8) Hp. $0-(-6)$ $\frac{-6}{v}x-(-6t)$ Th.

$\xi(t) = 0{,}1 \sin(6t)$ estremo corda

$T = 4N$

$\mu = 0{,}01\ kg/m$

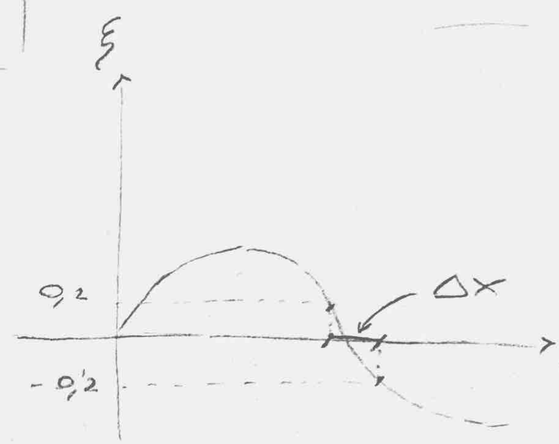
a) v e f = ?

b) Δx_{min} @ $\Delta y = 0{,}02$

c) eq.ne di un punto a 40 m.

a) $\omega = 6\ \frac{rad}{s}$ $\longrightarrow$ $\boxed{f = \frac{\omega}{2\pi} = 0{,}95\ Hz}$

$\boxed{v = \sqrt{\frac{T}{\mu}} = 20\ m/s}$



b) $0{,}02 = 0{,}1 \sin(kx-\omega t)$

↳ $\sin(kx-\omega t) = 0{,}2 = \frac{1}{5}$

$\arcsin\left(\frac{1}{5}\right) \cong 0{,}20\ rad$

$\Longrightarrow$ 2 angoli più vicini: $\pi + 0{,}2$ e $\pi - 0{,}2$

$0{,}2 = \sin(kx_1-\omega t) \Longrightarrow kx_1-\omega t = \pi - 0{,}2$

$-0{,}2 = \sin(kx_2-\omega t) \Longrightarrow kx_2-\omega t = \pi + 0{,}2$

$\left.\right\} x_2 - x_1 = \frac{0{,}2+0{,}2}{k}$

$\boxed{\Delta x = \frac{v(0{,}4)}{\omega} \cong 1{,}34\ m}$

c) $\xi_{(x=40m)} = 0{,}1m \cdot \sin\left(40 \cdot \frac{6}{20} - 6t\right) = 0{,}1m \sin\left(12\,rad - 6\,\frac{rad}{s} \cdot t\right)$

7) Hp.

$\xi_0 = 0{,}01\,m$

$f = 80\,Hz$

$P = 10W = \overline{P}$

$K = 25{,}1\,rad/m$

Th.

i) λ e $v = ?$

ii) $T = ?$ $\mu = ?$

iii) ξ_0' t.c. $f' = 20\,Hz$ e $\overline{P}' = 5W$

i) $K = \frac{2\pi}{\lambda} \longrightarrow \boxed{\lambda = \frac{2\pi}{k} = 0{,}25\,m}$

$\boxed{v = \lambda f = 20\,m/s}$

ii) $v = \sqrt[2]{\frac{T}{\mu}} \longrightarrow \boxed{T = v^2 \mu \overset{(*)}{=} 15{,}83\,N}$

$$\overline{P} = \frac{1}{2}\mu\omega^2\xi_0^2 v \longrightarrow \mu = \frac{2\overline{P}}{\omega^2 \xi_0^2 v} = \frac{2\overline{P}}{(2\pi f)^2 \xi_0^2 v}$$

$(*)$ $\boxed{\mu = 3{,}95 \cdot 10^{-2}\,Kg/m}$

iii) $\overline{P}' = \frac{1}{2}\mu\omega^2\xi_0^2 v = \frac{1}{2}\mu(2\pi f')^2 \xi_0'^2 v$

$$\xi_0'^2 = \frac{2\overline{P}'}{\mu(2\pi f')^2 v} \longrightarrow \boxed{\xi_0' = \sqrt{\frac{2\overline{P}'}{\mu(2\pi f')^2 v}} = 0{,}028\,m}$$

6) <u>Hp.</u>

$t = 10°C$

$p = 50\ atm$

$v = 1420\ m/s$

$f = 1000\ Hz$

$\xi_0 = 1 \cdot 10^{-9}\ m$

$\rho_0 = 1000\ Kg/m^3$

<u>Th.</u>

i) $\Delta p_{max} = ?$

ii) $w_\tau = ?$

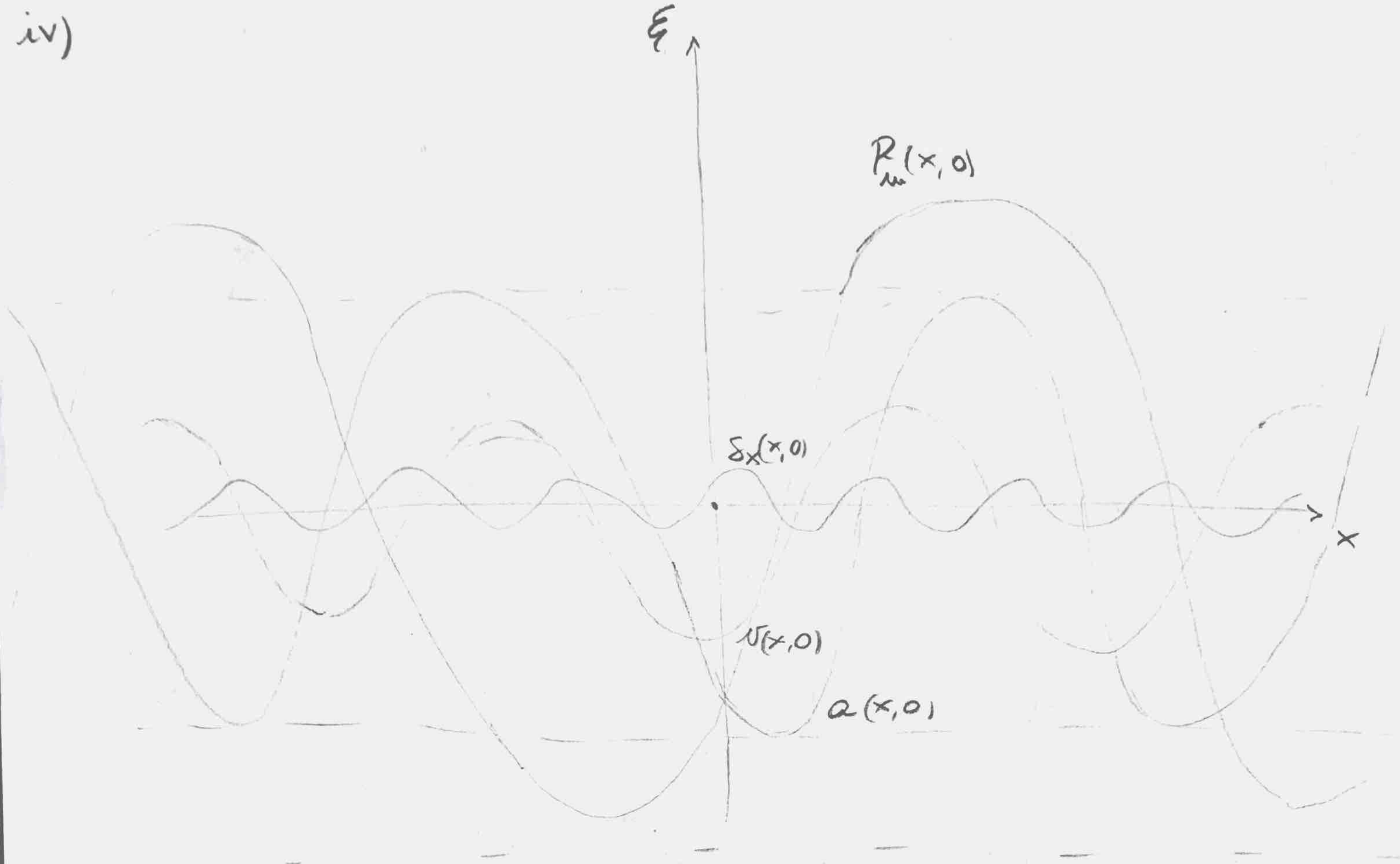
iii) $I = ?$

i) $\Delta p_{max} = 2\pi \rho_0 f v \xi_0 = \boxed{8{,}9\ Pa}$

ii) $w_\tau = \frac{1}{2} \rho_0 (2\pi f)^2 \xi_0^2 = \boxed{1{,}98 \cdot 10^{-8}\ \frac{J}{m^3}}$

iii) $I = w_\tau v = \boxed{2{,}81 \cdot 10^{-5}\ \frac{W}{m^2}}$

iv)



5) <u>Hp:</u>

$\mu = 300\ g/m$

$P_{max} = 400\ W$

$T = 120\ N$

$\xi_0 = 0{,}1\ m$

<u>Th.</u>

a) $f_{max} = ?$

a) $P = T\xi_0^2 \omega k \cos^2(kx-\omega t) \Longrightarrow P_{max} = T\xi_0^2 \omega k = T\xi_0^2 \frac{\omega^2}{v}$

$v = \sqrt{\frac{T}{\mu}} = 20\ m/s$

$\sqrt{\frac{P_{max} v}{T\xi_0^2}} = \omega$

$\omega = 81{,}65\ rad/s$

$\boxed{f = \frac{\omega}{2\pi} = 12{,}99\ Hz}$

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4) **Hp.**

$\rho = 7{,}8 \cdot 10^3 \frac{Kg}{dm^3}$

$S = 1\ dm^2 = 0{,}01\ m^2$

$f = 200\ Hz$

$E = 2 \cdot 10^{11}\ Pa$

$\overline{P} = 100\ W$

$\delta_x(x,t) = A\cos(Kx - \omega t - \frac{\pi}{3})$

Th.

i) $\omega, k, v, T, \lambda, A = ?$

ii) $\frac{\partial \delta_x}{\partial t} = ?$ $\frac{\partial^2 \delta_x}{\partial t^2} = ?$

iii) P in $x = \frac{\lambda}{4}$ e $t = \frac{T}{2} = ?$

i) $\omega = 2\pi f = \boxed{1256{,}63 \frac{rad}{s}}$ $v = \sqrt{\frac{E}{\rho}} = \boxed{5063{,}70\ m/s}$

$T = \frac{2\pi}{\omega} = \boxed{5 \cdot 10^{-3}\ s}$ $\lambda = vT = \boxed{25{,}32\ m}$

$K = \frac{2\pi}{\lambda} = \boxed{0{,}25 \frac{rad}{m}}$

$\overline{P} = \frac{1}{2}\rho\omega^2 A^2 vS \implies A = \sqrt{\frac{2\overline{P}}{\rho\omega^2 vS}} = \boxed{1{,}79 \cdot 10^{-5}\ m}$

ii) $\frac{\partial \delta_x}{\partial t} = \boxed{A\omega \sin(Kx - \omega t - \frac{\pi}{3})} = v_{\delta x}(x,t)$

$\frac{\partial^2 \delta_x}{\partial t^2} = \boxed{-A\omega^2 \cos(Kx - \omega t - \frac{\pi}{3})} = a_{\delta x}(x,t)$

iii) $P = F \cdot v = -ES \frac{\partial \delta}{\partial x} \cdot \frac{\partial \delta}{\partial t} = \underbrace{ESA^2 k\omega \sin^2(Kx - \omega t - \frac{\pi}{3})}$

$\frac{\partial \delta}{\partial x} = -Ak\sin(Kx - \omega t - \frac{\pi}{3})$

$\boxed{P_{(x = \frac{\lambda}{4},\ t = \frac{T}{2})} = 135{,}99\ W}$