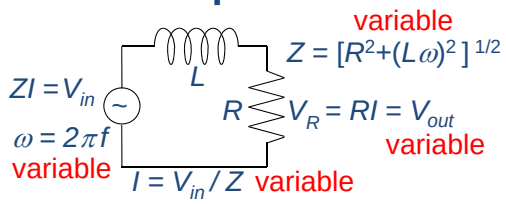
Departament de Física
i Enginyeria Nuclear
UNIVERSITAT POLITÈCNICA DE CATALUNYA

Circuits Filtres

Circuit RL passa-baixos

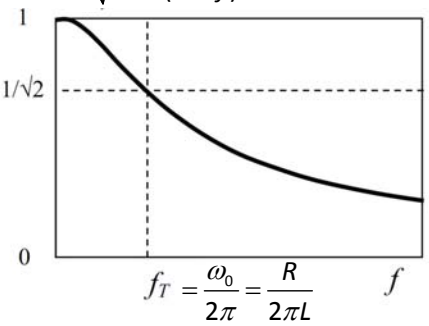


$$H(\omega) = \frac{V_{out}}{V_{in}} = \frac{RI}{ZI} = \frac{R}{\sqrt{R^2+(L\omega)^2}}$$

$$H(\omega = \omega_0 = R/L) = \frac{1}{\sqrt{2}}$$

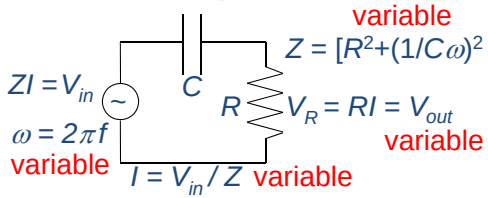
$\omega_0 \equiv$ pulsació de tall

$$H(f) = \frac{R}{\sqrt{R^2+(L2\pi f)^2}}$$



freqüència de tall

Circuit RC passa-alts

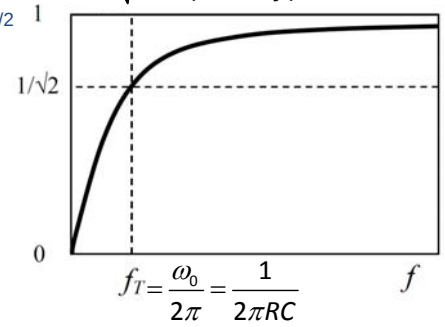


$$H(\omega) = \frac{V_{out}}{V_{in}} = \frac{RI}{ZI} = \frac{R}{\sqrt{R^2+(1/C\omega)^2}}$$

$$H(\omega = \omega_0 = 1/RC) = \frac{1}{\sqrt{2}}$$

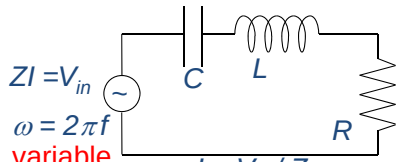
$\omega_0 \equiv$ pulsació de tall

$$H(f) = \frac{R}{\sqrt{R^2+(1/C2\pi f)^2}}$$



freqüència de tall

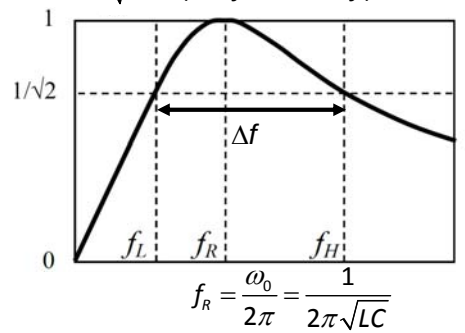
Circuit RLC passa-banda



$$H(\omega) = \frac{V_{out}}{V_{in}} = \frac{RI}{ZI} = \frac{R}{\sqrt{R^2+(L\omega-1/C\omega)^2}}$$

$$H(\omega = \omega_0 = 1/\sqrt{LC}) = 1$$

$$H(f) = \frac{R}{\sqrt{R^2+(L2\pi f-1/C2\pi f)^2}}$$



freqüència de ressonància

freqüències de tall passa-baixos i passa-alts

$$f_{\substack{L\\H}} = \frac{1}{2\pi}\left[\sqrt{\left(\frac{R}{2L}\right)^2+\frac{1}{LC}} \mp \frac{R}{2L}\right] = \sqrt{(\tfrac{1}{2}\Delta f)^2+f_R^2} \mp \tfrac{1}{2}\Delta f$$

ampla de banda $\Delta f = R / (2\pi L) = f_H - f_L$

factor de qualitat $Q = f_R / \Delta f = (L/C)^{1/2} / R$