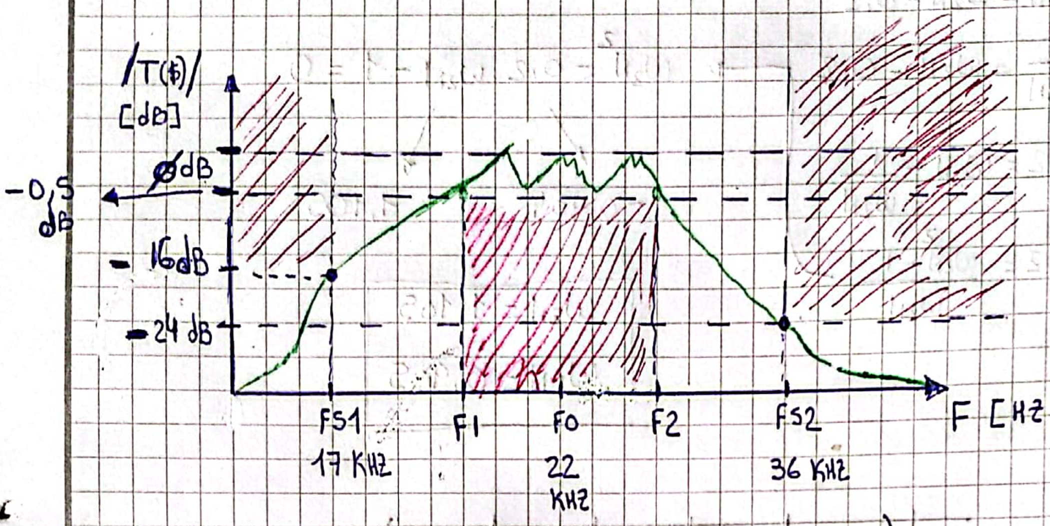
TS5 (A)

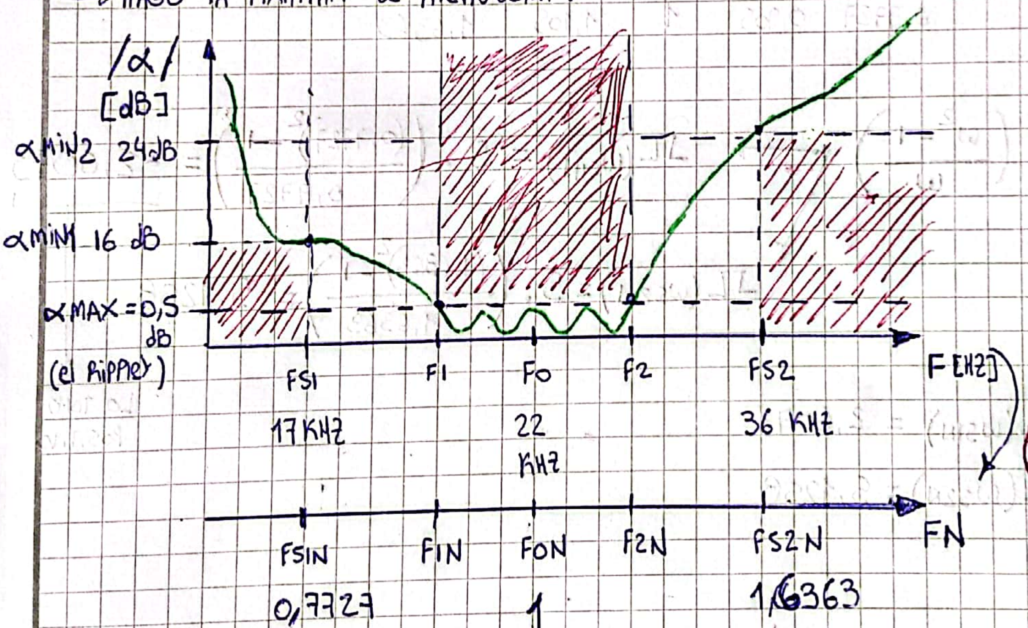
TAREA SEMANAL 5 PASABANDA



Se sabe que:

- $Q = 5$
- Aproximación Chebyshev con ripple de 0,5 dB

→ Hago la plantilla de atenuación:



$W_{O_N} = 1$

- $Q = \frac{W_{ON}}{B} \therefore \Rightarrow Q = \frac{1}{B} \Rightarrow B = \frac{1}{Q} \Rightarrow \left[B = \frac{1}{5} = 0{,}2 \right]$

- $B = W_{2N} - W_{1N} \Rightarrow 0{,}2 = W_{2N} - W_{1N} \Rightarrow \left[W_{1N} = W_{2N} - 0{,}2 \right]$

- $W_0^2 = W_1 \cdot W_2 \Rightarrow W_{O_N}^2 = W_{1N} \cdot W_{2N} \Rightarrow \left[1 = W_{1N} \cdot W_{2N} \right]$

$\quad \llcorner 1^2 = 1$

$$\begin{cases} \omega_{1N} = \omega_{2N} - 0{,}2 \\ 1 = \omega_{1N} \cdot \omega_{2N} \longrightarrow \omega_{1N} = \dfrac{1}{\omega_{2N}} \end{cases}$$

$$\omega_{1N} = \omega_{2N} - 0{,}2$$

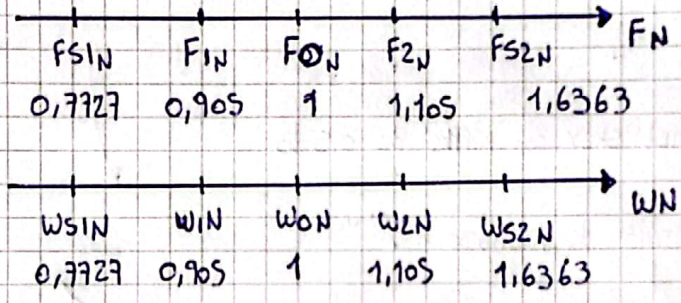
$$\frac{1}{\omega_{2N}} = \omega_{2N} - 0{,}2 \longrightarrow \omega_{2N}^2 - 0{,}2 \cdot \omega_{2N} - 1 = 0$$

$$0{,}2 = \omega_{2N} - \frac{1}{\omega_{2N}}$$

$$0{,}2 = \frac{\omega_{2N}^2 - 1}{\omega_{2N}}$$

$-0{,}904$ (descartado) $\qquad 1{,}105$

$$\boxed{\begin{array}{l} \omega_{2N} = 1{,}105 \\ \omega_{1N} = 0{,}905 \end{array}}$$



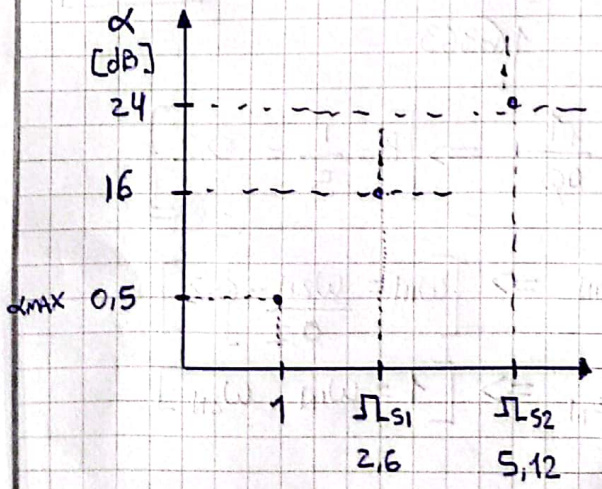
$$\cdot \sqcap = \varnothing \cdot \left(\frac{\omega^2 - 1}{\omega}\right) \longrightarrow \sqcap(\omega_{S1N}) = 5 \cdot \left(\frac{(0{,}7727)^2 - 1}{0{,}7727}\right) = -2{,}6073$$

$$\sqcap(\omega_{S2N}) = 5 \cdot \left(\frac{(1{,}6863)^2 - 1}{1{,}6363}\right) = 5{,}1258$$

LO TOMO POSITIVO

$$\sqcap(\omega_{S1N}) = 2{,}6073$$

$$\sqcap(\omega_{S2N}) = 5{,}1258$$



TS5 (B)

Es un Chebyshev pasabajo ∴ saco el "N" y elijo la peor condición (osea el "N" más grande)

$$N = \frac{\operatorname{arccosh}\left(\frac{\sqrt{10^{\frac{\alpha_{min\,dB}}{10}} - 1}}{\varepsilon}\right)}{\operatorname{arccosh}(\Omega_S)}$$

$\varepsilon = 0{,}3493$

$$\varepsilon^2 = 10^{\frac{\alpha_{max/dB}}{10}} - 1 \quad (\alpha_{max} = 0{,}5\ dB)$$

$$\varepsilon^2 = 0{,}122018$$

$$\varepsilon = 0{,}3493$$

Ω_{S1}	Ω_{S2}
2,6073	5,1258
$\alpha_{min} = 16$	$\alpha_{min} = 24$

∴ $N_1 = 2{,}2161 \rightarrow 3$

$N_2 = 1{,}944 \rightarrow 2$

LA PEOR CONDICIÓN ES CON $N_1 = 3$

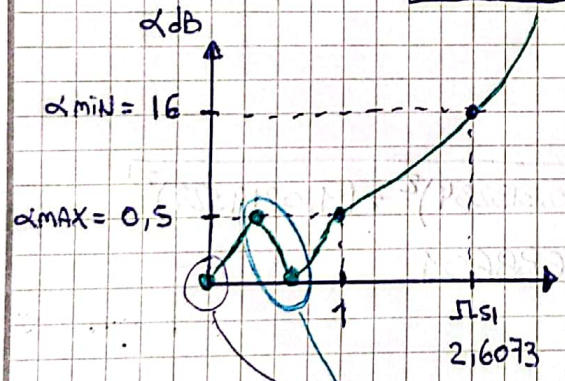
USO Ω_{S1}, $\alpha_{min} = 16$, $N = 3$

CHEBYSHEV ORDEN N=3

$\varepsilon^2 = 0{,}122018$

$\varepsilon = 0{,}3493$

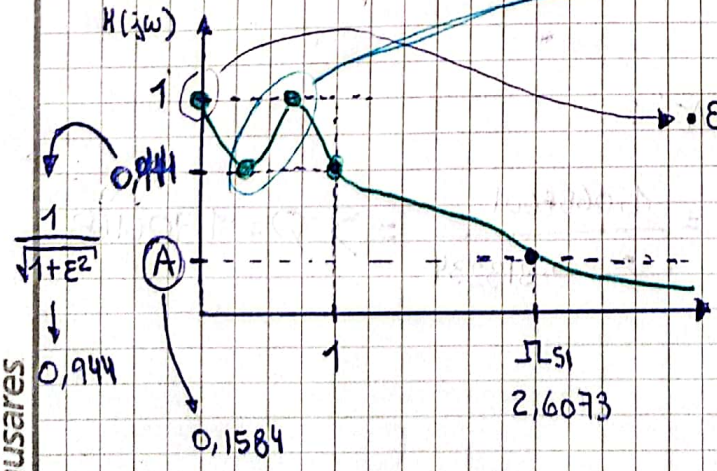
HAGO CON ESA INFORMACIÓN LA PLANTILLA DEL PASABAJOS DE ATENUACIÓN



- Orden impar en atenuación empieza de abajo ya que se le invierte la transferencia
- N-1 = CANT REBOTES

2 REBOTES

TRANSFERENCIA:



- En transferencia el orden impar (N=3) significa que parte desde arriba.

$20 \cdot \log(X) = -16$

$X = 0{,}1584$

$A = 0{,}1584$

húsares

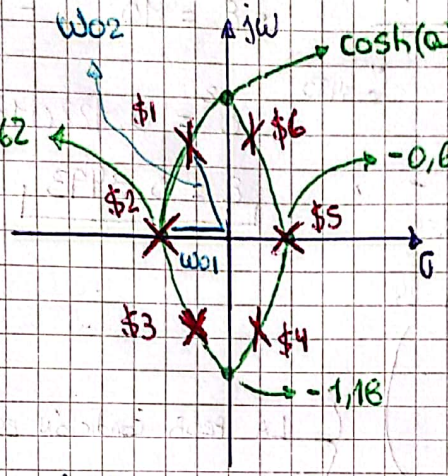
Con esa plantilla para bajar diseño mi filtro Chevy orden 3

- $\varepsilon^2 = 0,122018$
- $\varepsilon = 0,3493$
- $N = 3$

- $nK = \frac{1}{N} \cdot \text{arcsenh}\left(\frac{1}{\varepsilon}\right) \longrightarrow = 0,591388 = a$

$a = 0,591388$

- $\cosh(a) = 1,180026$
- $\text{Senh}(a) = 0,626478$



$1, $2, $3 son los polos de H($)

(los otros son de H(-$))

$\$K = GK + j.WK \longrightarrow S_1 = G_1 + jW_1$ (K=1)

$GK = -\text{senh}(a).\text{sen}\left(\frac{(2K-1)}{2.N}.\pi\right)$

$WK = \cosh(a).\cos\left(\frac{(2K-1)}{2.N}.\pi\right)$

$\$_1 = -0,313234 + j.\ 1,0219327$

$\$_2 = -0,626478 + 0.j$

$\$_3 = -0,313234 - 1,0219327.j$

$Wo1 = 0,626478$

$Wo2 = \sqrt{(-0,313234)^2 + (1,0219327)^2}$

$Wo2 = 1,0688601$

¡ojo! Este Q no tiene nada que ver con el Q=5 que era la selectividad del PASABANDA... es otro Q distinto

$Q = \frac{1}{2.\cos(\theta)}$ $\quad \text{Tan}(\theta) = \frac{op}{ady} \longrightarrow \text{Tg}(\theta) = \frac{1,0219327}{0,313234} \longrightarrow \theta = 72,96$

$Q = 1,706$

Sino también podía sacarlo así:

$Q = \frac{WOK}{2.GK} \longrightarrow Q = \frac{Wo2}{2.|G_2|} = \frac{1,0688601}{2.\ 0,313234} \Rightarrow Q = 1,706168$

TS5 ©

$$H(\$) = \frac{\omega_{01}}{\$ + \omega_{01}} \cdot \frac{\omega_{02}^2}{\$^2 + \frac{\omega_{02}}{Q_1} \cdot \$ + \omega_{02}^2}$$

PASABAJOS CHEVY ORDEN 3

$$H(\$) = \frac{0,6264678}{\$ + 0,6264678} \cdot \frac{(1,0688601)^2}{\$^2 + 0,6265 \cdot \$ + (1,0688601)^2}$$

PASABAJOS CHEVY ORDEN 3

NUCLEO de TRANSFORMACIÓN A PASABANDA

$$S = \frac{1}{B} \cdot \frac{\$^2 + \omega_0^2}{\$} = \frac{1}{0,2} \cdot \frac{\$^2 + 1}{\$}$$

($\omega_0^2 = 1^2$)

$$\boxed{S = 5 \cdot \frac{\$^2 + 1}{\$}}$$

$$H(\$) = \frac{\omega_{01}}{\left(5 \cdot \frac{\$^2+1}{\$}\right) + \omega_{01}} \cdot \frac{\omega_{02}^2}{\left(5 \cdot \frac{\$^2+1}{\$}\right)^2 + \frac{\omega_{02}}{Q_1} \cdot 5 \cdot \frac{(\$^2+1)}{\$} + \omega_{02}^2}$$

$$H(\$) = \frac{\omega_{01}}{\frac{5 \cdot \$^2 + 5}{\$} + \omega_{01}} \cdot \frac{\omega_{02}^2}{\left(\frac{5 \cdot \$^2 + 5}{\$}\right)^2 + \frac{\omega_{02}}{Q_1} \cdot 5 \cdot \left(\$ + \frac{1}{\$}\right) + \omega_{02}^2}$$

$$H(\$) = \frac{\omega_{01}}{5 \cdot \$ + \frac{5}{\$} + \omega_{01}} \cdot \frac{\omega_{02}^2}{\frac{5^2 \cdot \$^4 + 2 \cdot 5 \cdot \$^2 \cdot 5 + 5^2}{\$^2} + \frac{\omega_{02} \cdot 5}{Q_1} \cdot \$ + \frac{\omega_{02} \cdot 5}{Q_1} \cdot \frac{1}{\$} + \omega_{02}^2}$$

$$H(\$) = \frac{\omega_{01}}{5 \cdot \$ + \frac{5}{\$} + \omega_{01}} \cdot \frac{\omega_{02}^2}{5^2 \cdot \$^2 + 2 \cdot 5 \cdot 5 + \frac{5^2}{\$^2} + \frac{\omega_{02} \cdot 5}{Q_1} \cdot \$ + \frac{\omega_{02} \cdot 5}{Q_1} \cdot \frac{1}{\$} + \omega_{02}^2}$$

(A) + 1 (B)

$$H(\$) = (A) \cdot \frac{\$}{\$} \cdot (B) \cdot \frac{\$^2}{\$^2}$$

(★) · (A) · $\frac{\$}{\$}$ → $\frac{w_{01}}{5.\$ + \frac{5}{\$} + w_{01}} \cdot \frac{\$}{\$}$ → $\frac{w_{01}.\$}{5.\$^2 + 5 + w_{01}.\$}$

$\rho = 5 \rightarrow \frac{1}{\rho} = B$

$\frac{\frac{w_{01}}{5}.\$}{\$^2 + \frac{w_{01}}{5}.\$ + 1} \simeq \frac{(B.w_{01}).\$}{\$^2 + B.w_{01}.\$ + 1}$

(★) (B) · $\frac{\$^2}{\$^2}$ → $\frac{w_{02}^2}{5^2.\$^2 + 2.5.5 + \frac{5^2}{\$^2} + \frac{w_{02}.5}{\rho_1}.\$ + \frac{w_{02}.5}{\rho_1}.\frac{1}{\$} + w_{02}^2} \cdot \frac{\$^2}{\$^2}$

$\frac{w_{02}^2.\$^2}{5^2.\$^4 + 2.5.5.\$^2 + 5^2 + \frac{w_{02}.5}{\rho_1}.\$^3 + \frac{w_{02}.5}{\rho_1}.\$ + w_{02}^2.\$^2}$ ○

Lo dejo mónico

$\frac{\frac{w_{02}^2}{5^2}.\$^2}{\$^4 + 2.\$^2 + 1 + \frac{w_{02}}{\rho_1.5}.\$^3 + \frac{w_{02}}{\rho_1.5}.\$ + \frac{w_{02}^2}{5^2}.\$^2}$

Lo ordeno

$\frac{\frac{w_{02}^2}{5^2}.\$^2}{\$^4 + \frac{w_{02}}{\rho_1.5}.\$^3 + \left(2 + \frac{w_{02}^2}{5^2}\right).\$^2 + \frac{w_{02}}{\rho_1.5}.\$ + 1}$ ○

$\frac{B^2.w_{02}^2.\$^2}{\left[\$^4 + B.w_{02}.\frac{1}{\rho_1}.\$^3 + \left(2 + B^2.w_{02}^2\right).\$^2 + B.w_{02}.\frac{1}{\rho_1}.\$ + 1\right]}$

$[\$^4 + 0{,}125.\$^3 + 2{,}045698.\$^2 + 0{,}125.\$ + 1]$

→ SACO los POLOS con CALCULADORA:

- $0{,}9029 < 91{,}78 \rightarrow -0{,}02807081 + 0{,}9025.i$
- $0{,}9029 < -91{,}78 \rightarrow -0{,}02807081 - 0{,}9025.i$

} Complejos conjugados (1)

- $1{,}1074 < 91{,}78 \rightarrow -0{,}034429 + 1{,}106944.i$
- $1{,}1074 < -91{,}78 \rightarrow -0{,}034429 - 1{,}106944.i$

} Complejos conjugados (2)

TS5 (d)

∴ Cada PAR de complejos conjugados los puedo Agrupar como:

- $\$^2 + \$ \cdot \gamma_1 + \ell_1$
- $\$^2 + \$ \cdot \gamma_2 + \ell_2$

γ = |SUMA PARTES REALES comp conj|

ℓ = Modulo de la FORMA POLAR Al cuadrado

deducido en la TAREA SEMANAL 3

∴

- $\$^2 + \$ \cdot 0,056141 + (0,9029)^2$
- $\$^2 + \$ \cdot 0,068858 + (1,1074)^2$

∴ AHORA Puedo FORMAR mi TRANSFERENCIA:

$$H(\$) = \star(A) \cdot \star(B)$$

$$H(\$) = \frac{(B.w_{01}).\$}{\$^2 + B.w_{01}.\$ + 1} \cdot \frac{(B.w_{02}).\$}{\$^2 + \$.0,056141 + (0,9029)^2} \cdot \frac{(B.w_{02}).\$}{\$^2 + \$.0,068858 + (1,1074)^2}$$

$$H(\$) = \frac{0,12529.\$}{\$^2 + 0,12529.\$ + 1} \cdot \frac{0,21377.\$}{\$^2 + \$.0,056141 + 0,815228} \cdot \frac{0,21377.\$}{\$^2 + \$.0,068858 + 1,22633}$$