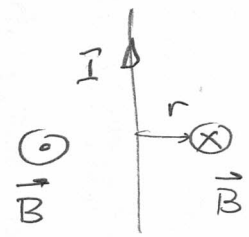
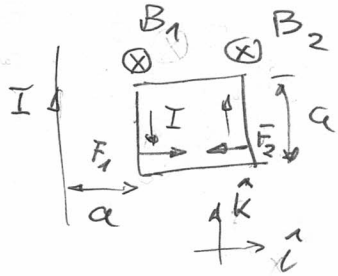
PROBLEMA 1

Circulación (Ley de Ampère) $2\pi r B = \mu_0 I$



a) $\boxed{B(r) = \dfrac{\mu_0 I}{2\pi r}}$

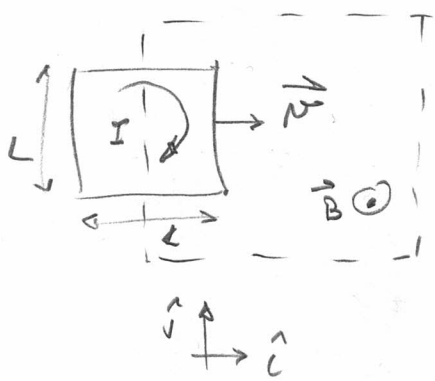


b) $\vec{F}_1 = \hat{i}\, B_1 I a \qquad \vec{F}_2 = -\hat{i}\, B_2 I a$

$$\vec{F} = \hat{i}(B_1 - B_2) I a = \hat{i}\left(\frac{\mu_0 I}{2\pi a} - \frac{\mu_0 I}{2\pi \cdot 2a}\right) I a$$

$$\boxed{\vec{F} = \hat{i}\frac{\mu_0 I^2}{4\pi}}$$

PROBLEMA 2



$\mathcal{E} = BLv_0 = IR \Rightarrow$

a) $I = \dfrac{BLv_0}{R}$ sentido horario

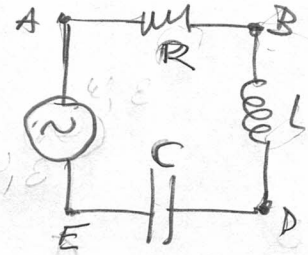
b) $\mathcal{E}(t) = BLv(t) = R\,I(t) \Rightarrow I(t) = \dfrac{BL}{R} v(t)$

$$F(t) = -BLI(t) = -\frac{B^2L^2}{R} v(t) = m\frac{dv}{dt}$$

$$\frac{dv}{dt} + \frac{B^2L^2}{mR} v(t) = 0 \qquad v(t) = v_0 e^{\alpha t} \Rightarrow \alpha v_0 e^{\alpha t} + \frac{B^2L^2}{mR} v_0 e^{\alpha t} = 0$$

$$\Rightarrow \alpha = -\frac{B^2L^2}{mR} \Rightarrow \boxed{b)\ v(t) = v_0 e^{-\frac{B^2L^2}{mR}t}}$$

PROBLEMA 3.



$\mathcal{E}_{rms} = 75\ V$
$\omega = 2{,}5 \times 10^4\ s^{-1}$
$R = 400\ \Omega$
$L = 20\ mH$
$C = 0{,}20\ \mu F$

a) $I_{rms} = \dfrac{\mathcal{E}_{rms}}{Z}$ $\quad Z = \sqrt{R^2 + (X_L - X_C)^2}$

$X_L = \omega L = 500\ \Omega$ $\quad X_C = \dfrac{1}{\omega C} = 200\ \Omega$

$Z = 500\ \Omega$ $\quad I_{rms} = \dfrac{75\ V}{500\ \Omega} = 0{,}15\ A$

b) $V_{AB} = V_R = I_{rms} \cdot R = 60\ V$, $\quad V_{BD} = V_L = I_{rms} X_L = 75\ V$

$V_{DE} = V_C = I_{rms} X_C = 30\ V$

c) $P = R I_{rms}^2 = 9\ W$

d) $P_{AB} = 9\ W$, $\quad P_{BD} = P_{DE} = 0$ (L y C son elementos conservativos)