{\partial \mathbf{A}}{\partial t} - \boldsymbol{\nabla}\phi \tag{15}$$

$$\begin{aligned} \boldsymbol{\nabla} \cdot \mathbf{A} + \frac{1}{c^2} \frac{\partial \phi}{\partial t} &= 0 \\ \nabla^2 \phi - \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2} &= -\frac{\rho}{\epsilon_0} \\ \nabla^2 \mathbf{A} - \frac{1}{c^2} \frac{\partial^2 \mathbf{A}}{\partial t^2} &= -\mu_0 \mathbf{j} \end{aligned} \tag{16}$$

$$\langle \rho \rangle = \frac{1}{T} \int_0^T \rho dt \tag{17}$$

$$\nabla^2 \phi - \frac{1}{c^2} \frac{\partial^2 \phi}{\partial t^2} = -\frac{1}{\epsilon_0} \rho \tag{18}$$

$$\nabla^2 \mathbf{A} - \frac{1}{c^2} \frac{\partial^2 \mathbf{A}}{\partial t^2} = -\mu_0 \mathbf{j} \tag{19}$$

$$\begin{aligned} D_{2n} - D_{1n} &= \sigma \\ B_{2n} - B_{1n} &= 0 \\ P_{2n} - P_{1n} &= -\sigma_{vez} \\ E_{2n} - E_{1n} &= \frac{1}{\epsilon_0} \sigma \\ E_{2t} - E_{1t} &= 0 \\ \mathbf{n} \times (\mathbf{H}_2 - \mathbf{H}_1) &= \mathbf{i} \\ M_{2t} - M_{1t} &= \mathbf{i}_{vez} \times \mathbf{n} \end{aligned} \tag{20}$$

$$\begin{aligned} \boldsymbol{\nabla} \cdot \vec{E} &= \frac{\rho}{\epsilon_0} \\ \boldsymbol{\nabla} \cdot \vec{B} &= 0 \\ \boldsymbol{\nabla} \times \mathbf{E} &= -\frac{\partial \mathbf{B}}{\partial t} \\ \boldsymbol{\nabla} \times \mathbf{B} &= \mu_0 \left(\mathbf{j} + \epsilon_0 \frac{\partial \mathbf{E}}{\partial t} \right) \end{aligned} \tag{21}$$

$$\begin{aligned} \boldsymbol{\nabla} \cdot \vec{D} &= \rho + \rho_{ext} \\ \boldsymbol{\nabla} \cdot \vec{B} &= 0 \\ \boldsymbol{\nabla} \times \mathbf{E} &= -\frac{\partial B}{\partial t} \\ \boldsymbol{\nabla} \times \mathbf{H} &= \mathbf{j} + \mathbf{j}_{ext} + \frac{\partial D}{\partial t} \end{aligned} \tag{22}$$

$$q = UC = U\epsilon_0 \frac{S}{d} \tag{23}$$

$$\begin{aligned} &\frac{d}{dt} \left(\sum_n \varepsilon_n + \underbrace{\int_V \mathrm{d}^3 r \left(\frac{1}{2} \mathbf{D} \cdot \mathbf{E} + \frac{1}{2} \mathbf{H} \cdot \mathbf{B} \right)}_{W_{em}} \right) \\ &= -\oint_{\partial S} \mathbf{S}_p d\mathbf{S} \\ &\frac{\mathrm{d}}{\mathrm{d}t} \left(\sum_n \varepsilon_n \right) = \int \mathrm{d}^3 r \, \mathbf{j} \cdot \mathbf{E} \end{aligned} \tag{24}$$

$$\begin{aligned} \mathbf{S}_p &= \mathbf{E} \times \mathbf{H} \\ \mathbf{g} &= \frac{\mathbf{S}_p}{c^2} \quad \text{- gustina impulsa} \end{aligned} \tag{25}$$

$$\mathbf{L} = \int \mathbf{r} \times \mathbf{g} \mathrm{d}V \tag{26}$$

$$\begin{aligned} &\frac{d}{dt} \left[\sum_\alpha \mathbf{p}_\alpha + \int \mathrm{d}^3 r \, (\mathbf{D} \times \mathbf{B}) \right] \\ -\frac{1}{2} &\int \mathrm{d}^3 r \, (\epsilon_0 \mathbf{E}^2 \boldsymbol{\nabla} \epsilon_r + \mu_0 \mathbf{H}^2 \boldsymbol{\nabla} \mu_r) = \oint_S \hat{T} d\mathbf{S} \\ &\hat{T} = |\mathbf{E}\rangle\langle\mathbf{D}| + |\mathbf{B}\rangle\langle\mathbf{H}| - \frac{1}{2}(\mathbf{E} \cdot \mathbf{D} + \mathbf{H} \cdot \mathbf{B}) I \end{aligned} \tag{27}$$