

3.14 Mechanický oscilátor kmitá tak, že doba mezi dvěma průchody rovnovážnou polohou je 750 ms. Amplituda kmitání je 7 cm a počáteční fáze kmitání je $\frac{\pi}{3}$. V jakém čase poprvé po začátku kmitání dosáhne oscilátor výchylku rovnou a) 3,5 cm, b) -3,5 cm?

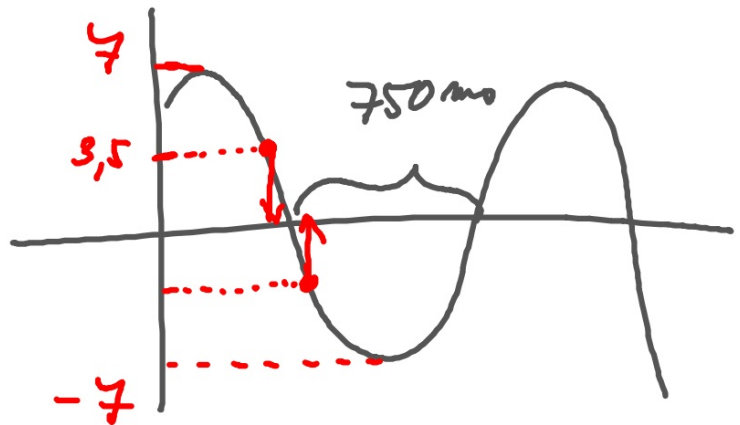
$$\frac{T}{2} = 750 \text{ ms}$$

$$T = 1500 \text{ ms} = 1,5 \text{ s}$$

$$\varphi_0 = \frac{\pi}{3}$$

$$\omega = \frac{2\pi}{T} = \frac{2\pi}{1,5} = \frac{4\pi}{3}$$

$$y_m = 7 \text{ cm} = 0,07 \text{ m}$$



$$y = 0,07 \sin \left(\frac{4\pi}{3} t + \frac{\pi}{3} \right)$$

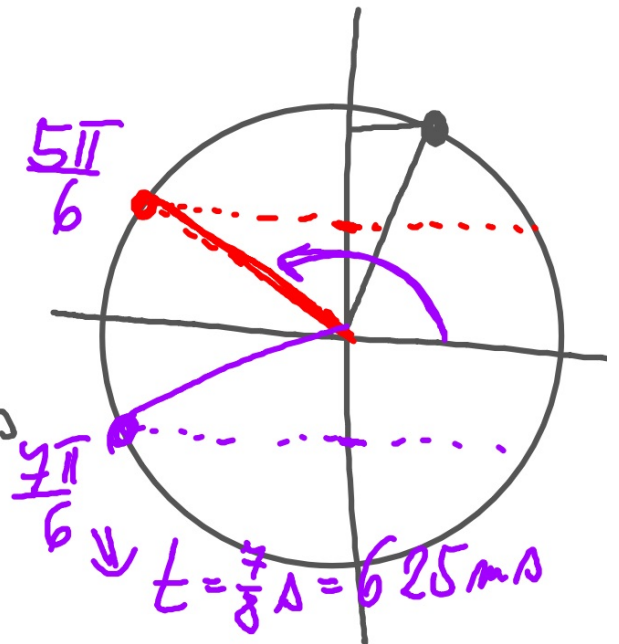
$$y = 0,07 \sin\left(\frac{4\pi}{3}t + \frac{\pi}{3}\right)$$

$$0,035 = 0,07 \sin\left(\frac{4\pi}{3}t + \frac{\pi}{3}\right) \quad /: 0,07$$

$$\frac{1}{2} = \sin\left(\frac{4\pi}{3}t + \frac{\pi}{3}\right)$$

$$\frac{5\pi}{6} = \frac{4\pi}{3}t + \frac{\pi}{3}$$

$$t = \frac{2}{8} \text{ s} = 0,25 \text{ s} = 250 \text{ ms}$$



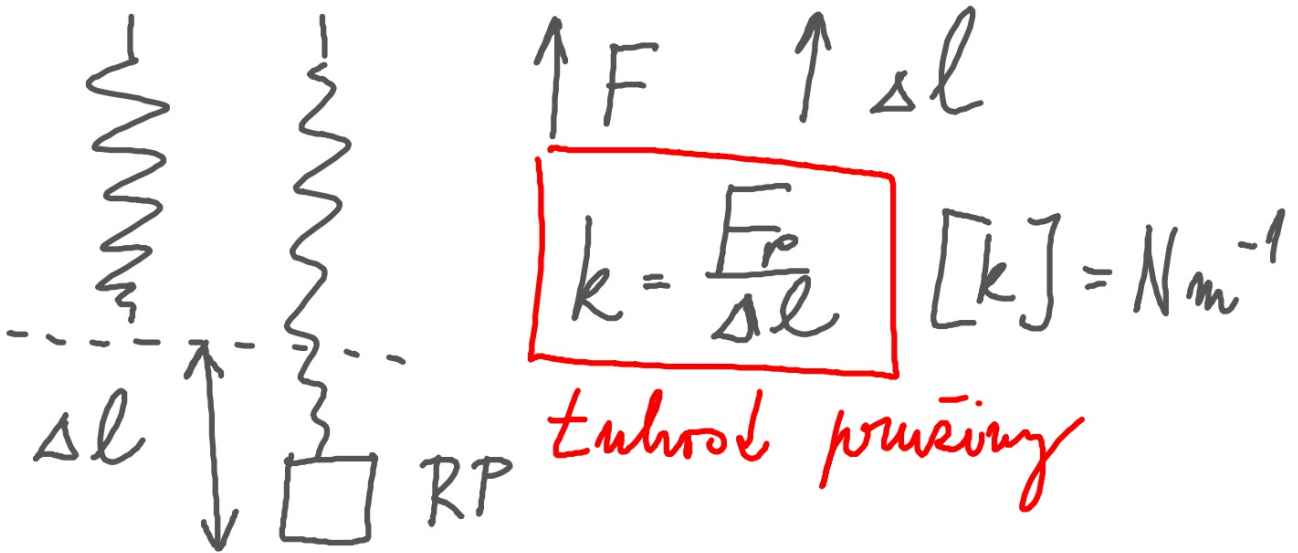
Dynamische mechanische Oscillatoren

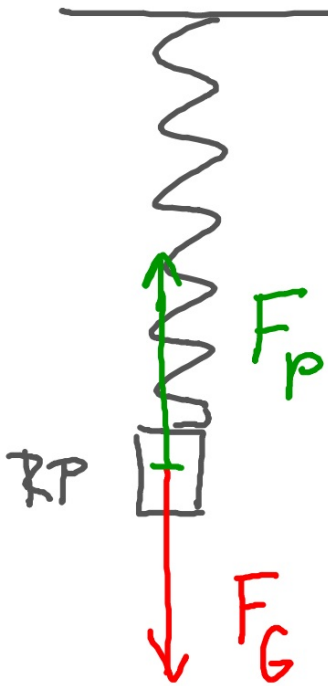
2. NZ $F = ma$ $a = -\omega^2 y_m \sin \omega t$

$$F = -m \omega^2 \underbrace{y_m \sin \omega t}_y$$

$$F = -m \omega^2 y$$

Tēlsoņa mēģinājums



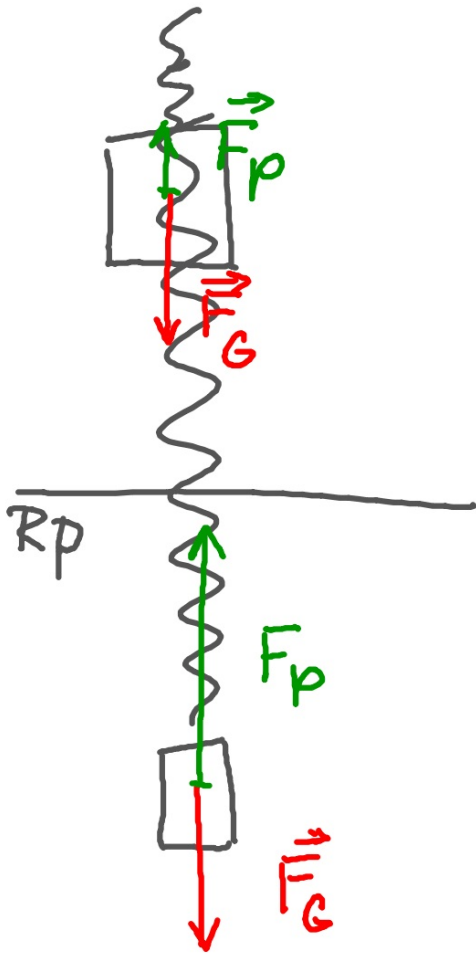


rovnovážný stav

$$F_G = F_p$$

← síla pružiny

$$mg = k \Delta l$$



$$\vec{F}_v = \vec{F}_G + \vec{F}_p$$

$$F_p = k \Delta l$$

$$F_v = F_G - F_p$$

$$F_v = mg - k(\Delta l + y_0)$$

$$F_v = \cancel{mg} - \cancel{k\Delta l} - ky$$

$$F_v = -ky$$

relativnost síly
 Ederi epizodnye 'em
 -m'ru' do RV

$$2.NZ \quad F = -m\omega^2 y$$

$$F = -ky$$

$$\cancel{m\omega^2 y} = \cancel{ky}$$

$$\omega^2 = \frac{k}{m}$$

$$\omega = \sqrt{\frac{k}{m}}$$

$$\omega = 2\pi f$$

$$f = \frac{\omega}{2\pi}$$

$$f = \frac{1}{2\pi} \sqrt{\frac{k}{m}}$$

$$T = 2\pi \sqrt{\frac{m}{k}}$$

elastic frequency oscillations

SP 99/ 29, 30, 31, 33, 34