PASABAJOS DE CAUER: *Síntesis en CASCADA. Usar celdas con realimentación doble T*

Proyecto TC II

Pasabajos Cauer : $\omega = 20\,000$ rad/s $\Rightarrow N = 20000$

$A_1 = 0,95$
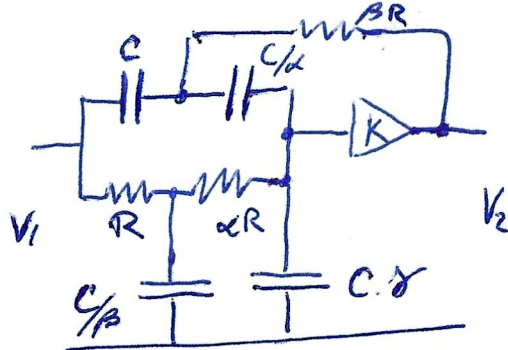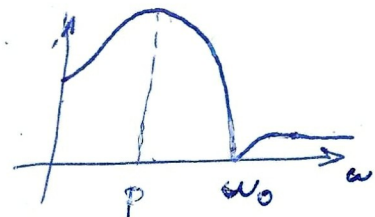
$A_2 = 0,04$

$\overline{\omega}_s = 1,3$

Obtención de $G(s)$ a partir de tablas :

1ª tabla : $G(s) = \dfrac{G(s^2 + a_0)}{s^2 + b_1 s + b_0}$;

$b_1 = 0,829058$

$b_0 = 1,62319$

$a_0 = 2,76980$

$G = A_2 = 0,0410,55 \rightarrow$ no cumple

2ª tabla : $G(s) = \dfrac{G(s^2 + a_1)}{(s+P)(s^2 + b_{11} s + b_{10})} \rightarrow$

P

b_{11}

b_{10}

a_1

H

$A_2 = 0,158 \rightarrow$ no cumple

3ª tabla : $G(s) = \dfrac{G(s^2 + a_1)(s^2 + a_2)}{(s^2 + b_{11} s + b_{10})(s^2 + b_{21} s + b_{20})}$

$b_{11} = 0,9831$

$b_{10} = 0,5638$

$a_1 = 1,8720$

$b_{21} = 0,2184$

$b_{20} = 1,067$

$a_2 = 8,096$

$G = A_2 = 0,038 \rightarrow$ cumple

$$G(s) = G \underbrace{\frac{s^2 + 1,872}{s^2 + 0,9831 s + 0,5638}}_{G_1(s)} \overset{cascada}{\cdot} \underbrace{\frac{s^2 + 8,096}{s^2 + 0,2184 s + 1,067}}_{G_2(s)}$$

$\omega_0 > P$

$$\frac{V_2}{V_1} = \frac{K}{\left(1 + \frac{\alpha \gamma}{\beta}\right) s^2 + s \dfrac{SG(2 - k + \alpha\gamma)}{\beta + \alpha\gamma} + S^2 G^2 \dfrac{\beta}{\beta + \alpha\gamma}} \cdot \frac{s^2 + S^2 G^2}{}$$

$\alpha = 1 \Rightarrow \beta = 0,5$

1° Celda :

$$S^2 G^2 = 1{,}872 \quad Si \begin{cases} S=1 \Rightarrow G \approx 1{,}3682 \\ S=2 \Rightarrow G \approx 0{,}684 \\ S=3 \Rightarrow G \approx 0{,}456 \end{cases} \rightarrow \boxed{\bar{C}=1 \wedge \bar{R}=0{,}731}$$

$$S^2 G^2 \frac{\beta}{\beta + \alpha \gamma} = 0{,}5638 \Rightarrow \boxed{\gamma = 1{,}16}$$

$$\frac{S \cdot G (2-k+\alpha \gamma)}{\beta + \alpha \gamma} = 0{,}9831 \Rightarrow \boxed{K = 1{,}967}$$

mismos capacitores

2° Celda :

$$s^2 G^2 = 8{,}096 \quad Si \begin{cases} S=1 \Rightarrow G \approx 2{,}845 \\ S=2 \Rightarrow G \approx \\ S=3 \Rightarrow G \approx \end{cases} \rightarrow \boxed{\bar{C}=1 \wedge \bar{R}=0{,}351}$$

$$C = 10nF \Rightarrow \partial = 5000$$

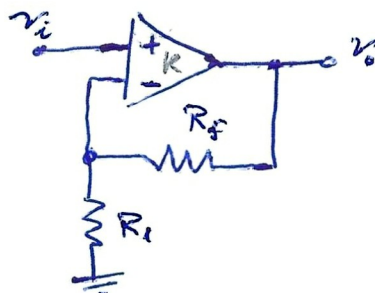$$S^2 G^2 \cdot \frac{\beta}{\beta + \alpha \gamma} = 1{,}067 \Rightarrow \boxed{\gamma = 0{,}833}$$

$$\frac{S \cdot G (2-k+\alpha \gamma)}{\beta + \alpha \gamma} = 0{,}2184 \Rightarrow \boxed{K = 2{,}73}$$

Diseño amplificadores :

$$k = 1 + \frac{R_f}{R_1}$$

1° Celda

$$K = 1{,}967 \Rightarrow \frac{R_f}{R_1} = 0{,}967$$

$$\boxed{\begin{array}{l} R_f = 965 \Omega \\ R_1 = 1k\Omega \end{array}} \rightarrow k = 1{,}965$$

2° Celda

$$K = 2{,}73 \Rightarrow \frac{R_f}{R_1} = 1{,}73$$

$$\boxed{\begin{array}{l} R_f = 1{,}72 k\Omega \\ R_1 = 1k\Omega \end{array}} \rightarrow K = 2{,}72$$

Diseño Completo:

Etapa 1 (izquierda):
- 1,82 kΩ
- 10nF, 10nF
- K = 1,965
- 3,65kΩ, 3,65kΩ
- 965 Ω
- 11,60F
- 20nF
- 1KΩ

Etapa 2 (derecha):
- 876Ω
- 10nF, 10nF
- K = 2,72
- 1,76kΩ, 1,76kΩ
- 8,33nF
- 1,72kΩ
- 20nF
- 1KΩ