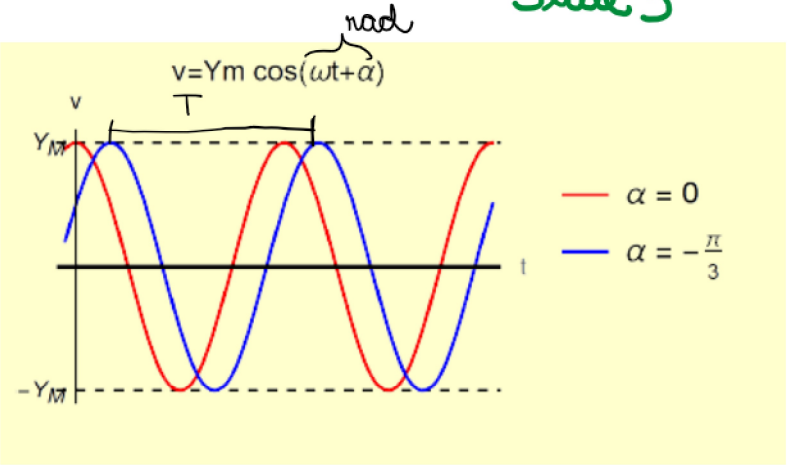
Rabiscos_CircuitosCA

segunda-feira, 21 de setembro de 2020 15:23

Slide 3



Brasil: $T = 16{,}66667\,ms$

$f = \frac{1}{T} = 60\,Hz$

$\omega = 2\pi 60 \cong 376{,}99\,rad/s$

Slide 4

$v(t) = V_M \cos(\omega t + \theta)$

$\vec{V} = V_M \cos(\omega t+\theta) - V_M \operatorname{sen}(\omega t+\theta)\cdot i$

i ↙ $\sqrt{-1}$

$V_M e^{i(\omega t+\theta)} = V_M e^{i\omega t} e^{i\theta}$

$i = j = \sqrt{-1}$

fasor $\dot{V} = \frac{V_M}{\sqrt{2}} e^{j\theta} \cancel{e^{j\omega t}} = \frac{V_M}{\sqrt{2}} \cdot e^{i\theta}$

Slide 8

indutor, L (henry, H) = reator

$\frac{V_M}{\sqrt{2}} \angle \theta$ ou $\frac{V_M}{\sqrt{2}} e^{j\theta}$ ou $\frac{V_M}{\sqrt{2}} e^{i\theta}$

fluxo magnético (Wb) (t) $= L\, i(t)$ ← corrente ind

$\left.\begin{matrix} v_{ind} \\ e_{ind} \end{matrix}\right\} = d\,\text{fluxo}/dt \rightarrow v(t) = \frac{d}{dt}\left(L\, i(t)\right) = L\frac{di(t)}{dt}$

Rabiscos_CircuitosCA (cont)

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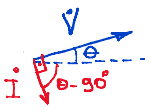
Slide 8 (última linha)

$j = \sqrt{-1}$

$j^2 = (-1)$

$j^4 = 1$



Em indutores (L)

I é atrasado de V em 90°

$\dot{V} = V\angle\theta \left[\frac{V_M}{\sqrt{2}}\angle\theta\right] = V\cos\theta + jV\operatorname{sen}\theta$

$\dot{I} = \dot{I}\angle(\theta - 90°) = \frac{V_M}{\omega L}\cos(\theta - 90°) + j\frac{V_M}{\omega L}\operatorname{sen}(\theta - 90°)$

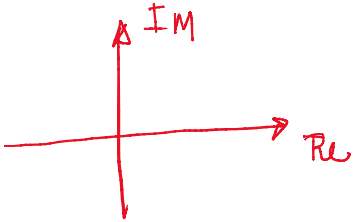
$\frac{V_M}{\omega L}$

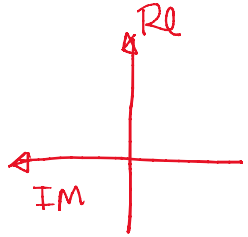
$= \frac{V_M}{\omega L}\operatorname{sen}\theta + j\frac{V_M}{\omega L}(\operatorname{sen}\theta\cos(90°) - \cos\theta\operatorname{sen}90°)$ (ω)

$= \frac{V_M}{\omega L}\operatorname{sen}\theta + j\frac{V_M}{\omega L}(-\cos\theta)$

$= \frac{V_M}{\omega L}\operatorname{sen}\theta j^4 + j j^2 \frac{V_M}{\omega L}\cos\theta = \frac{V_M}{\omega L} j^3(\cos\theta + j\operatorname{sen}\theta) = \frac{j^4}{j}\frac{1}{\omega L}[V_M\cos\theta + jV_M\operatorname{sen}\theta]$

$= \frac{1}{j\omega L}[V_M\angle\theta]$





Real puro → $\bar{Z} = a = a\angle 0°$

Imag puro → $\bar{Z} = jb = b\angle 90°$

$\bar{Z} = -jb = b\angle -90°$

R → $\frac{\dot{V}}{\dot{I}} = R$

L → $\frac{\dot{V}}{\dot{I}} = j\omega L$

C → $\frac{\dot{V}}{\dot{I}} = \frac{-j}{\omega C}$

Genericamente

$\frac{\dot{V}}{\dot{I}} = \bar{Z}$: impedância

$\omega L = X_L$: reatância indutiva

$\frac{1}{\omega C} = X_C$: reatância capacitiva

unidade Ω (ohm)

ex: L tem $j20\Omega$ ($\bar{Z}$)

ou tem 20Ω (X_L, $\bar{Z} = jX_L$)

$0{,}5H$ (L, $\bar{Z} = j2\pi 60 \cdot 0{,}5)\Omega$