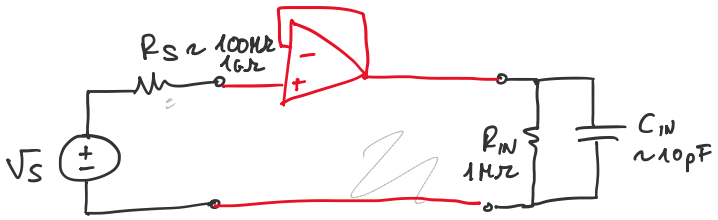
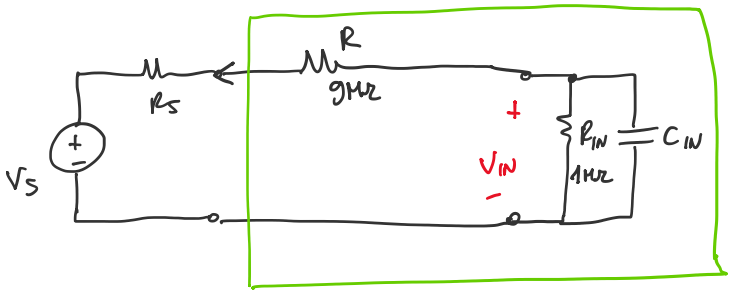
COMPENSAZIONE SONDA

Tuesday, 9 October 2018 08:58



UTILIZZO UN BUFFER NEL CASO CHE $R_S \gg R_{IN}$

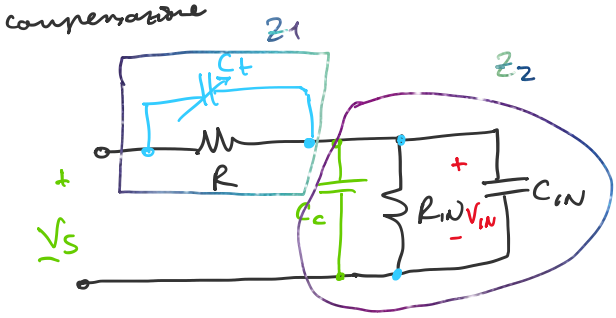


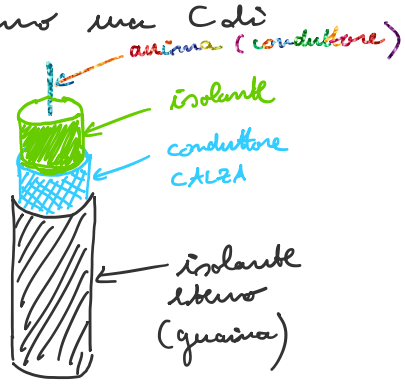
Se utilizzo la sonda in modalità x10, inserisco una R da 9MΩ

FILTRO RC

$V_{IN} \neq V_S \quad \forall f$ in quanto ho introdotto un filtro RC passa basso

Per evitare questo problema, introduciamo una C di compensazione





$$H(j\omega) = \frac{V_{IN}}{V_S} = \text{cost}, \quad \forall f$$

$$H(j\omega) = \frac{Z_2}{Z_1 + Z_2} = \frac{\frac{R_{IN}}{R_{IN}(C_c+C_{IN})j\omega + 1}}{\frac{R_{IN}}{R_{IN}(C_c+C_{IN})j\omega + 1} + \frac{R}{RCj\omega + 1}} =$$

$$= \frac{R_{IN}(CRj\omega + 1)}{R_{IN}(RCj\omega + 1) + R[R_{IN}(C_c+C_{IN})j\omega + 1]} = \frac{R_{IN} + R_{IN}Rj\omega C}{R_{IN} + R + R_{IN}R(C + C_c + C_{IN})j\omega}$$

$$H(j\omega) = K, \quad \forall \omega$$

$$H(0) = H(\infty) \qquad H(0) = \frac{R_{IN}}{R_{IN}+R} = H(\infty) = \frac{C}{C + C_c + C_{IN}}$$

$$\boxed{\frac{R_{IN}}{R_{IN}+R} = \frac{C}{C + C_c + C_{IN}}}$$

VELOCITÀ DEL CCV

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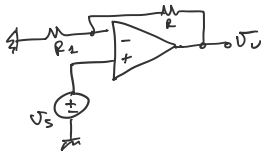


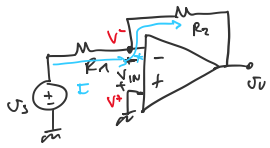
NON- INV

$A_V = \left(1 + \frac{R_2}{R_1}\right)$

INV

$A_V = -\frac{R_2}{R_1}$

$v_S(t) = V_{pp} \sin(\omega t) \Longrightarrow v_U(t) = V_{pp} |H(j\omega)| \sin\left[\omega t + \angle H(j\omega)\right]$



$A_{VOLφ} \gg 1$ $\quad v_U = A_{VOLφ} v_{IN}$

$A_{VOLφ} \to +\infty$

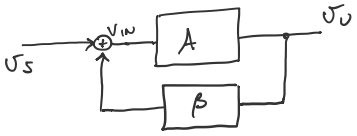
$V^- \cong V^+ = 0 \Rightarrow V^- \to 0$

Per il CCV

$V_{IN} \to 0$

$V^- \to V^+$

$I = \frac{v_S}{R_1}$ $\quad v_U = -R_2 I \Rightarrow v_U = -\frac{R_2}{R_1} v_S$



$v_U = V_{IN} \cdot A$

$V_{IN} = v_S + \beta v_U$

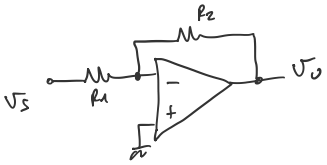
$\frac{V_{IN} - v_S}{\beta} = v_U$

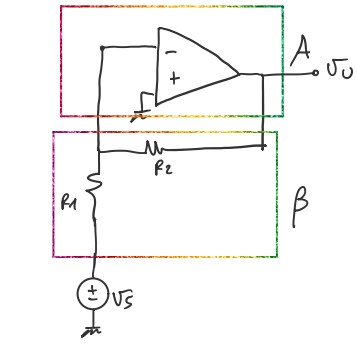
$\frac{v_{IN} - v_S}{\beta} = V_{IN} \cdot A$

$v_{IN} - v_S = \beta A V_{IN} \Rightarrow V_{IN}(1 - \beta A) = v_S$

$$V_{IN} = \frac{v_S}{1 - \beta A}$$

Se $A \to +\infty \Rightarrow V_{IN} \to 0$ in quanto V_S è limitata



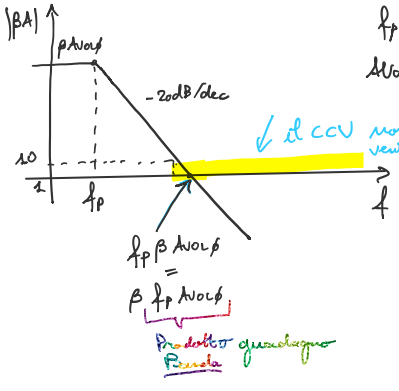


$A = \frac{A_{VOLφ}}{1 + \frac{s}{\omega_p}}$

$\beta = \frac{R_1}{R_1 + R_2}$

Affinché valga il CCV

$\beta A \gg 1$



$f_{p,\mu A741} \cong 4\,Hz$

$A_{VOLφ} \cong 200.000$

il CCV non è più verificato perché $|\beta A| < 10$ ($|\beta A|$ non è $\gg 1$)

$f_p \beta A_{VOLφ} = \beta f_p A_{VOLφ}$

Prodotto guadagno Banda

SLEW - RATE

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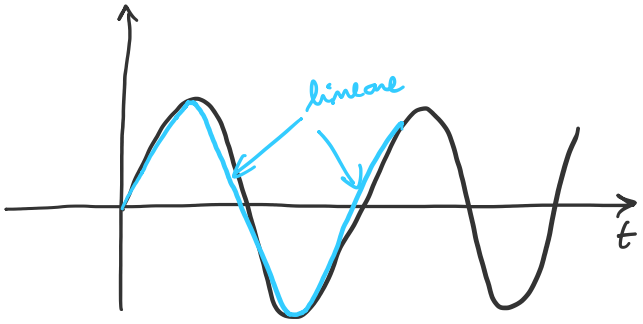


SLEW RATE $\sigma = \left| \frac{\partial v_u}{\partial t} \right|_{MAX}$

$\sigma_{\mu A741} \simeq 0{,}5 \, V/\mu s$

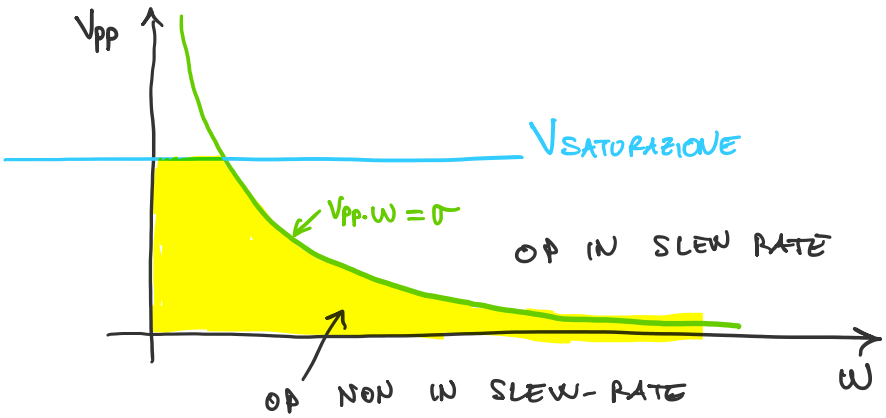
Se v_u varia troppo velocemente $\Rightarrow v_u = \sigma \cdot t + V_0$

$v_u = V_{pp} \sin(\omega t)$

$\frac{\partial v_u}{\partial t} = V_{pp} \omega \cos(\omega t)$

$\left| \frac{\partial v_u}{\partial t} \right|_{MAX} < \sigma$

$V_{pp} \cdot \omega < \sigma$



$V_{pp} < V_{SAT}$
affinché l'operazionale si comporti come un sistema lineare