

Ingénierie Electronique pour le Traitement de l'Information

TD9

Modéliser et corriger des systèmes

Julien VILLEMEJANE



Paris-Saclay



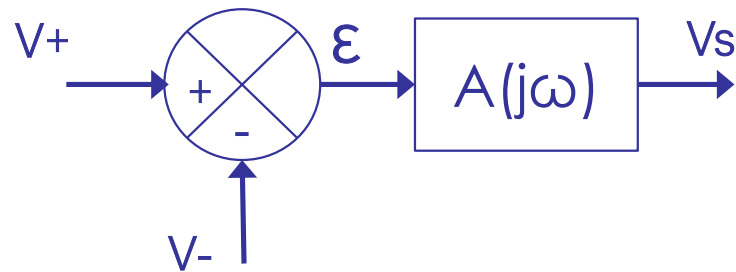
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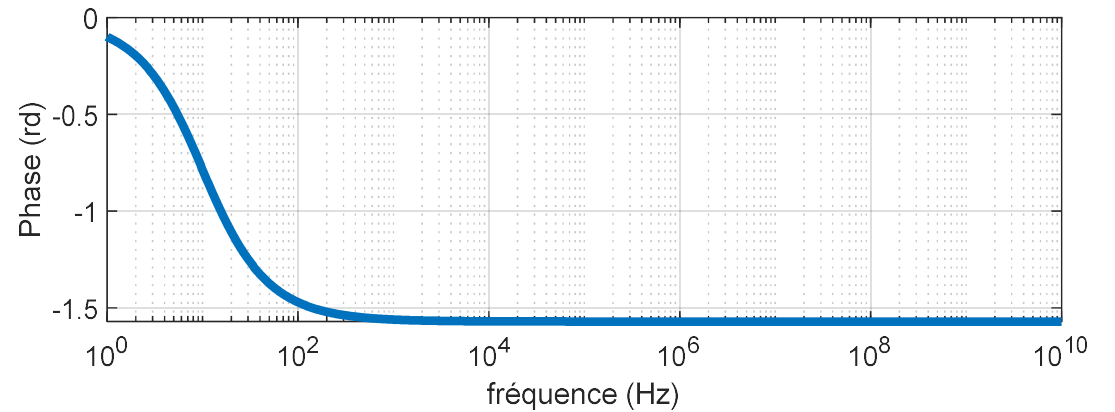
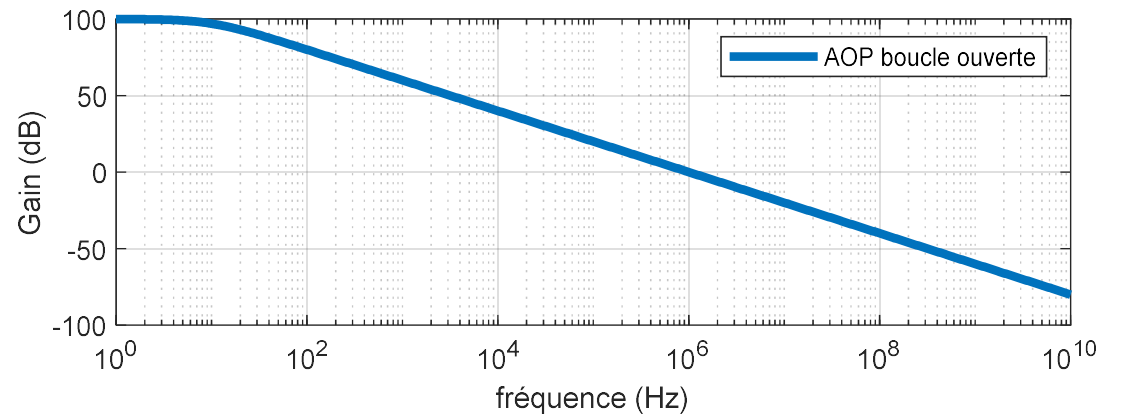
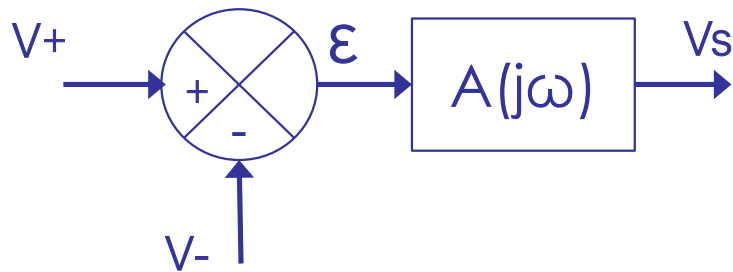
- Exercice 1 / Modélisation ALI

$$A(p) = \frac{V_S(p)}{\varepsilon(p)} = \frac{A_0}{1 + \frac{p}{\omega_c}}$$



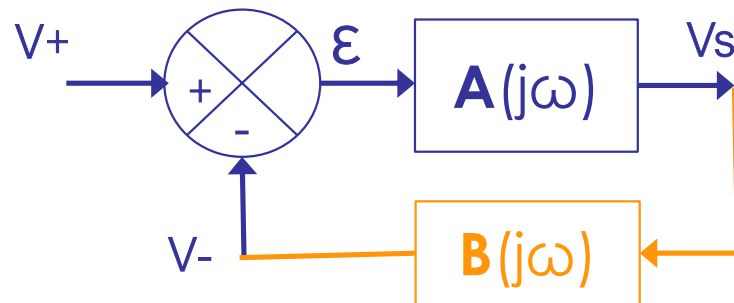
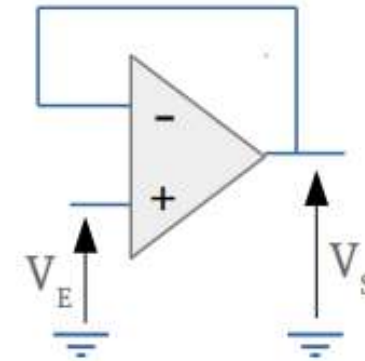
• Exercice 1 / Modélisation AII

$$A(p) = \frac{V_S(p)}{\varepsilon(p)} = \frac{A_0}{1 + \frac{p}{\omega_c}}$$



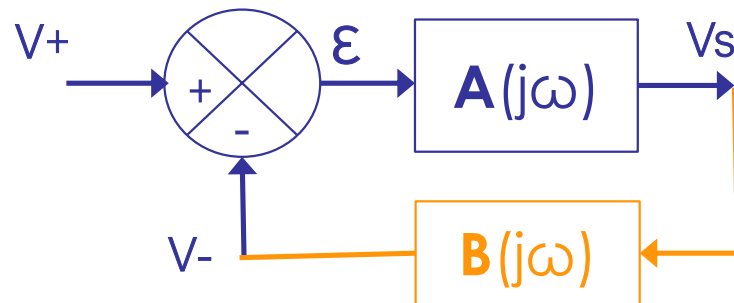
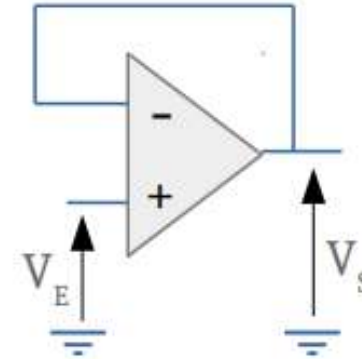
• Exercice 1 / Modélisation AII - Rebouclage

$$A(p) = \frac{V_S(p)}{\varepsilon(p)} = \frac{A_0}{1 + \frac{p}{\omega_c}}$$



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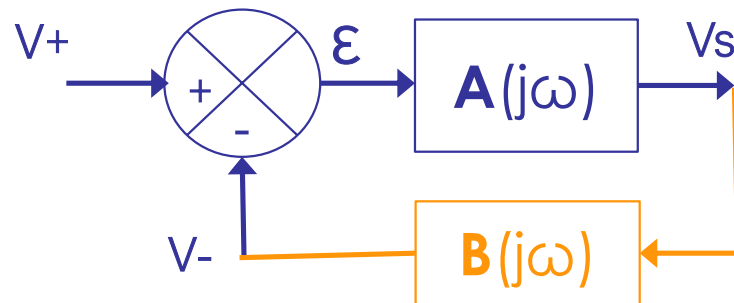
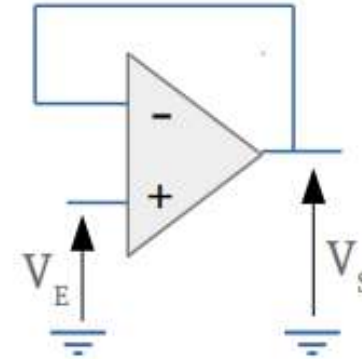


$$V_S = A(j\omega) \cdot (V_E - B(j\omega) V_S)$$



• Exercice 1 / Modélisation AII - Rebouclage

$$A(p) = \frac{V_S(p)}{\varepsilon(p)} = \frac{A_0}{1 + \frac{p}{\omega_c}}$$

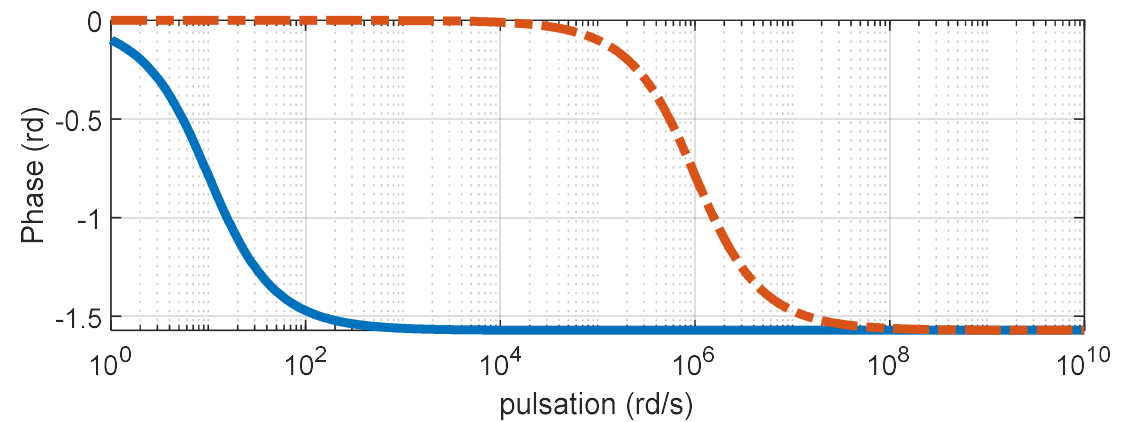
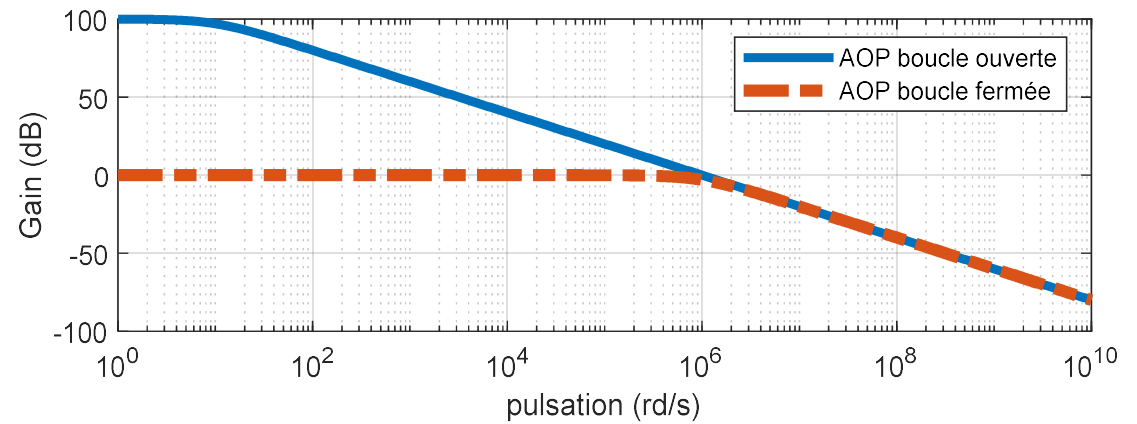
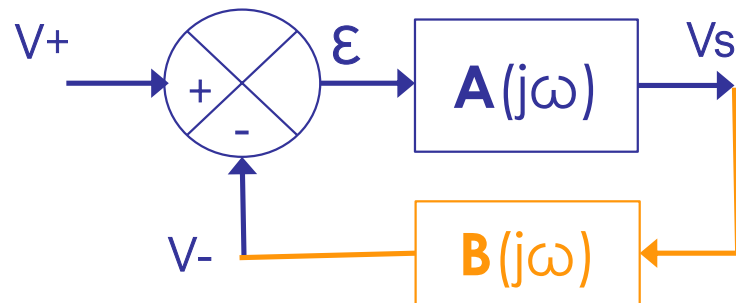


$$V_s/V_e = \frac{A(j\omega)}{1 + A(j\omega) \cdot B(j\omega)}$$



• Exercice 1 / Modélisation AII - Rebouclage

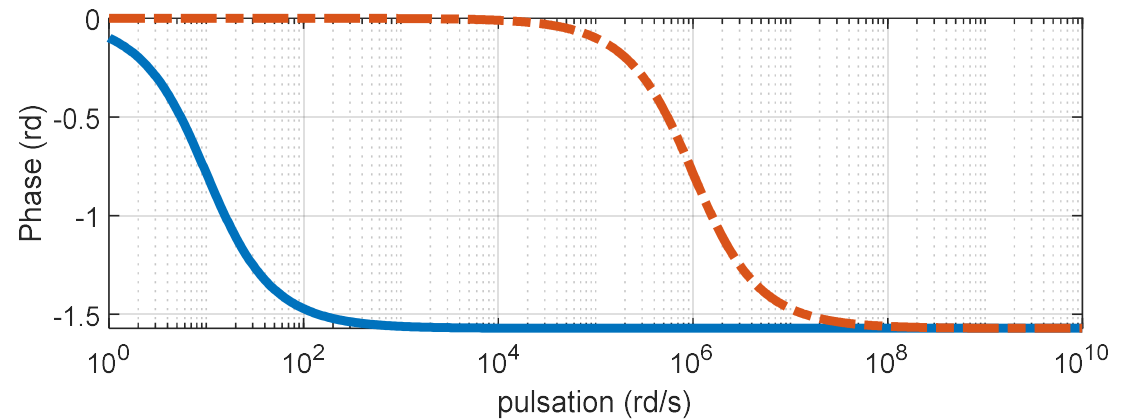
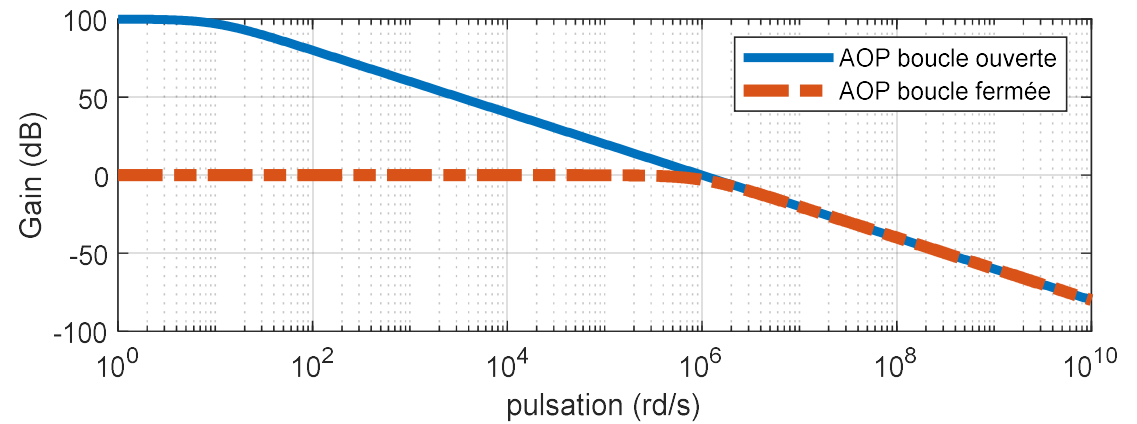
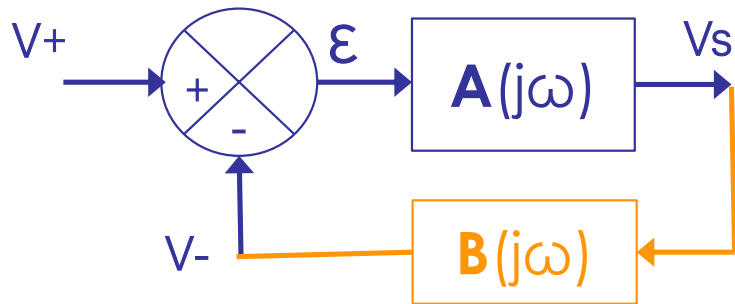
$$H(p) = \frac{A_0}{1 + A_0} \cdot \frac{1}{1 + \frac{p}{\omega_c \cdot (1 + A_0)}}$$



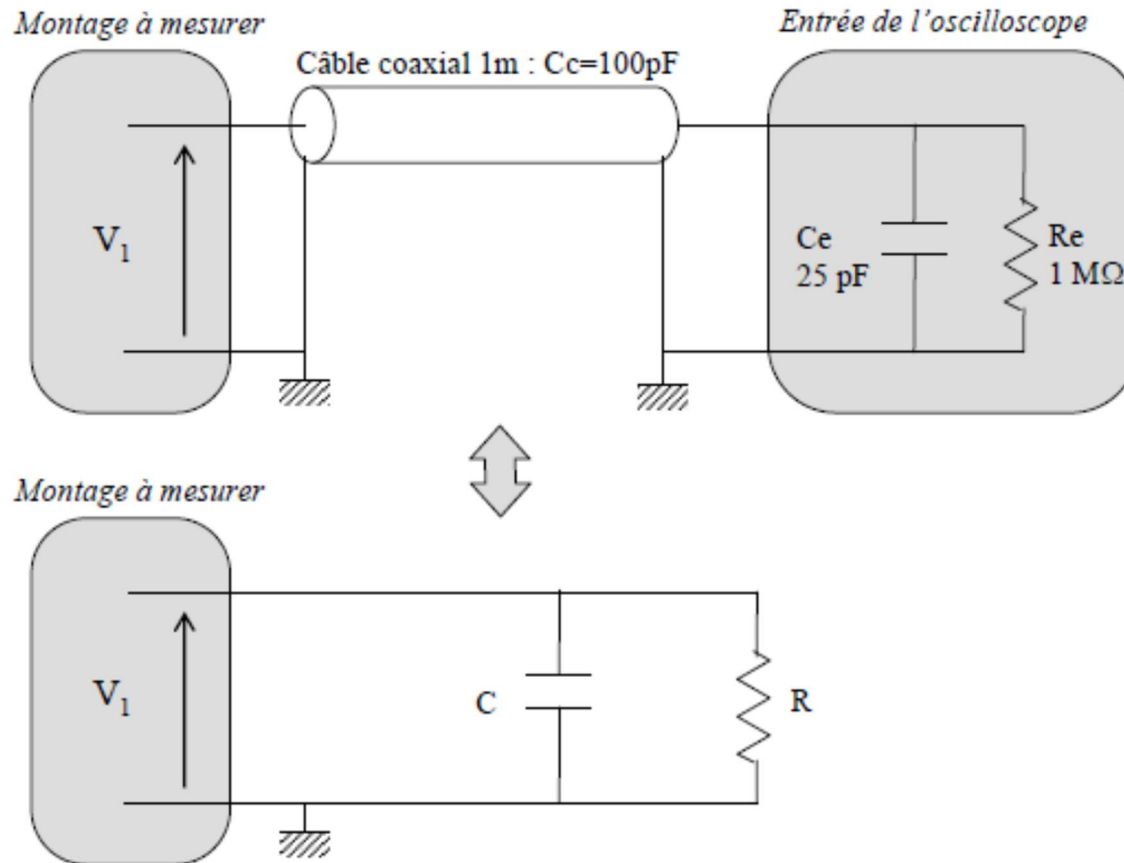
• Exercice 1 / Modélisation AII - Rebouclage

$$H_0 = \frac{A_0}{1+A_0} \approx 1$$

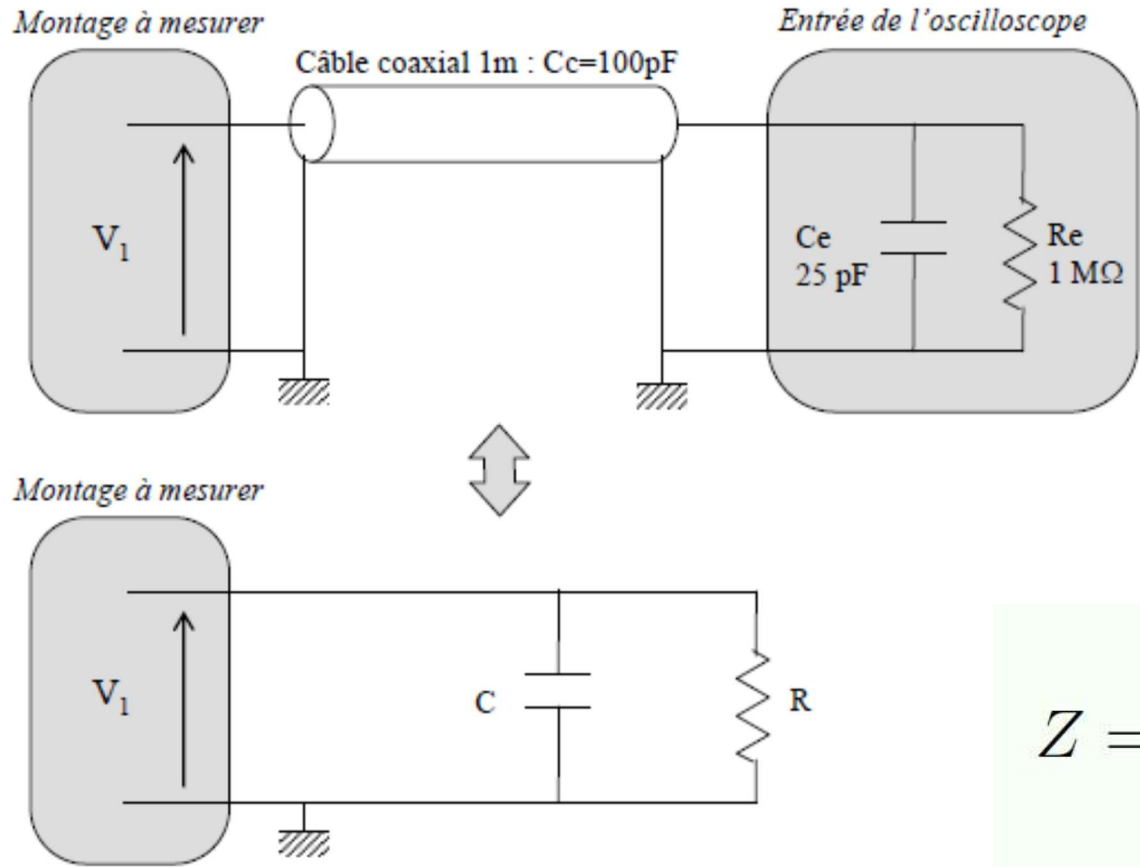
$$f_0 = f_c \cdot (1 + A_0) = GBP \cdot \frac{1+A_0}{A_0}$$



- Exercice 2 / Modèle d'un oscilloscope



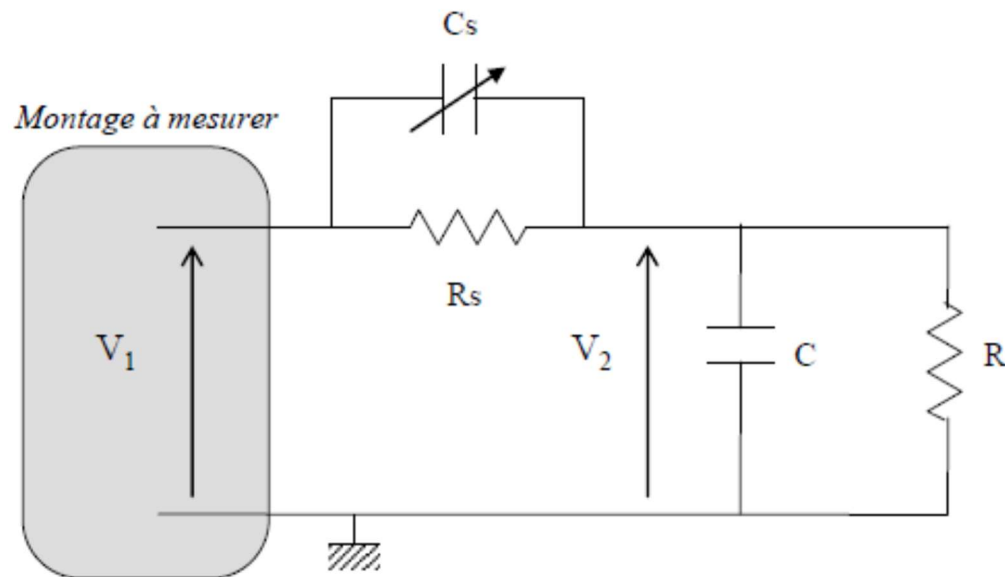
• Exercice 2 / Modèle d'un oscilloscope



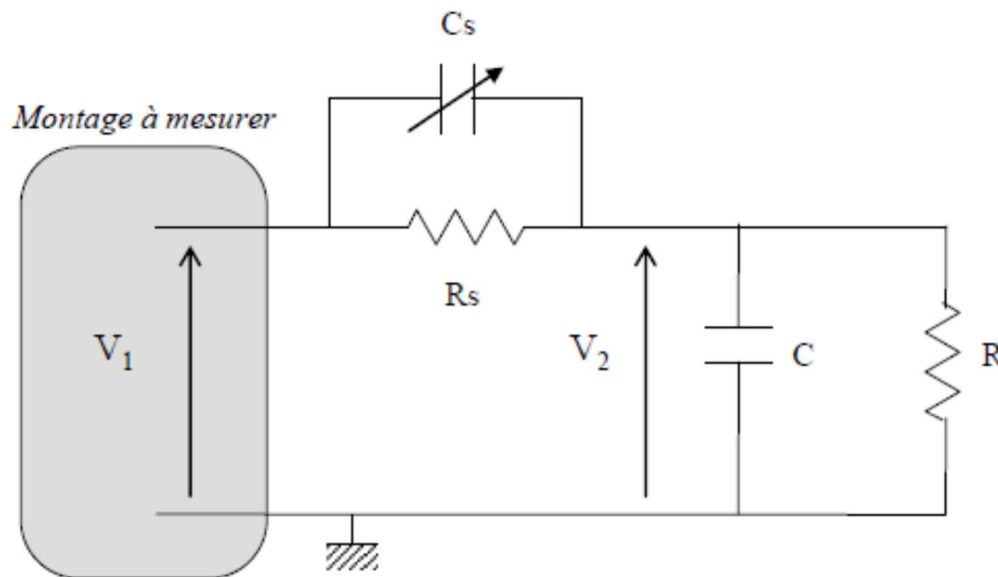
$$Z = \frac{\frac{R}{jC\omega}}{R + \frac{1}{jC\omega}} = \frac{R}{1 + jRC\omega}$$



- Exercice 2 / Sonde compensée



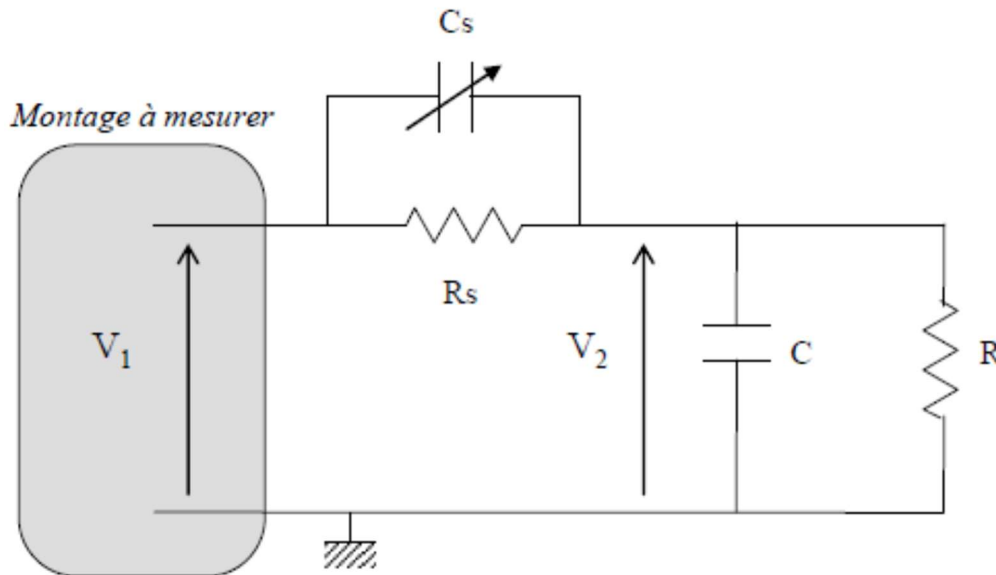
• Exercice 2 / Sonde compensée



$$T = \frac{R}{R + R_S} \cdot \frac{1 + jR_S C_S \omega}{1 + j \frac{R R_S}{R + R_S} (C + C_S) \omega}$$



• Exercice 2 / Sonde compensée



$$f_1 = \frac{1}{2\pi R_s C_s}$$

$$f_2 = \frac{R + R_s}{2\pi R R_s (C + C_s)}$$

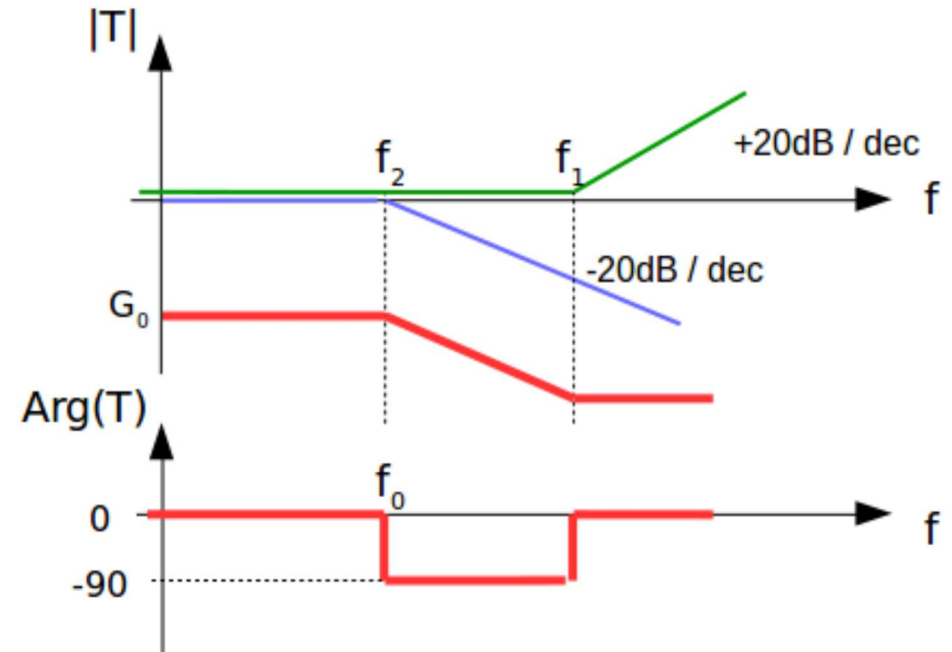
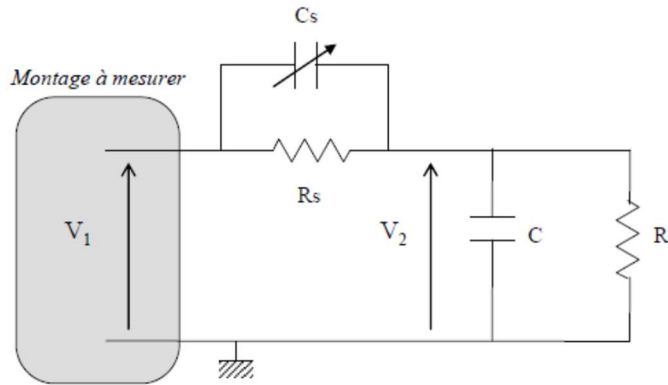
$$T = \frac{R}{R + R_s} \cdot \frac{1 + j R_s C_s \omega}{1 + j \frac{R R_s}{R + R_s} (C + C_s) \omega}$$



• **Exercice 2 / Sonde compensée**

$C_s = 5\text{pF}$

$f_1 = 3,5\text{ kHz}$ et $f_2 = 1,3\text{ kHz}$



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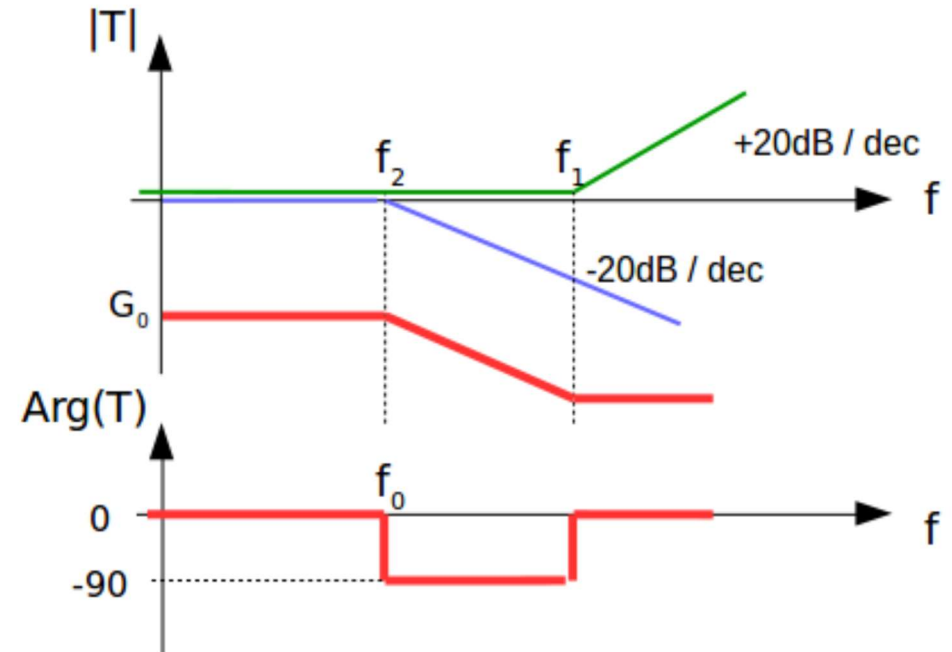
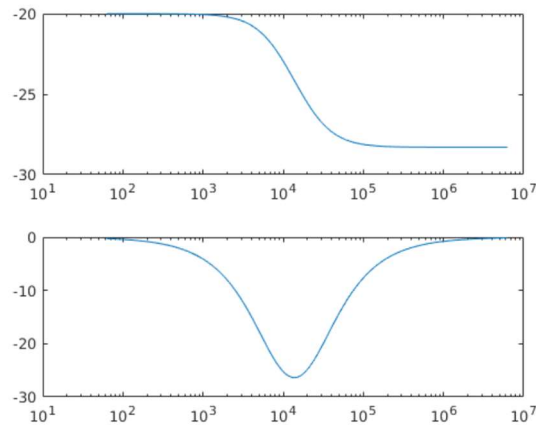
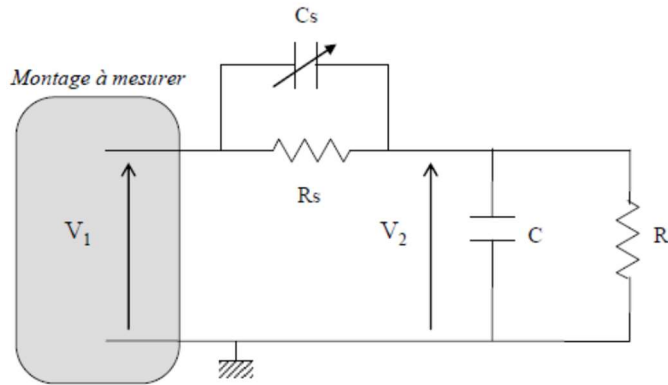


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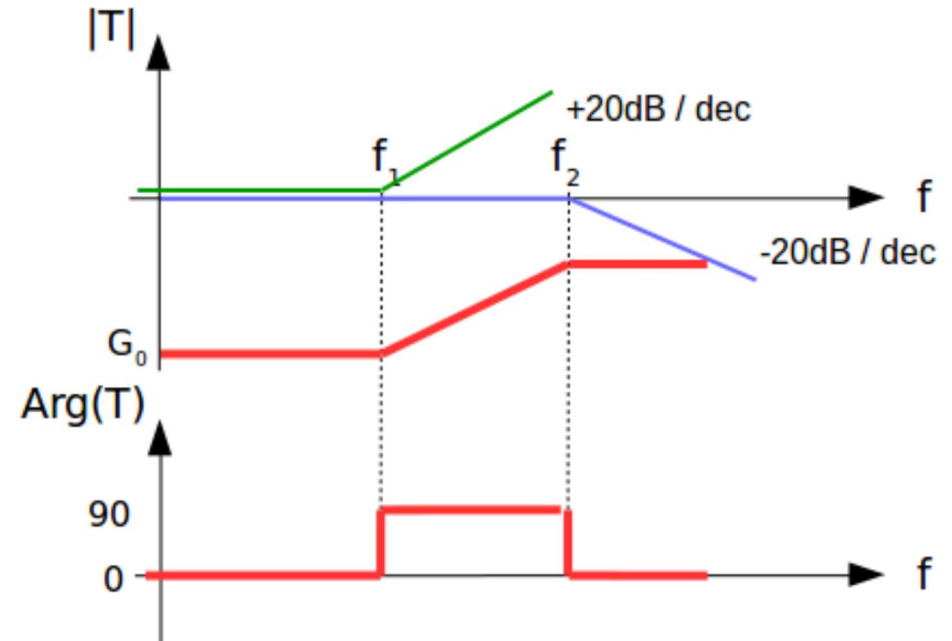
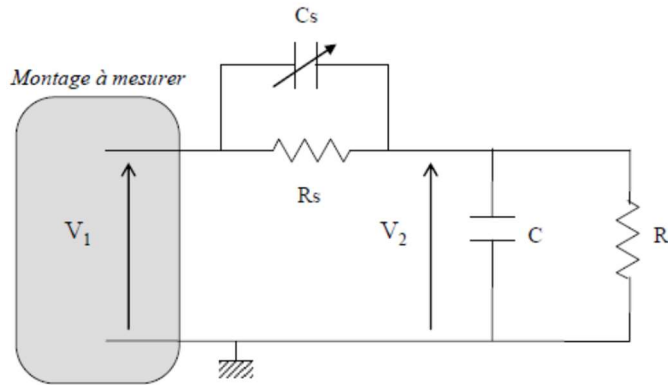


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• **Exercice 2 / Sonde compensée**

$C_s = 50\text{pF}$

$f_1 = 350\text{ Hz}$ et $f_2 = 1\text{ kHz}$



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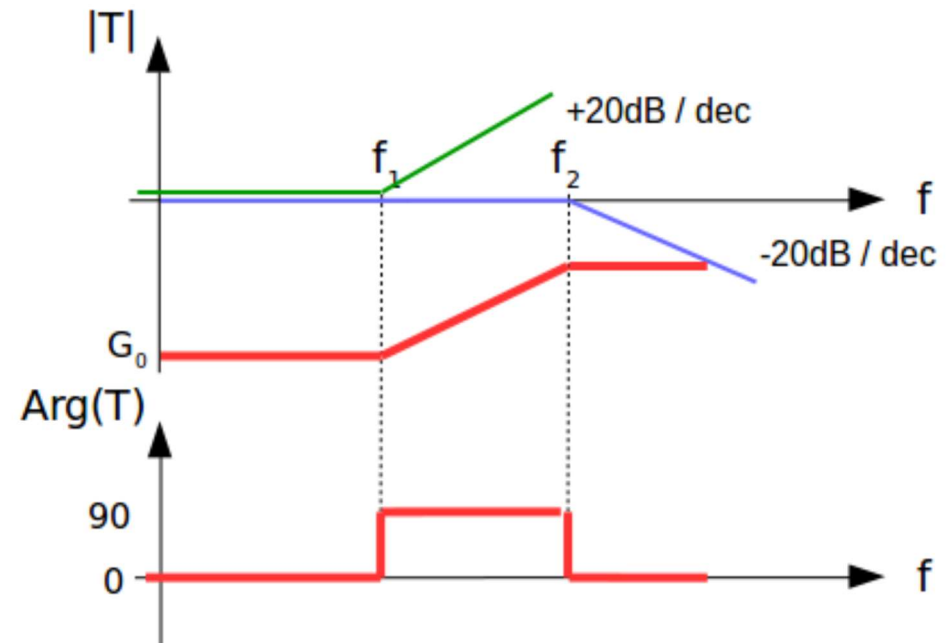
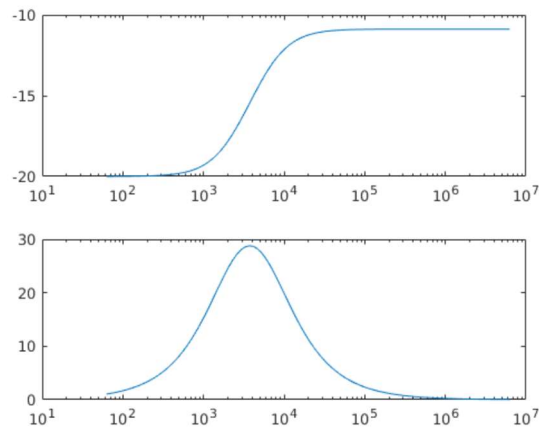
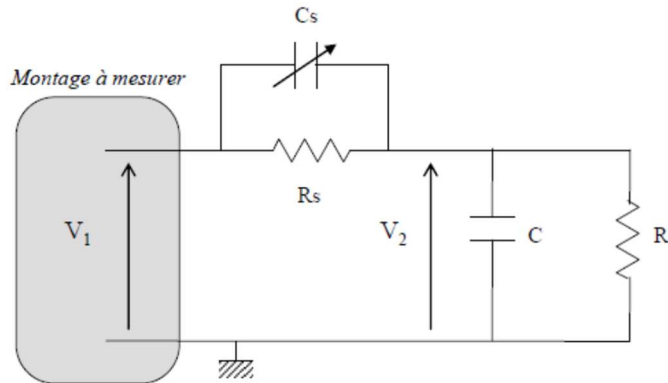


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• Exercice 2 / Sonde compensée

Bon choix de Cs
f1 = f2

