

Circuits Filtres

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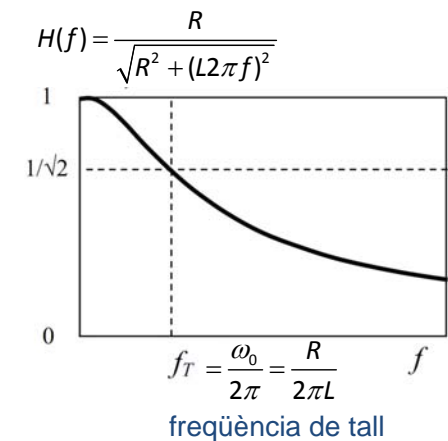
Circuit RL passa-baixos

$ZI = V_{in}$
 $\omega = 2\pi f$
 $Z = [R^2 + (L\omega)^2]^{1/2}$ **variable**
 $I = V_{in}/Z$ **variable**
 $V_R = RI = V_{out}$ **variable**

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

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

$\omega_0 \equiv$ pulsació de tall



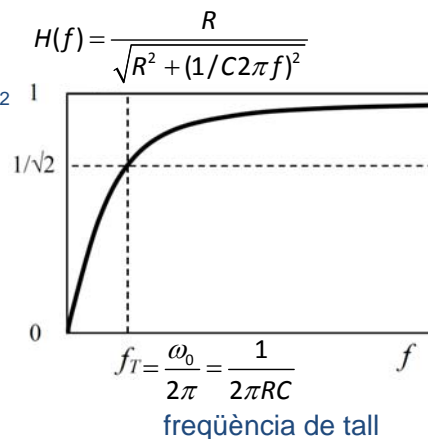
Circuit RC passa-alts

$ZI = V_{in}$
 $\omega = 2\pi f$
 $Z = [R^2 + (1/C\omega)^2]^{1/2}$ **variable**
 $I = V_{in}/Z$ **variable**
 $V_R = RI = V_{out}$ **variable**

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

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

$\omega_0 \equiv$ pulsació de tall



Circuit RLC passa-banda

$ZI = V_{in}$
 $\omega = 2\pi f$
 $Z = \sqrt{R^2 + (L\omega - 1/C\omega)^2}$
 $I = V_{in}/Z$
 $V_R = V_{out}$

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

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

freqüències de tall passa-baixos i passa-alts
 $f_L = \frac{1}{2\pi} \left[\sqrt{\left(\frac{R}{2L}\right)^2 + \frac{1}{LC}} - \frac{R}{2L} \right]$
 $f_H = \frac{1}{2\pi} \left[\sqrt{\left(\frac{R}{2L}\right)^2 + \frac{1}{LC}} + \frac{R}{2L} \right] = \sqrt{\left(\frac{1}{2}\Delta f\right)^2 + f_R^2} \mp \frac{1}{2}\Delta f$
 ampla de banda $\Delta f = R / (2\pi L) = f_H - f_L$
 factor de qualitat $Q = f_R / \Delta f = (L/C)^{1/2} / R$

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