cl. 11a (S.16.3) Rez(R) - Bobina(L) şi Condensatorul C în c.a. - curent alternativ

Bobina (L) L R=0 $\phi = Li$

(c.a)

$$-\frac{\Delta\phi}{\Delta t}\quad e = -L\frac{\Delta i}{\Delta t} = -U_m \sin\omega t = -\frac{\Delta\phi}{\Delta t}$$

$e = -L\frac{di}{dt}$

$u = U_m \sin\omega t$

$\boxed{e + u = 0} \rightarrow -e = +u \quad (e = -L\,di/dt) =$

$\boxed{i = I_m \sin\omega t}$

$\Delta i = -\frac{e}{L}\Delta t, \quad di = -\frac{e}{L}dt$

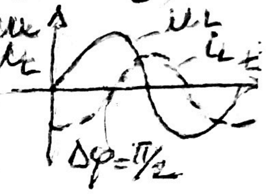
$\boxed{i = -\frac{1}{L}\int dt \cdot e}$ $e = -u$

$i = +\frac{1}{L}\int U_m \sin\omega t\, dt = +\frac{U_m}{L}\int \sin\omega t\, dt = +\frac{U_m}{\omega L}\cos\omega t$

$-\sin x = \sin(x - \pi)$

deci: $i_L = -\frac{U_m}{\omega L}\cos\omega t = \frac{U_m}{\omega L}\sin(\omega t + \frac{\pi}{2}) = I_{max}\sin(\omega t - \frac{\pi}{2})$

$I_{max} = \left(\frac{U_m}{X_L}\right) \rightarrow \boxed{X_L = \omega L = 2\pi\nu L}$



Condensatorul (C)

(c.a)

$u = U_m \sin\omega t$

$$\begin{cases} C = \left(\frac{q}{u}\right) \rightarrow q = Cu = [CU_m \sin\omega t] \\ i_C = \frac{dq}{dt} \rightarrow \cancel{dq = i\,dt} \end{cases}$$

$W_e = \frac{Cu^2}{2} = \frac{Q^2}{2C} = \frac{1}{2}\varepsilon E^2$

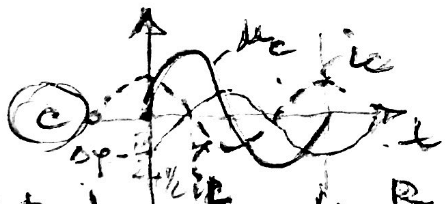
$i_C = \left(\frac{dq}{dt}\right) = \frac{d}{dt}[CU_m \sin\omega t]$

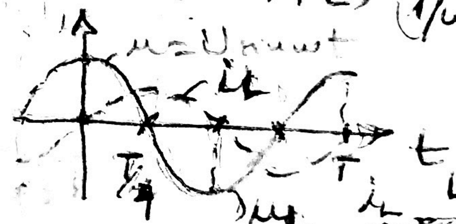
$dq = C\,u\,dt$

$\boxed{X_C = \frac{1}{\omega C}}$ $\boxed{\Delta\varphi = +\frac{\pi}{2}}$

$i_C = \omega C U_{max}\cos\omega t = \omega C U_{max}\sin(\omega t + \pi/2) = \frac{U_m}{(1/\omega C)}\sin\omega t$

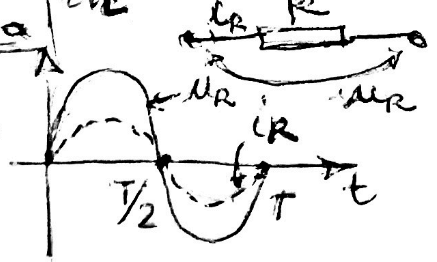
$= X_C$





R - Rezistența

(c.a)



$\Delta\varphi = -\frac{\pi}{2}$

$\boxed{I = \frac{U}{R}}$ $R = \rho\frac{l}{S}$ $\rho = \rho_0(1 + \alpha\Delta t)$

$$\begin{cases} R \rightarrow i_R = \frac{u}{R} = \left(\frac{U_m}{R}\right)\sin\omega t \\ \Delta\varphi_R = 0 \\ u_R = U\sqrt{2}\sin\omega t \end{cases}$$

$$\begin{cases} u = U\sqrt{2}\sin\omega t \\ i_L = \frac{U_m}{X_L}\sin(\omega t - \frac{\pi}{2}) \\ \Delta\varphi_L = -\pi/2 \\ X_L = \omega L = 2\pi\nu L \end{cases}$$

$\alpha = \frac{R - R_0}{R_0 \Delta t}$

$$\begin{cases} u_C = U\sqrt{2}\sin\omega t \\ i_C = \frac{U}{X_C}\sin(\omega t + \frac{\pi}{2}) \\ \Delta\varphi_C = +\frac{\pi}{2} \\ X_C = 1/\omega C = \frac{1}{2\pi\nu C} \end{cases}$$