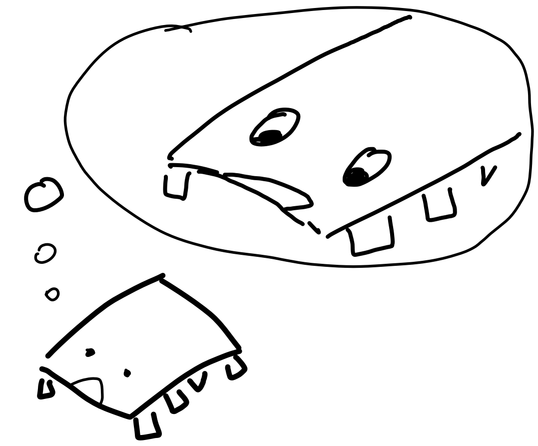
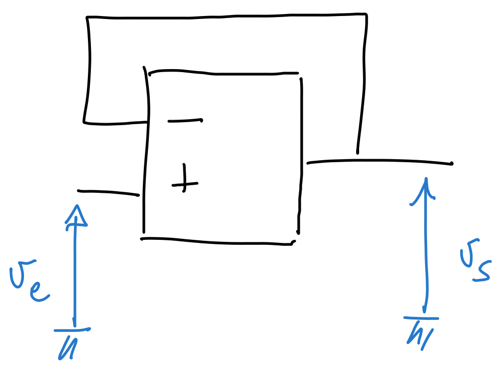
MONTAGES AMPLIFICATEURS



* Montage suiveur



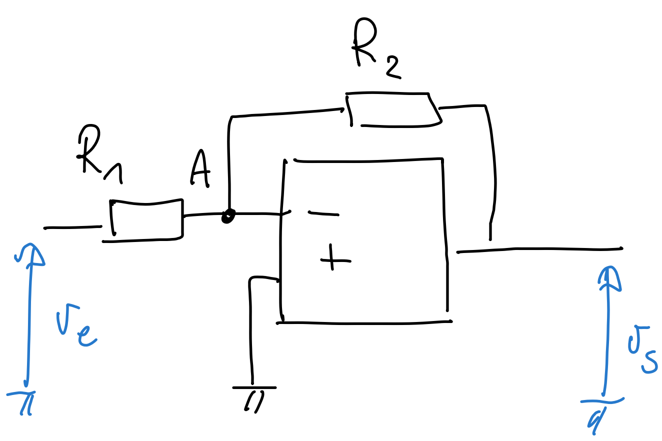
$v^+ = v_e$

$v^- = v_s$

$v^+ = v^- \Rightarrow \boxed{v_s = v_e}$

→ comme $i^+ = 0$ ce montage permet la mise en cascade de 2 filtres

* Ampli inverseur

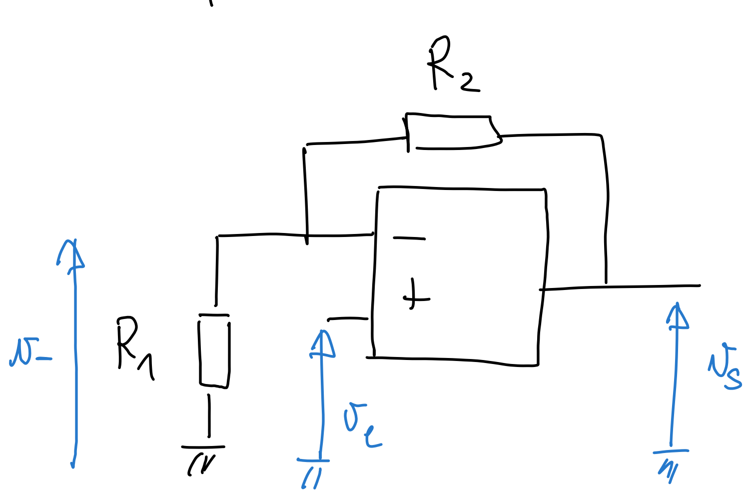


$$\left.\begin{aligned} v^+ &= 0 \\ v^- &= V_A \end{aligned}\right\} \Rightarrow V_A = 0$$

Loi des noeuds en terme de potentiel en A

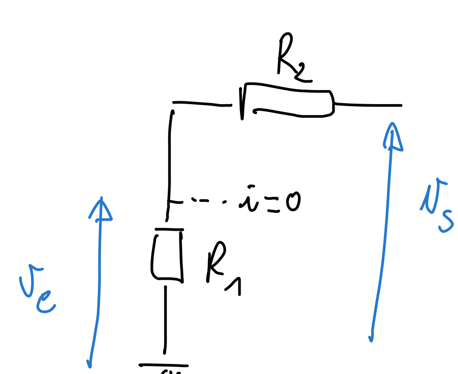
$$\frac{v_e - V_A}{R_1} + \frac{v_s - V_A}{R_2} = 0 \Rightarrow \boxed{v_s = -\frac{R_2}{R_1} v_e}$$

* Ampli non inverseur



$v^+ = v_e \Rightarrow v^- = v_e$

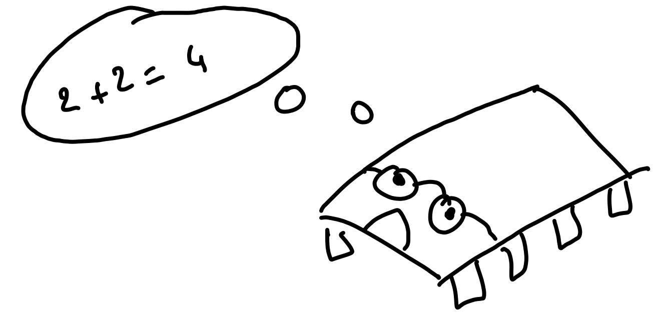
Diviseur de tension :



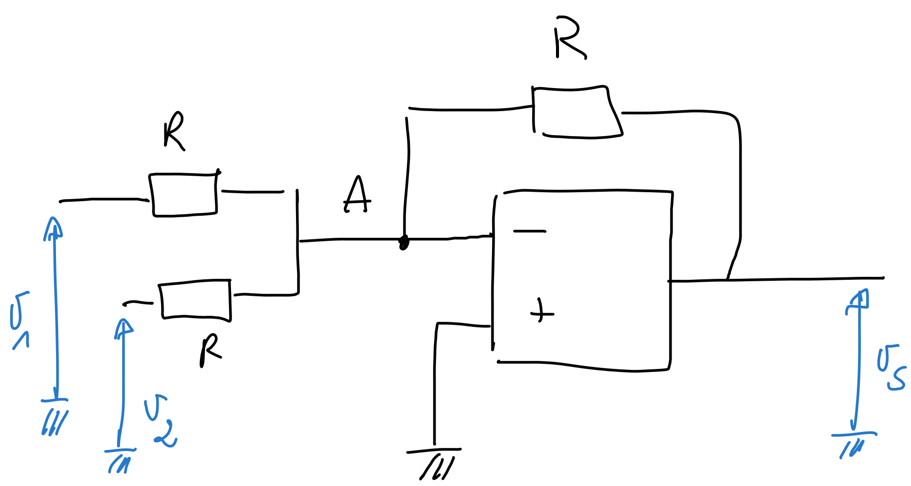
$$\Rightarrow v_e = \frac{R_1}{R_1 + R_2} v_s$$

$$\Rightarrow \boxed{v_s = \left(1 + \frac{R_2}{R_1}\right) v_e}$$

OPERATIONS



* Montage sommateur



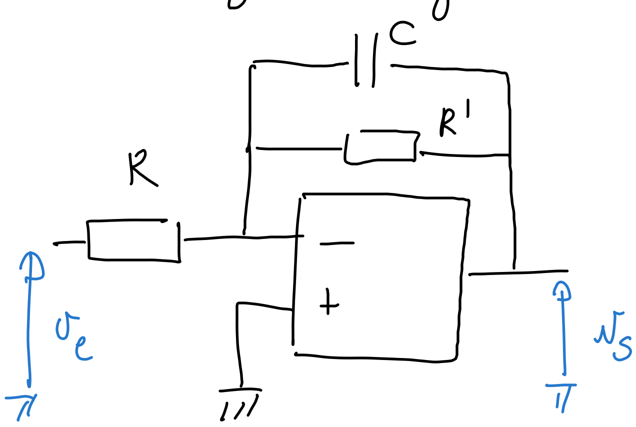
$v^+ = 0 \Rightarrow V_A = 0$

Loi des noeuds en terme de potentiel en A :

$$\frac{v_1 - V_A}{R} + \frac{v_2 - V_A}{R} + \frac{v_S - V_A}{R} = 0$$

$$\Rightarrow \boxed{v_S = -\left(v_1 + v_2\right)}$$

* Montage intégrateur



$\Rightarrow$ ampli inverseur avec :

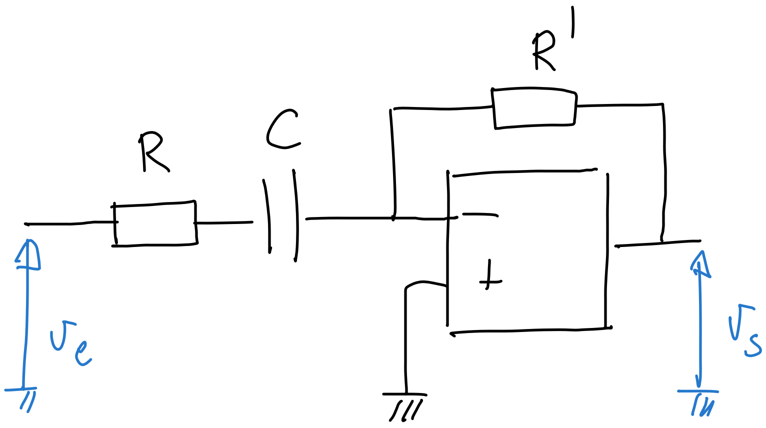
$$Z_1 = R$$

$$Y_2 = \frac{1}{R'} + jC\omega$$

$$\underline{H} = \frac{-1}{Z_1 Y_2} \Rightarrow \boxed{\underline{H} = \frac{-R'/R}{1 + jRC\omega}}$$

Savoir faire l'analyse BF / HF

* Montage dérivateur



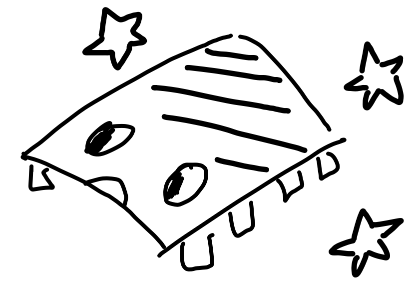
$\Rightarrow$ Ampli inverseur avec

$$Z_1 = R + \frac{1}{jC\omega}$$

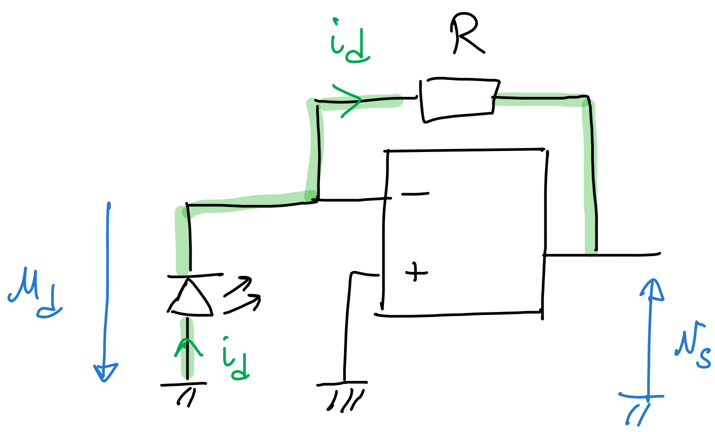
$$Z_2 = R'$$

$$\underline{H} = \frac{-R'}{R + \frac{1}{jC\omega}} \Rightarrow \boxed{\underline{H} = \frac{-\frac{R'}{R}\left(jRC\omega\right)}{1 + jRC\omega}}$$

DES MONTAGES À CONNAITRE



* Convertisseur courant tension

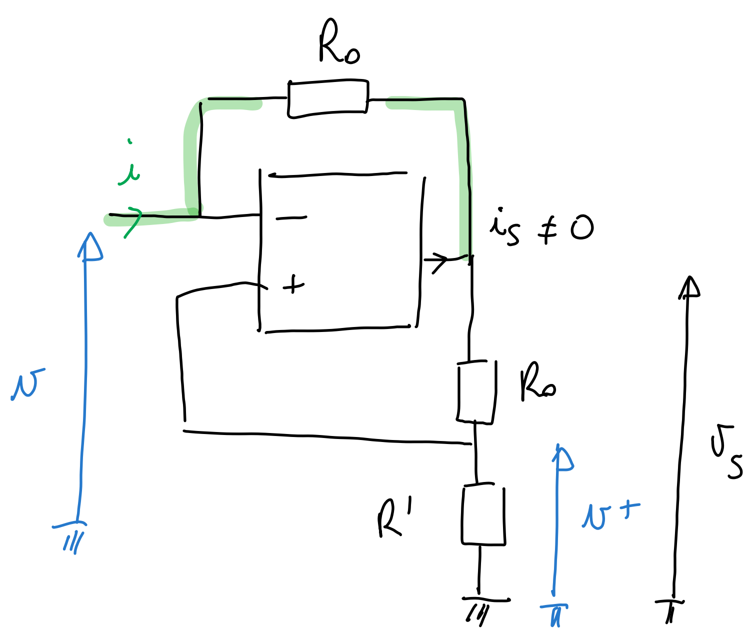


$$\left.\begin{array}{l} v^+ = 0 \\ v^- = u_d \end{array}\right\} \; u_d = 0$$

$$\boxed{v_s = -R\, i_d}$$

$i_d \nearrow$ lorsque l'éclairement lumineux $\nearrow$

* Résistance négative

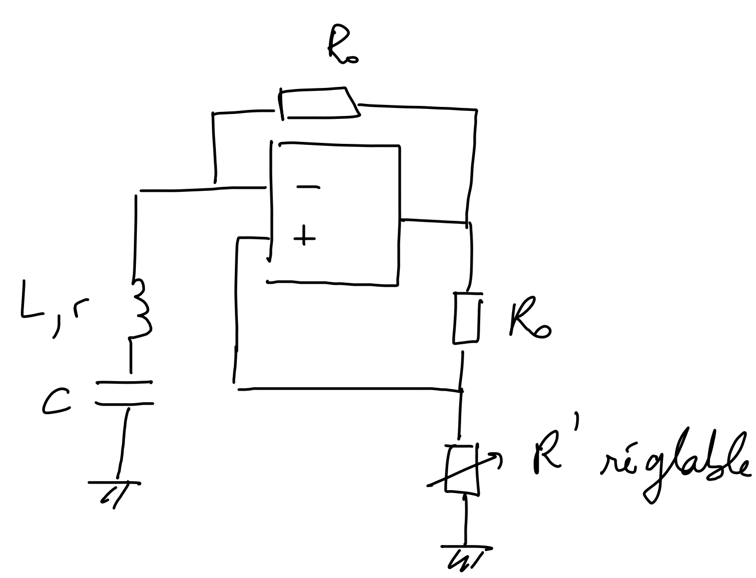


$$\left\{\begin{array}{l} v^- = v \\ v^+ = \dfrac{R'}{R' + R_0}\, v_s \\ v - v_s = R_0 i \end{array}\right. \quad v_s = \left(1 + \frac{R_0}{R'}\right) v$$

$$\Rightarrow \quad -\frac{R_0}{R'}\, v = R_0\, i$$

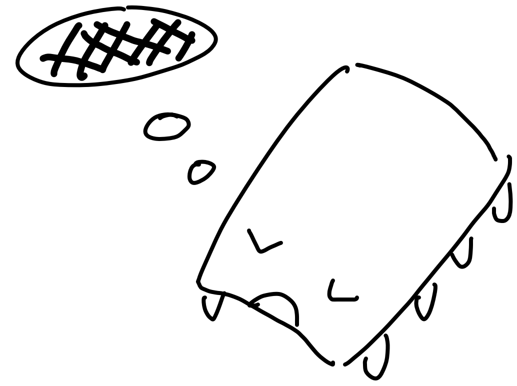
soit $\boxed{v = -R'\, i}$

$\Rightarrow$ Oscillateur à résistance négative



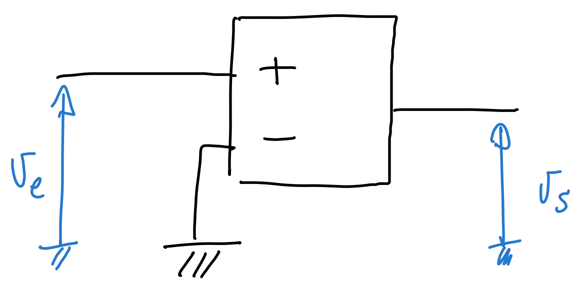
Le montage à résistance négative permet de compenser la résistance r de la bobine $\Rightarrow$ comme si on avait un circuit L, C $\left(\dfrac{d^2 u_c}{dt^2} + \omega_0^2 u_c = 0 \text{ avec } \omega_0^2 = \dfrac{1}{LC} \right)$

RÉGIME SATURÉ



$v^+ > v^- \iff v_s = +V_{sat}$	
$v^+ < v^- \iff v_s = -V_{sat}$	

* Comparateur simple



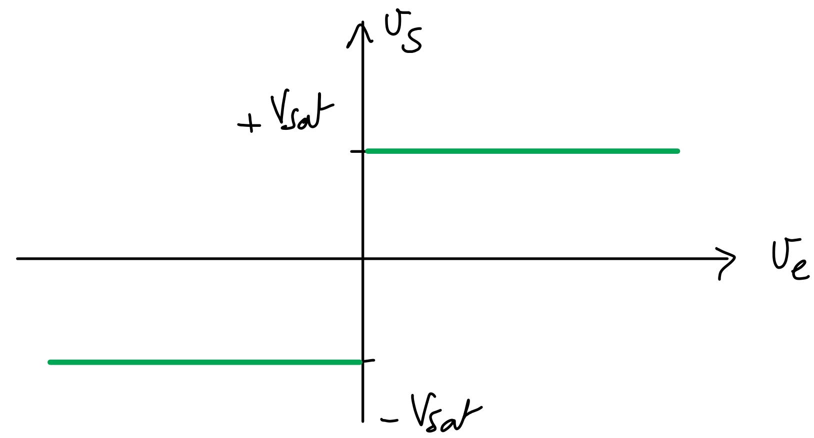
* On suppose $v_s = +V_{sat}$

$\Rightarrow v^+ > v^-$ soit $v_e > 0$

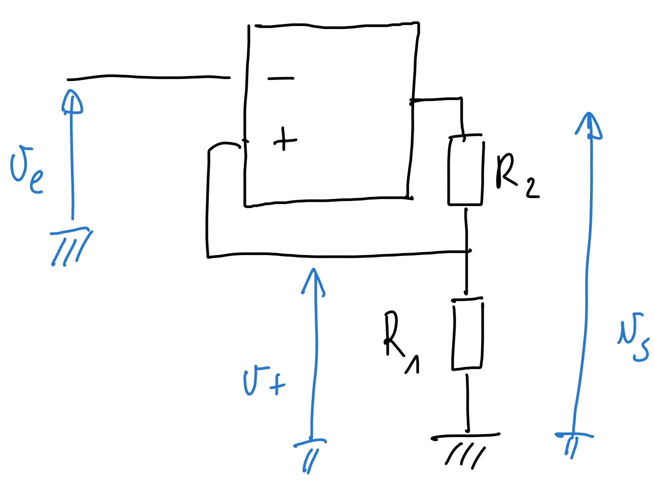
* On suppose $v_s = -V_{sat}$

$\Rightarrow v^+ < v^-$ soit $v_e < 0$

Bilan :



* Comparateur à hystérésis



* Diviseur de tension $v^+ = \dfrac{R_1}{R_1 + R_2} v_s$

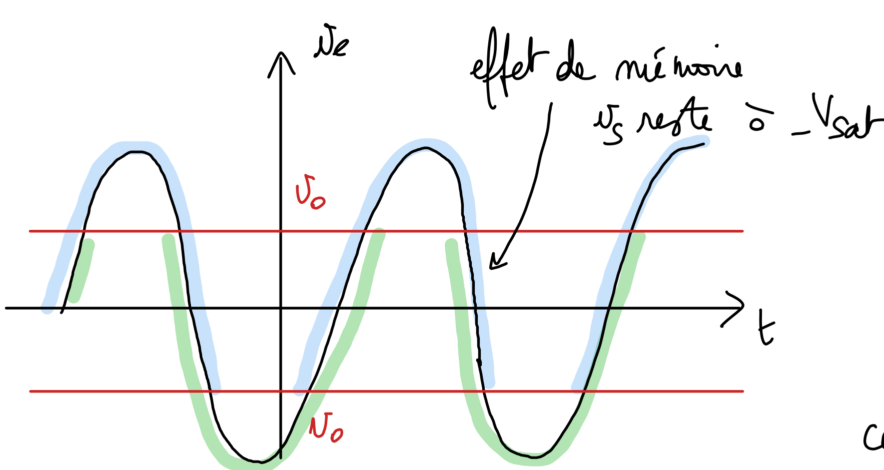
$\Rightarrow$ on note $v_0 = \dfrac{R_1}{R_1 + R_2} V_{sat}$

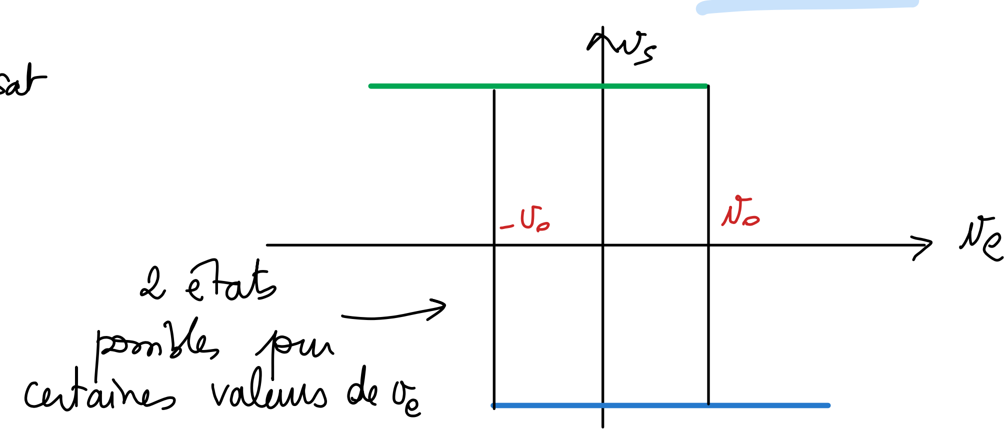
* On suppose $v_s = +V_{sat}$

$v_+ > v_-$ soit $v_e < v_0$

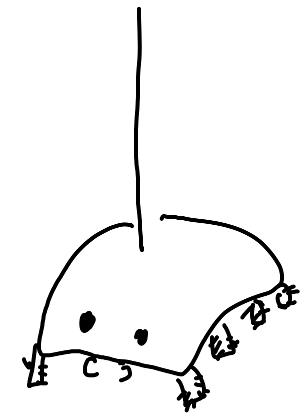
* On suppose $v_s = -V_{sat}$

$v^+ < v^-$ soit $-v_0 < v_e$

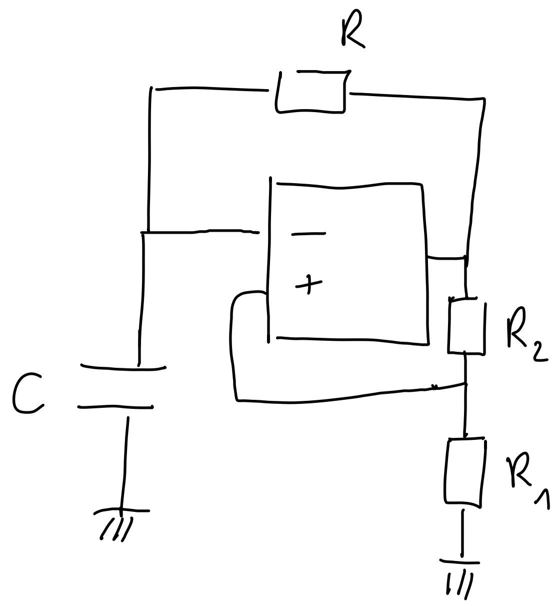




Montages à tester / étudier



* Multivibrateur

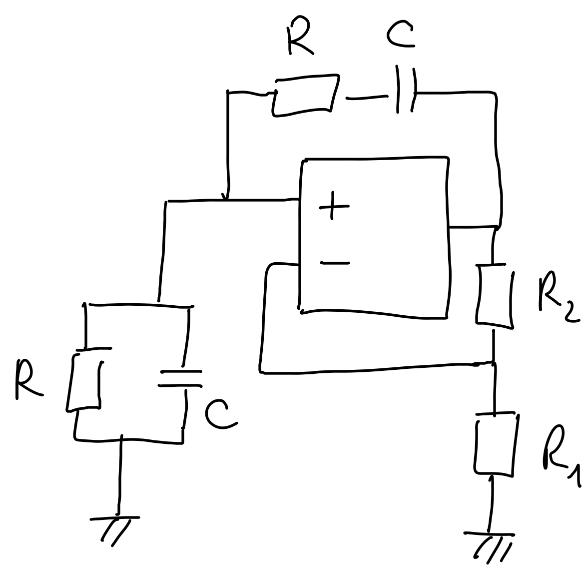


$R = 10\ k\Omega$

$C = 10\ nF$

$R_1 = R_2 = 10\ k\Omega$

* Oscillateur de Wien

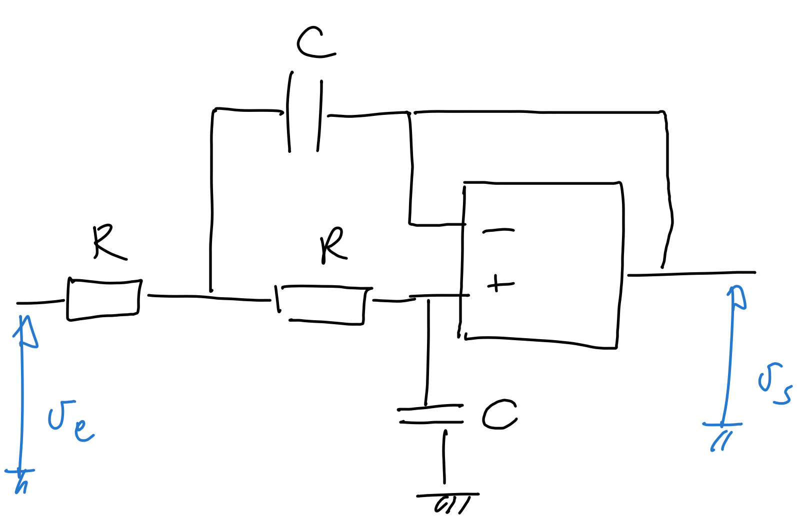


$R = 10\ k\Omega$ $C = 10\ nF$

$R_1 = 1\ k\Omega$ $R_2 = 2{,}2\ k\Omega$

(il faut $\frac{R_2}{R_1} > 2$)

Filtre de Sallen-Key (cas du passe-bas d'ordre 2)



$R = 10\ k\Omega$ $C = 10\ nF$

$\Rightarrow$ Vérifier passe-bas d'ordre 2

Déterminer Q et f_0

Vérifier :

$Q = \frac{1}{2}$ $f_0 = \frac{1}{2\pi RC}$