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$$E = E_k + E_p = 4E_p + E_p = 5E_p$$

$$\frac{1}{2} k x_{max}^2 = 5 \frac{1}{2} k x^2$$

$$x_{max} = \sqrt{5} x$$

$$x = \frac{x_{max}}{\sqrt{5}} \quad (x = \pm \frac{x_{max}}{\sqrt{5}})$$

$$v = \omega_0 \sqrt{x_{max}^2 - x^2}$$

$$= 2\pi \sqrt{0,04 - 0,25 \times 10^{-2}}$$

$$= 2\pi \times 10^{-1} \sqrt{5,75} \text{ ms}^{-1}$$

$$\approx 1,25 \text{ ms}^{-1}$$

$$\text{الطول} = x_0 + x_{max} \quad -6$$

$$= \frac{1}{4} + 0,2 = 0,45 \text{ m}$$

$$T_0 = 2\pi \sqrt{\frac{m}{k}} \quad -7$$

$$l = 2\pi \sqrt{\frac{1}{k}}$$

$$k = 40 \text{ N} \cdot \text{m}^{-1}$$

السؤال (2)

$$B = 4\pi \times 10^{-7} \frac{\text{N}}{\text{A}^2} \quad (1)$$

$$\frac{\mu}{l} = 10 \times 100 = 1000 \text{ (المغناطيس)}$$

$$2 \times 10^{-5} = 4\pi \times 10^{-7} \cdot 10^3 \cdot I$$

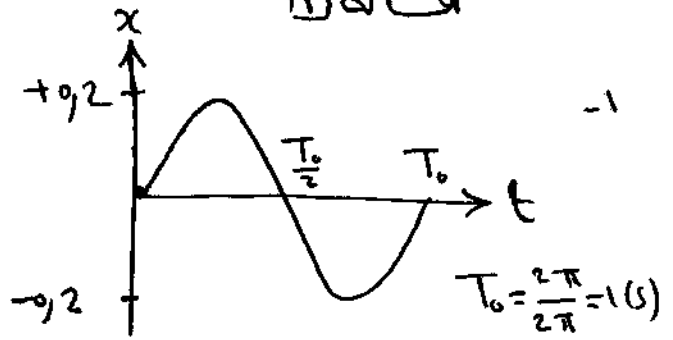
$$I = \frac{10^{-1}}{2\pi} \text{ A}$$

$$\tan \theta = \frac{B}{B_H} = \frac{2 \times 10^{-5}}{2 \times 10^{-5}} = 1 \quad (2)$$

$$\theta = \frac{\pi}{4} \text{ rad}$$

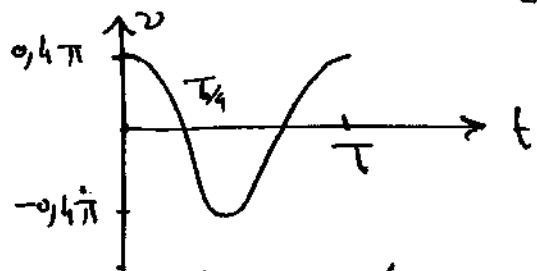
(زاوية الانحراف عن عمودي B_H)

السؤال (1)



$$\bar{x} = -x_{max} \quad t = 3 \frac{T_0}{4}$$

$$\bar{v} = -0,4\pi \sin(2\pi t - \frac{\pi}{2}) \quad -2$$



$$v_{max} = \omega_0 x_{max} = 0,4\pi \text{ ms}^{-1}$$

$$F_{s_0} = F_{z_0} = k x_0 \quad -3$$

$$\bar{W} = mg$$

$$mg = k x_0$$

$$T_0 = 2\pi \sqrt{\frac{m}{k}}$$

$$T_0 = 2\pi \sqrt{\frac{k x_0}{k g}}$$

$$T_0 = 2\sqrt{x_0} \Rightarrow l = 2\sqrt{x_0}$$

$$x_0 = \frac{1}{4} \text{ m}$$

$$t = \frac{1}{2} \text{ (s)} \Rightarrow x = 0,2 \cos(2\pi \frac{1}{2} - \frac{\pi}{2}) = 0$$

$$\bar{v} = -0,4\pi \sin(2\pi \frac{1}{2} - \frac{\pi}{2})$$

$$= -0,4\pi \text{ ms}^{-1}$$

$$a = -\omega_0^2 x = 0$$

$$\bar{F} = -k \bar{x} = 0$$

(مساوي الصفر)

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المثال 4

$T_0 = 2 \text{ (s)}$ -1

$\omega_0 = \frac{2\pi}{T_0} = \frac{2\pi}{2} = \pi \text{ rad/s}^{-1}$

$\bar{a} = -\omega_0^2 \bar{x}$ -2

$+0,8 = -\pi^2(-x_m)$

$x_m = 90 \text{ } \mu\text{m}$

$a = -\omega_0^2 x_m \cos(\omega_0 t + \phi)$ -3

$\phi = \pi$

$t=0, a = -a_{max}$

$-a_m = -a_m \cos \phi$

$\cos \phi = 1 \Rightarrow \phi = 0$

$\bar{a} = -0,8 \cos(\pi t)$

$\bar{x} = x_m \cos(\omega_0 t + \phi)$ -4

$\bar{x} = 90 \mu\text{m} \cos(\pi t)$

$\vec{B} = \vec{B}_1 + \vec{B}_2$ -3

$B = \sqrt{B_1^2 + B_2^2} \quad (B = B_1)$

$= \sqrt{2} B = 2\sqrt{2} \times 10^5 \text{ T}$

نفس \vec{B}_1, \vec{B}_2 في الاتجاه -4

أكبر قيمة $B_1 = B + B_2$
 $= 2 \times 10^5 + 2 \times 10^5$
 $= 4 \times 10^5$

أصغر قيمة $B_2 = B - B_1 = 0$

المثال 3

$B_1 = 2 \times 10^{-7} \frac{5}{\sqrt{2}} = 2 \times 10^{-6} \text{ T}$

$B_2 = 2 \times 10^{-7} \frac{20}{\sqrt{2}} = 8 \times 10^{-6} \text{ T}$

$\vec{B} = \vec{B}_1 + \vec{B}_2$

$B = B_1 + B_2 = 2 \times 10^{-6} + 8 \times 10^{-6}$
 $= 10 \times 10^{-6} \text{ T}$

$x : I_1$ في الاتجاه -2

$1+x : I_2$ " " -1

$\vec{B}_1 = -\vec{B}_2$

$B_1 = B_2$

$2 \times 10^{-7} \frac{5}{x} = 2 \times 10^{-7} \frac{20}{1+x}$

$4x = 1+x \Rightarrow x = \frac{1}{3} \text{ (m)}$