Universidade Federal do Rio de Janeiro | Instituto de Física

Física III | 2017/2

Lista 8 - Indução Eletromagnética

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1. (a) da esquerda para a direita.

   (b) da direita para a esquerda.

   (c) da direita para a esquerda.

   (d) da esquerda para a direita.

2. (a) $\Phi_B = \pi a^2 B_0 e^{-t/\tau}$.

   (b) $\dfrac{d\Phi_B}{dt} = -\dfrac{\pi a^2 B_0}{\tau} e^{-t/\tau}$.

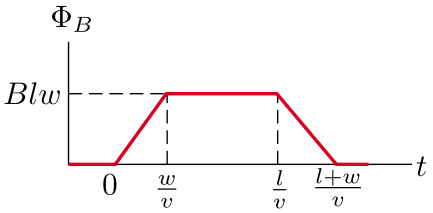
   (c) $\mathcal{E} = \dfrac{\pi a^2 B_0}{\tau} e^{-t/\tau}$.

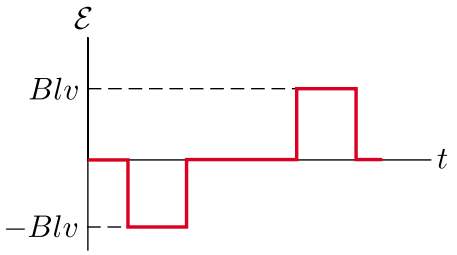
   (d) $I = \dfrac{\pi a^2 B_0}{\tau R} e^{-t/\tau}$ e sentido anti-horário.

3. (a) $\Phi_B = \begin{cases} Bhvt & t \le w/v \\ Bhw & w/v < t \le l/v \\ Bh(l+w-vt) & l/v < t \le (l+w)/v \\ 0 & t > (l+w)/v \end{cases}$

   (b) $\mathcal{E} = \begin{cases} Bhv & t \le w/v \\ 0 & w/v < t \le l/v \\ -Bhv & l/v < t \le (l+w)/v \\ 0 & t > (l+w)/v \end{cases}$.

   (c)

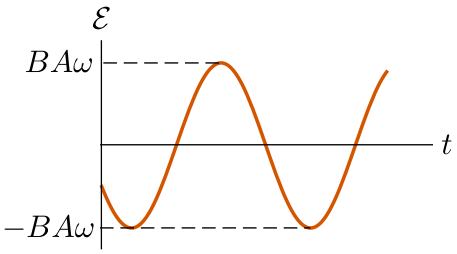




4. (a) $\Phi_B = BA\cos(\omega t - \theta_0)$.

   (b) $\mathcal{E} = BA\omega \operatorname{sen}(\omega t - \theta_0)$.

   (c)



5. (a) $\mathcal{E} = Blv$.

   (b) $I = \dfrac{Blv}{R}$ com sentido $\hat{\boldsymbol{x}}$.

   (c) $\vec{\boldsymbol{F}}_B = \dfrac{B^2 l^2 v}{R}\hat{\boldsymbol{y}}$.

   (d) $\vec{\boldsymbol{v}}_{\text{term}} = -\dfrac{mgR}{B^2 l^2}\hat{\boldsymbol{y}}$.

(e) $\text{Pot}_{\text{grav}} = -\text{Pot}_{\text{diss}} = \dfrac{(mg)^2 R}{B^2 l^2}$.

6. (a) $\Phi_B = -\dfrac{\mu_0 I_0 \operatorname{sen} \omega t}{2\pi} b \ln\left(\dfrac{s+a}{s}\right)$.

(b) $\mathcal{M} = \dfrac{\mu_0}{2\pi} b \ln\left(\dfrac{s+a}{s}\right)$.

(c) $\mathcal{E} = \omega \dfrac{\mu_0 I_0 \cos \omega t}{2\pi} b \ln\left(\dfrac{s+a}{s}\right)$.

7. (a) $\mathcal{L} = \mu_0 \dfrac{N^2 A}{L}$.

(b) $\mathcal{E} = \mu_0 \dfrac{N^2 A}{L} \omega I_0 \operatorname{sen} \omega t$.

(c) $\vec{\boldsymbol{E}} = \dfrac{\mu_0}{2\sqrt{\pi}} \dfrac{N^2 \sqrt{A}}{L} \omega I_0 \operatorname{sen} \omega t \ \hat{\boldsymbol{\phi}}$.

(d) $u_B = \dfrac{\mu_0}{2} \dfrac{N^2}{L^2} I_0^2 \cos^2 \omega t$.