

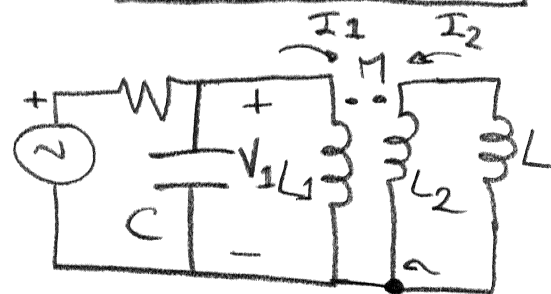
$$1) a) \vec{D} = \frac{Q}{2\pi r L} \hat{e}_r = \epsilon_0 \vec{E} + \epsilon_0 \frac{ab}{r^2} \vec{E} = \epsilon_0 \vec{E} \left(1 + \frac{ab}{r^2} \right)$$

$$\Rightarrow \vec{E} = \frac{Q r}{2\pi \epsilon_0 L (r^2 + ab)} \hat{e}_r$$

$$b) V = - \int_a^b \frac{Q r dr}{2\pi \epsilon_0 L (r^2 + ab)} = \left[\begin{array}{l} u = r^2 + ab \\ du = 2r dr \end{array} \right] = + \int_a^b \frac{Q}{4\pi \epsilon_0 L} \frac{du}{u} =$$

$$= \frac{Q}{4\pi \epsilon_0 L} \ln \frac{b(b+a)}{a(b+a)} = \frac{Q}{4\pi \epsilon_0 L} \ln \frac{b}{a} \Rightarrow C = \frac{Q}{V} = \frac{4\pi \epsilon_0 L}{\ln b/a}$$

$$2) a) \text{Nodas en a: } I_0 + I_2 = I_2 \Rightarrow I_0 = 0 \quad \checkmark$$

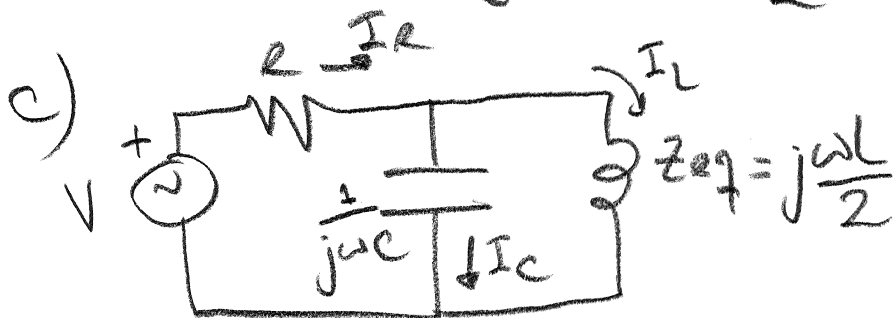


$$b) V_1 = j\omega L_1 I_1 + j\omega M I_2 = j\omega L (I_1 + I_2)$$

$L_1 = M = L$

$$0 = j\omega L_2 I_2 + j\omega M I_1 + j\omega L I_2 = j\omega L (2I_2 + I_1)$$

$$\Rightarrow I_2 = -\frac{I_1}{2} \Rightarrow V_1 = j\omega L \frac{I_1}{2} \Rightarrow Z_{eq} = \frac{V_1}{I_1} = \frac{j\omega L}{2}$$

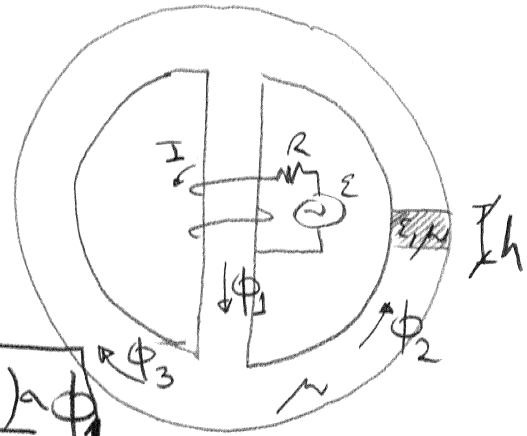


$$I_R = 0 \Rightarrow I_C = -I_L$$

$$\frac{I_C}{j\omega_0 C} = -I_C \frac{j\omega_0 L}{2}$$

$$\Rightarrow \frac{\omega_0^2 L C}{2} = 1$$

3) a) $\mathcal{R}_1 = \frac{a}{\mu S}$; $\mathcal{R}_2 = \mathcal{R}_3 = \frac{\pi a}{2\mu S}$



$$\Phi_1 = \frac{NI}{\mathcal{R}_1 + \frac{\mathcal{R}_2}{2}} = \frac{NI}{\frac{a}{\mu S} \left(1 + \frac{\pi}{4}\right)} = \frac{4NI\mu S}{(4+\pi)a} \Rightarrow I = \frac{(4+\pi)a\Phi_1}{4\mu S} \quad \textcircled{I}$$

* Circuito eléctrico

$$\mathcal{E} = IR + N \frac{d\Phi_1}{dt} = IR + j\omega \Phi_1 N = \Phi_1 \left[\frac{(4+\pi)aR}{4\mu S} + j\omega N \right]$$

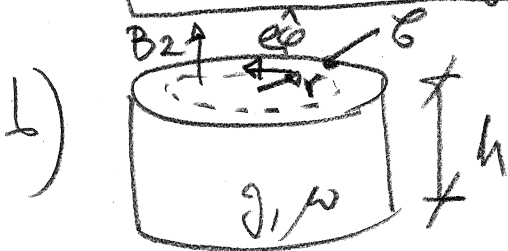
\uparrow \uparrow
resumen \uparrow
sinusoidal \textcircled{I}

$$\Rightarrow \Phi_1 = \frac{\mathcal{E}}{(4+\pi)aR + j\omega 4N^2\mu S} = B_1 S = 2B_2 S$$

\uparrow
simétrico

$$\Rightarrow B_2 = \frac{2N\mu \mathcal{E}}{(4+\pi)aR + j\omega 4N^2\mu S}$$

$$\Rightarrow B_2(t) = \frac{2N\mu \mathcal{E} e^{j\omega t - \text{Arctg}\left(\frac{4N^2\mu S\omega}{(4+\pi)aR}\right)}}{\sqrt{(4+\pi)^2 a^2 R^2 + 16N^4 \mu^2 S^2 \omega^2}}$$



$$\oint_C \vec{E} \cdot d\vec{l} = - \frac{d}{dt} \int_S \vec{B} \cdot \hat{n} dA$$

$$\Rightarrow \mathcal{E} \cdot 2\pi r = \dot{B}_2 \pi r^2 = \int \vec{J} = j\vec{E} \left[= \frac{\vec{J}}{g} \right] 2\pi r$$

$$\Rightarrow \vec{J} = \frac{g r}{2} \dot{B}_2 \hat{e}_\phi$$