Képletek az 1. zh-hoz (Bev. Fiz. M)

$s = \sum_i |\Delta \vec{r}_i|$ vagy $s = \int_{t_1}^{t_2} ds = \int_{t_1}^{t_2} |\Delta \vec{r}|$ $v_{átl.} = \frac{s_{össz.}}{t_{össz.}}$ $v(t) = \lim_{\Delta t \to 0} \frac{x(t+\Delta t) - x(t)}{\Delta t} = \frac{dx}{dt}$

$x(t_2) - x(t_1) = \int_{t_1}^{t_2} v(t)dt$ $x(t) = x_0 + \int_0^t v(t)dt$ $\mathrm{s = v \cdot t}$ $a_{átl.} = \frac{\Delta v}{\Delta t} = \frac{v(t_2)\text{-}v(t_1)}{t_2\text{-}t_1}$

$\vec{v} = \dot{\vec{r}} = \dot{r}\vec{e}_r + r\dot{\varphi}\vec{e}_\varphi$ $\vec{a} = \left(\ddot{r} - r\dot{\varphi}^2\right)\vec{e}_r + \left(2\dot{r}\dot{\varphi} + r\ddot{\varphi}\right)\vec{e}_\varphi$ $v(t) = \int_0^t a(\tau)d\tau + v_0$

$x(t) = \int_0^t v(\tau)d\tau + x_0 = \int_0^t \left(\int_0^{\tau'} a(\tau)d\tau \right) d\tau' + v_0 t + x_0$ $x(t) = x_o + v_o \cdot t + \frac{1}{2}at^2$

$s = \frac{v_1 + v_2}{2}t = \frac{v_2^2 - v_1^2}{2a}$ $s = \frac{1}{2}at^2 = \frac{vt}{2} = \frac{v^2}{2a}$

$\frac{d(m\vec{v})}{dt} = \vec{F}$ $\vec{F}_{12} = \gamma \frac{m_1.m_2}{r^2}\frac{\vec{r}}{r}$ $F_{tap} = \mu_o N$ $F_s = \mu_k N$ $F_r = -kx$

Képletek az 2. zh-hoz (Bev. Fiz. M)

$\omega_{átl.} = \frac{\Delta\Theta}{\Delta t} = \frac{\Theta(t_2) - \Theta(t_1)}{t_2 - t_1}$ $\omega(t) = \lim_{\Delta t \to 0} \frac{\Theta(t+\Delta t) - \Theta(t)}{\Delta t} = \frac{d\Theta}{dt}$ $\vec{r}_{tkp} = \frac{\sum_i m_i \vec{r}_i}{\sum_i m_i}$

$\omega(t) = \omega_0 + \int_0^t \beta(\tau)d\tau$ $\Theta(t) = \Theta_0 + \int_0^t \omega(\tau)d\tau$ $\Theta = \omega_o t + \frac{1}{2}\beta t^2$ $\Theta = \frac{1}{2}\beta t^2 = \frac{\omega t}{2} = \frac{\omega^2}{2\beta}$ $\vec{M} = \vec{r} \times \vec{F}$

$|\vec{M}| = |\vec{r}| \cdot |\vec{F}| \sin\varphi = F \cdot d$ $M = \Theta\beta$ $\Theta = \Theta_o + ms^2$ $E_k = \frac{1}{2}\Theta\omega^2$ $W = M \cdot \varphi$ $P = M \cdot \omega$

$E_k = \frac{1}{2}mv^2 + \frac{1}{2}\Theta\omega^2$ $\vec{\mathrm{N}} = \vec{\mathrm{L}} = \vec{\mathrm{r}} \times \vec{\mathrm{p}}$ $\omega_p = \frac{d\varphi}{dt} = \frac{mgs}{L}$

$$\vec{v}_{tkp} = \frac{d\vec{r}_{tkp}}{dt} = \frac{\sum_i m_i \dot{\vec{r}}_i}{\sum_i m_i} = \frac{\sum_i m_i \vec{v}_i}{\sum_i m_i} \qquad \vec{a}_{tkp} = \frac{d\vec{v}_{tkp}}{dt} = \frac{\sum_i m_i \ddot{\vec{r}}_i}{\sum_i m_i} = \frac{\sum_i m_i \vec{a}_i}{\sum_i m_i} \qquad \vec{F}_e^k = 0 \Rightarrow \vec{p}_{syst.} = const.$$

$$v_{1f} = \left(\frac{m_1 - m_2}{m_1 + m_2}\right) v_{1i} + \left(\frac{2m_2}{m_1 + m_2}\right) v_{2i} \qquad df = \frac{1}{2} r ds = \frac{1}{2} r v_t dt \Rightarrow \frac{df}{dt} = \frac{1}{2} r v_t$$

$$v_{2f} = \left(\frac{2m_1}{m_1 + m_2}\right) v_{1i} + \left(\frac{m_2 - m_1}{m_1 + m_2}\right) v_{2i} \qquad E = \frac{1}{2} m v^2 - G\frac{Mm}{r}$$

$$E = \frac{1}{2} m\dot{r}^2 + \frac{1}{2} m(r\dot{\varphi})^2 - G\frac{Mm}{r} = \frac{1}{2} m\dot{r}^2 + \frac{L^2}{2mr^2} - G\frac{Mm}{r}$$

$$m\vec{a}' = F - m\vec{a}_o - m\vec{\omega} \times (\vec{\omega} \times \vec{r}') + 2m(\vec{v} \times \vec{\omega}) - m(\dot{\vec{\omega}} \times \vec{r}')$$

$$\text{II.}\quad \vec{\tau}_{net} \neq 0 \rightarrow \tau_{net} = Fd \qquad \vec{M}_e = \vec{g} \times (m_1\vec{r}_1 + m_2\vec{r}_2 + \ldots) = \vec{g} \times (\vec{r}_{cm} M)$$

$$\frac{F}{A} = Y\frac{\Delta \ell}{\ell_o} \qquad S \equiv \frac{\text{shear stress}}{\text{shear strain}} = \frac{F/A}{\Delta x/h} \qquad y(t) = 2A\cos\left(2\pi\frac{f_1 + f_2}{2}t\right)\cos\left(2\pi\frac{f_2 - f_1}{2}t\right)$$

$$y(x, t) = A\sin(kx - \omega t + \varphi)$$

$$B \equiv \frac{\text{volume stress}}{\text{volume strain}} = -\frac{\Delta F/A}{\Delta V/V_i} = -\frac{\Delta P}{\Delta V/V_i} \qquad \frac{\partial^2 y(x,t)}{\partial x^2} = \frac{1}{v^2}\frac{\partial^2 y(x,t)}{\partial t^2}$$

$$y(x,t) = 2A\cos(\omega t)\cos(kx)$$

$$f_n = n \cdot f_1 \qquad f_n = (2n-1) \cdot f_1 \qquad f' = f_o \frac{1 \pm \frac{v_m}{v_h}}{1 \mp \frac{v_f}{v_h}} \qquad F = \alpha\ell \qquad E = W = \alpha A$$

$$P = \frac{2\alpha}{r} \qquad P + \frac{1}{2}\rho v^2 + \rho g y = \text{const.} \qquad A_1 v_1 = A_2 v_2 \qquad F_f = \rho_{fo\ell y.} g V' \qquad F = \frac{1}{2} c_w \rho A v^2$$