1 Električno polje

$$\vec{F}_{12} = \frac{1}{4\pi\epsilon_0}\,\frac{q_1 q_2}{r^2}\,\hat{r};\quad \vec{F} = \frac{1}{4\pi\epsilon_0}\,\sum_i \frac{q_i q}{r_i^2}\,\hat{r}_i$$

$$\vec{F} = q\vec{E}$$

$$\vec{E} = \frac{1}{4\pi\epsilon_0}\,\frac{q}{r^2}\,\hat{r};\quad \vec{E} = \frac{1}{4\pi\epsilon_0}\,\sum_i \frac{q_i}{r_i^2}\,\hat{r}_i \to \frac{1}{4\pi\epsilon_0}\,\int \frac{\mathrm{d}Q}{r^2}\,\hat{r}$$

$$\mathrm{d}Q = \rho\,\mathrm{d}V = \rho_A\,\mathrm{d}A = \rho_l\,\mathrm{d}l$$

$$E = \frac{1}{4\pi\epsilon_0}\,\frac{Qr}{R^3}\ (r<R);\ E = \frac{1}{4\pi\epsilon_0}\,\frac{Q}{r^2}\ (r>R)\ \text{(izol. krogla)}$$

$$E = \frac{1}{4\pi\epsilon_0}\,\frac{x\,Q}{(x^2+R^2)^{\frac{3}{2}}}\ \text{(prstan)};\quad E = \frac{1}{4\pi\epsilon_0}\,\frac{2\rho_l}{r}\ \text{(nesk. vodnik)};\quad E = \frac{\rho_A}{2\epsilon_0}\ \text{(plošča)}$$

$$\Psi = \epsilon_0 \oint \vec{E}\cdot\mathrm{d}\vec{A} = Q_{\text{znotraj}}$$

2 Električni potencial in napetost

$$\Delta E_{\mathrm{p}} = \int \vec{F}\cdot\mathrm{d}\vec{s};\quad U = \Delta V = \int \vec{E}\cdot\mathrm{d}\vec{s}$$

$$E_{\mathrm{p}} = q\,V;\quad \Delta E_{\mathrm{p}} = q\,\Delta V$$

$$V = \frac{1}{4\pi\epsilon_0}\,\frac{q}{r};\quad V = \frac{1}{4\pi\epsilon_0}\,\sum_i \frac{q_i}{r_i} \to \frac{1}{4\pi\epsilon_0}\,\int \frac{\mathrm{d}Q}{r}$$

$$V = \frac{1}{4\pi\epsilon_0}\,\frac{Q}{2R}\left(3-\frac{r^2}{R^2}\right)\ (r<R);\ V = \frac{1}{4\pi\epsilon_0}\,\frac{Q}{r}\ (r>R)\ \text{(izol. krogla)}$$

$$V = \frac{1}{4\pi\epsilon_0}\,\frac{Q}{(x^2+R^2)^{\frac{1}{2}}}\ \text{(prstan)};\quad U = \Delta V = \vec{E}\cdot\vec{s} = E\,d\ \text{(homog. polje)}$$

$$Q = C\,U\quad C = \sum_i C_i\ \text{(vzp. vezava)};\quad \frac{1}{C} = \sum_i \frac{1}{C_i}\ \text{(zap. vezava)}$$

$$C = \frac{\epsilon_0 A}{d}\ \text{(plošč. kond.)};\quad \frac{C}{l} = \frac{2\pi\epsilon_0}{\ln\left(\frac{b}{a}\right)}\ \text{(koaks. kobel)}$$

$$E_{\mathrm{p}} = \frac{1}{2}\,C\,U^2;\quad w_E = \frac{1}{2}\,\epsilon_0\,E^2$$

3 Električni tok

$$\left[I = \rho v_{\mathrm{d}} A;\quad I = \vec{J}\cdot\vec{A};\quad \vec{J} = \sigma\vec{E};\quad \sigma = \frac{\rho q t'}{m_{\mathrm{e}}}\right]$$

$$U = R\,I;\quad R = \sum_i R_i\ \text{(zap. vezava)};\quad \frac{1}{R} = \sum_i \frac{1}{R_i}\ \text{(vzp. vezava)}$$

$$I = \frac{\mathrm{d}Q}{\mathrm{d}t} = \frac{\Delta Q}{\Delta t};\quad R = \frac{\rho l}{A} = \frac{l}{\sigma A};\quad P = U\,I$$

$$\sum I_{\text{not}} = \sum I_{\text{ven}};\quad \sum_{\text{zanka}} U = 0$$

4 Magnetno polje

$$\vec{F} = q\,\vec{v} \times \vec{B}; \quad \vec{F} = I\,\vec{l} \times \vec{B}; \quad \frac{F}{l} = \frac{\mu_0 I_1 I_2}{2\pi r}$$

$$r = \frac{mv}{qB}; \quad \omega = \frac{qB}{m}$$

$$\vec{B} = \frac{\mu_0 I}{4\pi} \int \frac{\mathrm{d}\vec{s} \times \hat{r}}{r^2}$$

$$B = \frac{\mu_0 I r}{2\pi R^2}\ (r < R);\ B = \frac{\mu_0 I}{2\pi r}\ (r > R)\ \text{(nesk. vodnik)}$$

$$B = \frac{\mu_0 I R^2}{2(x^2 + R^2)^{\frac{3}{2}}}\ \text{(prstan)}; \quad B = \frac{\mu_0 N I}{l}\ \text{(tuljava)}; \quad \left[B = \frac{\mu_0 J_\mathrm{S}}{2}\ \text{(plošča)}\right]$$

$$\Phi = \oint \vec{B} \cdot \mathrm{d}\vec{A} = 0$$

$$\oint \vec{B} \cdot \mathrm{d}\vec{s} = \mu_0 I_\mathrm{skozi} + \mu_0 \frac{\mathrm{d}\Psi}{\mathrm{d}t}$$

5 Indukcija

$$U_\mathrm{S} = \oint \vec{E} \cdot \mathrm{d}\vec{s} = -\frac{\mathrm{d}\Phi}{\mathrm{d}t}$$

$$U_\mathrm{S} = -Blv$$

$$U_\mathrm{S} = -L\frac{\mathrm{d}I}{\mathrm{d}t}; \quad L = \frac{N\Phi}{I}; \quad U_\mathrm{S1} = -L_{12}\frac{\mathrm{d}I_2}{\mathrm{d}t}; \quad L_{12} = \frac{N_2 \Phi_B}{I_1}$$

$$L = \mu_0 n^2 V\ \text{(tuljava)}; \quad \frac{L}{l} = \frac{\mu_0}{2\pi} \ln\left(\tfrac{b}{a}\right)\ \text{(koaks. kabel)}$$

$$E_\mathrm{p} = \frac{1}{2} L I^2; \quad w_B = \frac{B^2}{2\mu_0}$$

$$\frac{U_2}{U_1} = \frac{N_2}{N_1}\ \text{(transformator)}$$

6 Elektromagnetno valovanje

$$\left[\frac{\mathrm{d}E}{\mathrm{d}x} = -\frac{\mathrm{d}B}{\mathrm{d}t}; \quad \frac{\mathrm{d}B}{\mathrm{d}x} = -\mu_0 \epsilon_0 \frac{\mathrm{d}E}{\mathrm{d}t}\right]$$

$$E = E_0 \cos(kx - \omega t); \quad B = B_0 \cos(kx - \omega t)$$

$$\frac{1}{\mu_0 \epsilon_0} = c^2; \quad \frac{E}{B} = \frac{E_0}{B_0} = c; \quad c = \frac{\omega}{k} = \lambda f$$

$$\vec{S} = \frac{1}{\mu_0}\vec{E} \times \vec{B}; \quad \langle S \rangle = \frac{E_0 B_0}{2\mu_0}; \quad \langle S \rangle = \frac{P}{4\pi r^2}\ \text{(izotropno)}$$

$$\langle S \rangle = c\langle u \rangle; \quad \langle u \rangle = u_E + u_B = \frac{1}{2}\,\epsilon_0\,E_0^2 = \frac{B_0^2}{2\mu_0}$$

$\epsilon_0 = 8{,}854 \times 10^{-12}\,\mathrm{F/m}$, $\mu_0 = 4\pi \times 10^{-7}\,\mathrm{H/m}$, $c = 2{,}998 \times 10^8\,\mathrm{m/s}$, $e = 1{,}6 \times 10^{-19}\,\mathrm{A\,s}$
$\mathrm{J} = \mathrm{N\ m} = \mathrm{A\ V\ s}$, $\mathrm{T} = \frac{\mathrm{N}}{\mathrm{A\ m}}$, $\Omega = \frac{\mathrm{V}}{\mathrm{A}}$, $\mathrm{F} = \frac{\mathrm{A\ s}}{\mathrm{V}}$, $\mathrm{H} = \frac{\mathrm{V\ s}}{\mathrm{A}}$

oznaka	enota	slovensko ime veličine	angleško ime veličine
A	J	delo	work
$\vec{A}$	m^2	ploščina	area
$\vec{B}$	T	magnetno polje (gostota pretoka)	magnetic field (flux density)
c	m/s	fazna hitrost	phase velocity
C	F	kapacitanca	capacitance
e	A s	osnovni električni naboj	elementary electric charge
$\vec{E}$	V/m	električno polje (jakost)	electric field (strength)
E	J	mehanska energija	mechanical energy
E_k	J	kinetična energija	kinetic energy
E_p	J	potencialna energija	potential energy
f	Hz	frekvenca	frequency
$\vec{F}$	N	sila	force
I	A	električni tok	electric current
$\vec{J}$	$\mathrm{A/m}^2$	gostota elekričnega toka	electric current density
$\vec{J}_\mathrm{S}$	A/m	dolžinska gostota elektr. toka	linear electric current density
k	rad/m	valovno kotno število	angular wavenumber
l	m	dolžina	length
L	H	induktanca	inductance
N	1	število ovojev	number of turns
P	W	moč	power
q	A s	točkast električni naboj	point electric charge
Q	A s	električni naboj	electric charge
$\vec{r}$	m	položajni vektor	position vector
R	Ω	upor	resistance
s	m	dolžina poti	length of path
$\vec{S}$	$\mathrm{W/m}^2$	Poyntingov vektor	Poynting vector
t	s	čas	time
U	V	napetost	voltage
U_S	V	napetost vira	source voltage
$\vec{v}$	m/s	hitrost	velocity/speed
V	V	električni potencial	electric potential
V	m^3	prostornina	volume
w	$\mathrm{J/m}^3$	gostota elektromagnetne energije	electromagnetic energy density
ϵ_0	F/m	električna konstanta	electric constant
λ	m	valovna dolžina	wavelength
μ_0	H/m	magnetna konstanta	magnetic constant
$\vec{\omega}$	rad/s	kotna hitrost	angular velocity
ρ	Ω m	upornost	resistivity
ρ	$\mathrm{A\,s/m}^3$	gostota električnega naboja	electric charge density
ρ_A	$\mathrm{A\,s/m}^2$	površinska gostota elektr. naboja	surface density of electric charge
ρ_l	A s/m	dolžinska gostota elektr. naboja	linear density of electric charge
σ	$1/(\Omega\,\mathrm{m})$	prevodnost	conductivity
Φ	$\mathrm{T\,m}^2$	magnetni pretok	magnetic flux
Ψ	V m	električni pretok	electric flux