Filtre

Ordre d'un filtre

Degré de g(x)

$$\underline{H} = \frac{f(x)}{g(x)}$$

Formes canoniques

Ordre1

Passe-bas

$$\underline{H} = H_0 \frac{1}{1+jx}$$

Passe-haut

$$\underline{H} = H_0 \frac{jx}{1+jx}$$

Ordre 2

Passe-bas

$$\underline{H} = H_0 \frac{1}{1+jx/Q-x^2}$$

Passe-haut

$$\underline{H} = H_0 \frac{-x^2}{1+jx/Q-x^2}$$

Passe-bande

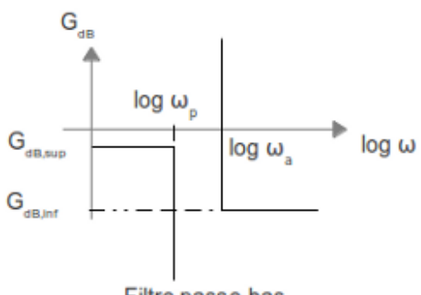
$$\underline{H} = H_0 \frac{jx/Q}{1+jx/Q-x^2}$$

Coupe-bande

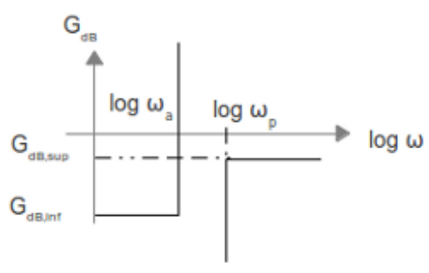
$$\underline{H} = H_0 \frac{1-x^2}{1+jx/Q-x^2}$$

Gabarit d'un filtre

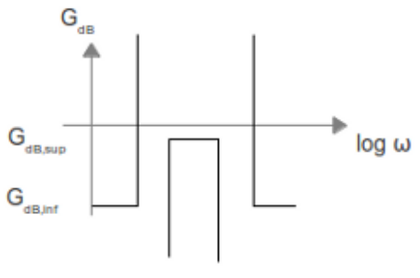
Un gabarit contient les caractéristiques recherchées pour un filtre en particulier.



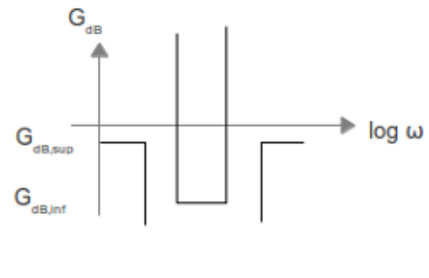
Filtre passe-bas



Filtre passe-haut



Filtre passe-bande



Filtre coupe-bande

Fonction de transfert

$$\underline{H} = \frac{\underline{U_s}}{\underline{U_e}}$$

Forme complexe

$$\underline{H} = |\underline{H}|\, e^{j\varphi}$$

Gain

$$|\underline{H}| = G = \frac{U_{s,\max}}{U_{e,\max}}$$

Phase

$$\varphi = \varphi_s - \varphi_e$$

Gain en décibels

$$G_{\mathrm{dB}} = 20 \log G$$

$$10 \log 2 \simeq 3 \text{ dB}$$

Pulsation de coupure à - 3 dB

$$G_{\mathrm{dB}}(\omega_c) = G_{\mathrm{dB,max}} - 3 \text{ dB}$$

$$G(\omega_c) = \frac{G_{\max}}{\sqrt{2}}$$

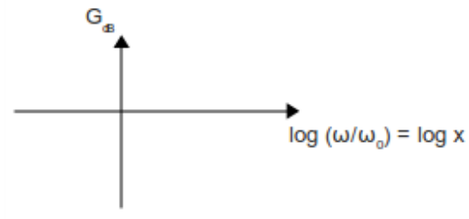
Bande passante à - 3 dB

$$G_{\mathrm{dB}}(\omega \in \Delta\omega) \geqslant G_{\mathrm{dB,max}} - 3 \text{ dB}$$

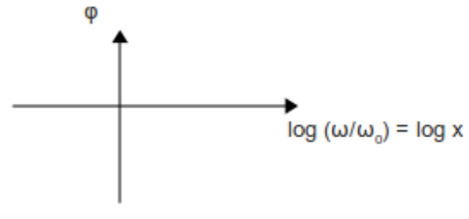
$$G(\omega \in \Delta\omega) \geqslant \frac{G_{\max}}{\sqrt{2}}$$

Diagramme de Bode

Courbe de Gain



Courbe de phase



Commencer par le diagramme asymptotique