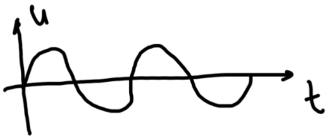
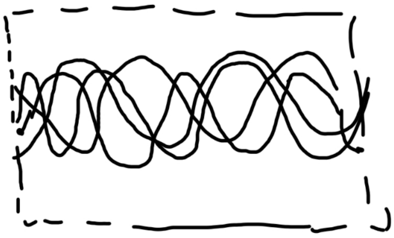
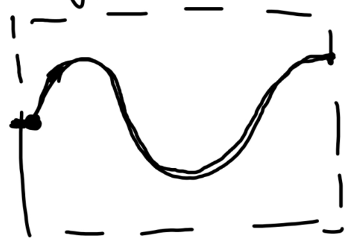


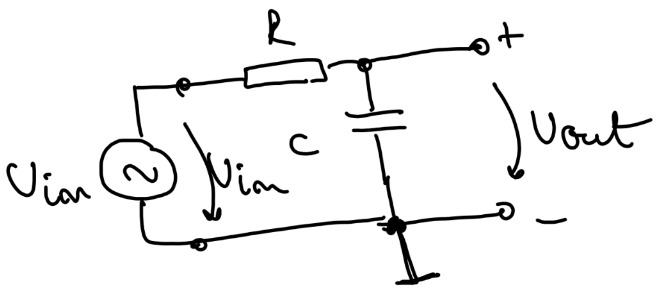


osciloscop nesincronizat
(untriggered)

Trigger



Studiul unui filtru trece-jos (FTJ, LPF) RC;



$\left|\frac{V_{out}}{V_{in}}\right|$ – funcţia de transfer.

$\left|\frac{A_{out}}{A_{in}}\right|$ - adimensional
- in dB

$\left|\frac{A_{out}}{A_{in}}\right| = f(\text{frecv.})$.

$\Delta\phi = f(\text{frecv.})$

$\Delta\phi = \phi_{out} - \phi_{in}$

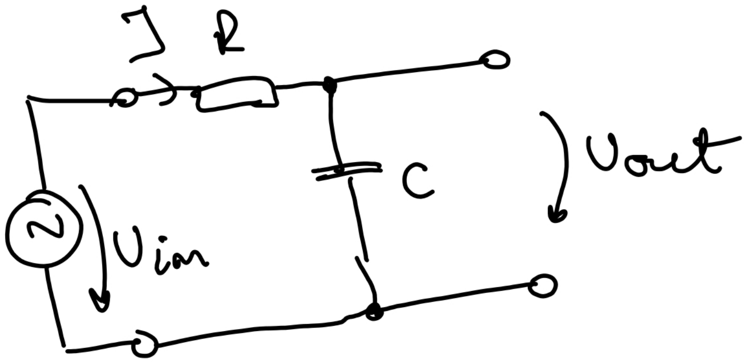
$n = x$ dB

$$n[dB] = 10\log_{10}\frac{P_{out}}{P_{in}} = 10\log_{10}\frac{\frac{U_{out}^2}{\cancel{R}}}{\frac{V_{in}^2}{\cancel{R}}} = 10\log_{10}\left(\frac{V_{out}}{V_{in}}\right)^2 = 20\log_{10}\frac{V_{out}}{V_{in}}$$

$V_{out} = V_{in} \Rightarrow n = 20\log_{10} 1 = 0\,dB$ (nici atenuare, nici amplificare)

$V_{out} = 2V_{in} \Rightarrow n = 20\log_{10}\frac{2\cancel{V_{in}}}{\cancel{V_{in}}} = 20\log_{10} 2 = +6.02\,dB$ (amplificare)

$V_{out} = 0.5V_{in} \Rightarrow n = 20\log_{10}\frac{0.5\cancel{V_{in}}}{\cancel{V_{in}}} = -6.02\,dB$ (atenuare)



$$V_{in} = I(R + Z_C)$$
$$V_{out} = I \cdot Z_C$$
$$\Rightarrow \frac{V_{out}}{V_{in}} = \frac{\cancel{I} Z_C}{\cancel{I}(R+Z_C)} = \frac{\cancel{Z_C}}{\cancel{Z_C}\left(1+\frac{R}{Z_C}\right)} = \frac{1}{1+\frac{R}{-\frac{j}{2\pi f C}}} =$$

$$\left(\frac{1}{-j} = \frac{-1}{j} = \frac{j^{\cancel{2}}}{\cancel{j}} = j\right)$$

$$= \frac{1}{1 + j \cdot 2\pi f R C}$$

$$\left|\frac{V_{out}}{V_{in}}\right| = \frac{1}{|1 + j \cdot 2\pi f R C|} = \frac{1}{\sqrt{1 + 4\pi^2 f^2 R^2 C^2}}$$

<u>Frecvența de tăiere:</u>

- frecvența la care $\left|\frac{V_{out}}{V_{in}}\right| = -3\,dB$

$$20 \log_{10} \left|\frac{V_{out}}{V_{in}}\right| = -3$$
$$\log_{10} \left|\frac{V_{out}}{V_{in}}\right| = -\frac{3}{20}$$
$$\Rightarrow \left|\frac{V_{out}}{V_{in}}\right| = 10^{-\frac{3}{20}} = 0.707 = \frac{1}{\sqrt{2}}$$

Dacă $f = f_T \Rightarrow \left|\frac{V_{out}}{V_{in}}\right| = \frac{1}{\sqrt{2}}$

$$\frac{1}{\sqrt{1+4\pi^2R^2C^2f_T^2}} = \frac{1}{\sqrt{2}} \Rightarrow 1+4\pi^2R^2C^2f_T^2 = 2$$

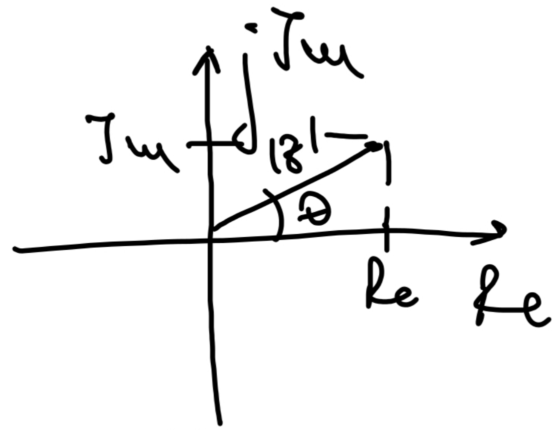
$$4\pi^2R^2C^2f_T^2 = 1$$

$$\boxed{f_T = \frac{1}{2\pi RC}}$$

$$\left|\frac{V_{out}}{V_{in}}\right| = \frac{1}{\sqrt{1+\left(\frac{f}{f_T}\right)^2}}$$

$$\frac{z_1}{z_2} = \frac{|z_1|e^{j\phi_1}}{|z_2|e^{j\phi_2}} = \left|\frac{z_1}{z_2}\right|e^{j(\phi_1-\phi_2)}$$

$$\left|\frac{V_{out}}{V_{in}}\right| = \frac{1}{1+j\cdot 2\pi RCf}$$



$$\Delta\phi = 0 - \operatorname{arctg} 2\pi RCf = -\operatorname{arctg}\frac{f}{f_T}$$

$$\operatorname{tg}\theta = \frac{Im}{Re}$$

$$\theta = \operatorname{arctg}\frac{Im}{Re}$$