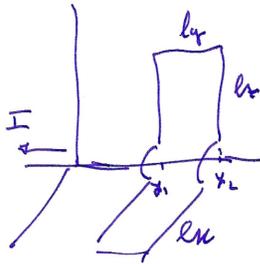


2º mini-Teste

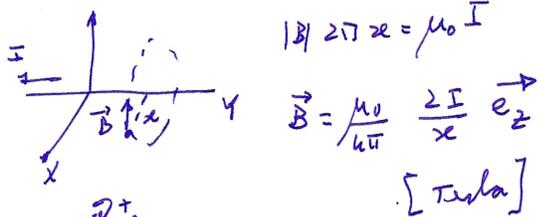
Vector B

MBoo + MQuin

2007/08 2º S 16/5/2008



a) $\oint (\vec{B} \cdot d\vec{s}) = \mu_0 I$

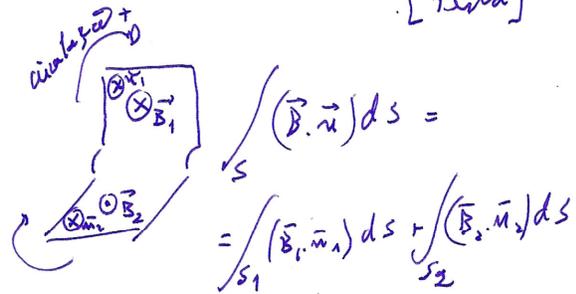


$B \cdot 2\pi x = \mu_0 I$

$\vec{B} = \frac{\mu_0}{4\pi} \frac{2I}{x} \vec{e}_z$
[Tesla]

b) Ao longo da area definida pelas arcos de circunferência a $(\vec{B} \cdot \vec{n}) = 0$

$\vec{n}_1 = -\vec{e}_x$
 $\vec{n}_2 = -\vec{e}_z$



$\oint (\vec{B} \cdot \vec{n}) ds =$

$= \int_{s_1} (\vec{B}_1 \cdot \vec{n}_1) ds + \int_{s_2} (\vec{B}_2 \cdot \vec{n}_2) ds$

$\Phi_{\text{perim}} = \int_s (\vec{B} \cdot \vec{n}) ds = \frac{\mu_0}{4\pi} \int_n^{\frac{1+l_x}{n}} \frac{2I}{z} dz \int_{y_1}^{y_2} dy - \frac{\mu_0}{4\pi} \int_n^{\frac{1+l_x}{n}} \frac{2I}{z} dz \int_{y_1}^{y_2} dy$

$\Phi_{\text{perim}} = \frac{\mu_0}{4\pi} 2I \left(\ln \frac{1+l_x}{n} \right) (y_2 - y_1) - \frac{\mu_0}{4\pi} 2I \left(\ln \frac{1+l_x}{n} \right) (y_2 - y_1)$

$\Phi_{\text{perim}} = \frac{\mu_0}{4\pi} 2I l_y \left[\ln(1+l_x) - \ln n - \ln(1+l_x) + \ln n \right]$

$\Phi_{\text{perim}} = \frac{\mu_0}{4\pi} 2I l_y \left(\ln \frac{1+l_x}{1+l_x} \right)$

$\Phi_{\text{total}} = N \times \Phi_{\text{perim}} = \frac{\mu_0}{4\pi} 2I l_y N \left(\ln \frac{1+l_x}{1+l_x} \right)$

c) $\Phi_{\text{total}} = LI$ $L = \frac{\mu_0}{4\pi} 2 l_y N \left(\ln \frac{1+l_x}{1+l_x} \right)$

$L = 10^{-7} \times 2 \times \underbrace{0,015}_{\text{metros!}} \times 50 \times \left(\ln \frac{0,15 + 4,5}{0,15 + 3} \right)$

$L = 58,4 \text{ nH}$ (nano Henry)

$$d) \quad \phi_{\text{total}} = L I$$

$$\phi_{\text{total}} = 58,4 \times 10^{-9} \times 4 \times 10^{-3}$$

$$\phi_{\text{total}} = 0,2 \text{ nWb (nano Weber)}$$

$$e) \quad \phi_{\text{total}} = L (I_0 + \alpha t)$$

$$\varepsilon^{\text{ind}} = - \frac{d\phi_T}{dt} = -L \alpha$$

$$I^{\text{ind}} = - \frac{L \alpha}{R}$$

$$f) \quad I^{\text{ind}} = - \frac{58,4 \times 10^{-8} \times (0,2 \times 10^{-3})}{19}$$

$$I^{\text{ind}} = -0,61 \text{ pA (pico Ampere)}$$

