# Képletgyűjtemény

A vastagított betűk vektorokat jelölnek.

$$F = \gamma \frac{m_1 m_2}{r^2}, \quad \gamma = 6,67 \cdot 10^{-11} \ \frac{\text{Nm}^2}{\text{kg}^2}$$

$$\mathbf{F} = -\gamma \frac{m_1 m_2}{|\mathbf{r}_2 - \mathbf{r}_1|^3}(\mathbf{r}_2 - \mathbf{r}_1)$$

$$F = k \frac{q_1 q_2}{r^2}, \quad k = 9 \cdot 10^9 \ \frac{\text{Nm}^2}{\text{C}^2}$$

$$e = 1,6 \cdot 10^{-19} \ \text{C}$$

$$\mathbf{F} = k \sum_{i=1}^{n} \frac{q_0 q_i}{|\mathbf{r} - \mathbf{r}_i|^3}(\mathbf{r} - \mathbf{r}_i)$$

$$\mathbf{E}(\mathbf{r}) = k \sum_{i=1}^{n} \frac{q_i}{|\mathbf{r} - \mathbf{r}_i|^3}(\mathbf{r} - \mathbf{r}_i)$$

$$\mathbf{E}(\mathbf{r}) = k \int\limits_{(V')} \frac{dq}{|\mathbf{r} - \mathbf{r}'|^3}(\mathbf{r} - \mathbf{r}')$$

$$E_x = k \frac{Qx}{(R^2 + x^2)^{3/2}}$$

$$\mathbf{F} = q(\mathbf{E} + \mathbf{v} \times \mathbf{B})$$

$$F = m \frac{v^2}{r}$$

$$r = \frac{mv}{qB}, \quad T = \frac{2\pi m}{qB}$$

$$F = -kx, \quad \omega_0 = \sqrt{\frac{k}{m}}$$

$$\sigma = E\varepsilon, \quad \sigma = \frac{dN}{dA}, \quad \varepsilon = \frac{N}{EA}$$

$$\Delta\ell = \int\limits_0^\ell \varepsilon dz = \frac{N\ell}{EA}$$

$$k = \frac{EA}{\ell}$$

$$\mathbf{F}(\mathbf{r}) = -\operatorname{grad} U(\mathbf{r}), \quad F_x = -\frac{\partial U(x,y,z)}{\partial x}$$

$$W_{1,2} = \int\limits_{\mathbf{r}_1}^{\mathbf{r}_2} \mathbf{F} d\mathbf{r}, \quad W_{1,2} = U_1 - U_2$$

$$U = -mgz$$

$$U = -\frac{\gamma m_1 m_2}{|\mathbf{r}_2 - \mathbf{r}_1|}$$

$$U = -\frac{\gamma m_1 m_2}{\sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2}}$$

$$U = -\gamma \frac{m_1 m_2}{r_{12}} - \gamma \frac{m_1 m_3}{r_{13}} - \gamma \frac{m_2 m_3}{r_{23}}$$

$$U = \frac{kq_1q_2}{|\mathbf{r}_2 - \mathbf{r}_1|}$$

$$U = \frac{kq_1q_2}{\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2 + (z_2-z_1)^2}}$$

$$W_{1,2} = q_0 \int_{\mathbf{r}_1}^{\mathbf{r}_2} \mathbf{E} d\mathbf{r} = U_1 - U_2$$

$$\mathbf{p} = q\mathbf{l}, \quad \mathbf{M} = q\mathbf{l} \times \mathbf{E} = \mathbf{p} \times \mathbf{E}$$

$$M = -pE\sin\theta$$

$$U = -\mathbf{pE} = -pE\cos\theta, \quad W_{1,2} = pE(\cos\theta_2 - \cos\theta_1)$$

$$V = \frac{U}{q_0}, \quad \Delta V = V_2 - V_1 = -\int_{\mathbf{r}_1}^{\mathbf{r}_2} \mathbf{E} d\mathbf{r}$$

$$\mathbf{E} = -\operatorname{grad} V, \quad E_x = -\frac{\partial V(x,y,z)}{\partial x}$$

$$V = k\sum_{i=1}^{n} \frac{q_i}{r_i}, \quad V = k\int_{(V)} \frac{dq}{r}$$

$$V(x) = \frac{kQ}{\sqrt{R^2 + x^2}}$$

$$U = \frac{1}{2}kx^2$$

$$U_{\text{rug}} = \frac{1}{2}EA\ell\varepsilon^2, \quad u_{\text{rug}} = \frac{1}{2}\sigma\varepsilon, \quad U_{\text{rug}} = \frac{1}{2}\int_{(V)} \sigma\varepsilon dV$$

$$\dot{Q} = \int_{(A)} \dot{\mathbf{q}} d\mathbf{A}$$

$$\dot{\mathbf{q}} = -\kappa \operatorname{grad} T, \quad \dot{q}_x = -\kappa\frac{\partial T(x,y,z,t)}{\partial x}$$

$$c_p\varrho\frac{\partial T}{\partial t} + \operatorname{div}\dot{\mathbf{q}} = \dot{e}$$

$$c_p\varrho\frac{\partial T}{\partial t} = \operatorname{div}(\kappa \operatorname{grad} T) + \dot{e}$$

$$\frac{\partial T}{\partial t} = a\left(\frac{\partial^2 T}{\partial x^2} + \frac{\partial^2 T}{\partial y^2} + \frac{\partial^2 T}{\partial z^2}\right) + \frac{1}{c_p\varrho}\dot{e}, \quad a = \frac{\kappa}{c_p\varrho}$$

$$\frac{\partial T}{\partial t} = a\left(\frac{\partial^2 T}{\partial r^2} + \frac{1}{r}\frac{\partial T}{\partial r} + \frac{1}{r^2}\frac{\partial^2 T}{\partial \varphi^2} + \frac{\partial^2 T}{\partial z^2}\right) + \frac{1}{c_p\varrho}\dot{e}$$

$$\kappa\Delta T + \dot{e} = 0, \quad \Delta T = 0, \quad \frac{d^2T}{dx^2} = 0$$

$$\dot{\mathbf{q}}|_{\text{felület}} = \alpha(T_{\text{felület}} - T_\infty)$$

$$\left.\frac{dT}{dx}\right|_{\text{felület}} = -\frac{\alpha}{\kappa}(T_{\text{felület}} - T_\infty)$$

$$\dot{q}_x = -\frac{\kappa_i}{d_i}(T_i - T_{i-1}), \quad \dot{q}_x = \frac{T_0 - T_n}{\sum\limits_{i=1}^{n}\frac{d_i}{\kappa_i}}$$

$$T_1 = T_0 - \dot{q}_x\frac{d_1}{\kappa_1}, \quad T_2 = T_1 - \dot{q}_x\frac{d_2}{\kappa_2}$$

$$\dot{Q}_i = \frac{T_{i-1} - T_i}{R_i} = \frac{\Delta T_i}{R_i}, \quad R_i = \frac{d_i}{\kappa_i A_i}$$

$$\dot{Q} = \frac{\Delta T}{R_{\text{eredő}}} = \frac{T_0 - T_n}{R_1 + R_2 + \cdots + R_n}$$

$$\dot{Q}_i\frac{T_1 - T_2}{R_i} = \frac{\Delta T}{R_i}, \quad \dot{Q} = \frac{\Delta T}{R_{\text{eredő}}}$$

$$R_{\text{eredő}} = \frac{1}{\frac{1}{R_1} + \frac{1}{R_2} + \cdots + \frac{1}{R_n}}$$

$$T(x) = T_0 + \frac{1}{2}\frac{\dot{e}}{\kappa}\left(\frac{d^2}{4} - x^2\right), \quad T_{\max} = T_0 + \frac{1}{8}\frac{\dot{e}}{\kappa}d^2$$

$$\frac{d^2T}{dr^2} + \frac{1}{r}\frac{dT}{dr} = 0, \quad T(r) = T_1 + \frac{T_1 - T_2}{\ln\frac{r_1}{r_2}}\ln\frac{r}{r_1}$$

$$\dot{q}_r = -\kappa\frac{T_1 - T_2}{\ln\frac{r_1}{r_2}}\frac{1}{r}, \quad \dot{Q} = -\kappa 2\pi L\frac{T_1 - T_2}{\ln\frac{r_1}{r_2}}$$

$$\dot{Q} = 2\pi L\frac{T_0 - T_n}{\sum\limits_{i=1}^{n}\frac{1}{\kappa_i}\ln\frac{r_i}{r_{i-1}}}$$

$$T_i = T_{i-1} + \frac{\dot{Q}}{2\pi L\kappa_i}\ln\frac{r_{i-1}}{r_i}$$