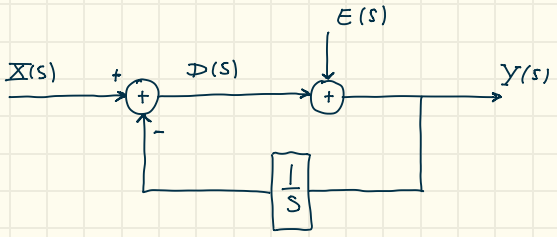
NOISE SHAPING

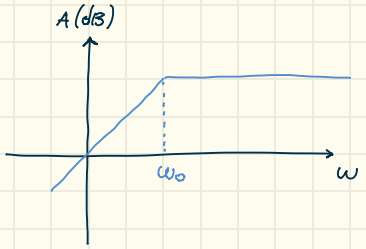


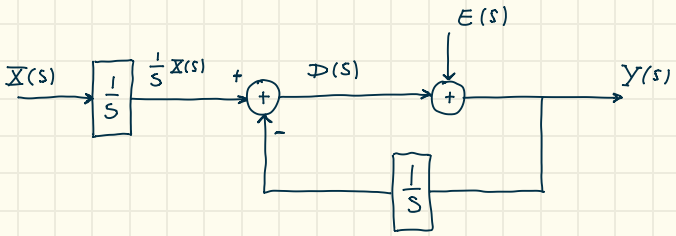
$$\begin{cases} Y(S) = E(S) + X(S) \\ D(S) = X(S) + \frac{1}{S} Y(S) \end{cases} \rightarrow X(S) = D(S) - \frac{1}{S} Y(S)$$

$$\rightarrow \quad Y(S) = E(S) + D(S) - \frac{1}{S} Y(S)$$

$$Y\left(1 + \frac{1}{S}\right) = E(S) + D(S)$$

$$\frac{S+1}{S} \rightarrow \quad Y(S) = \underbrace{\frac{S}{S+1}}_{\text{Zero}} E(S) + \underbrace{\frac{S}{S+1}}_{\text{Polo}} D(S)$$

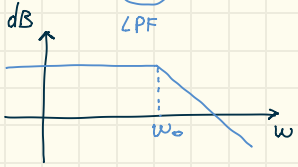




$$\begin{cases} Y = D + E \\ D = \frac{1}{S} X + \frac{1}{S} Y \end{cases} \rightarrow \quad Y = \frac{1}{S} X + \frac{1}{S} Y + E \rightarrow \quad Y\left(1 - \frac{1}{S}\right) = \frac{1}{S} X + E \rightarrow \quad Y = \frac{1}{S} \cdot \frac{S}{S-1} X + \frac{S}{S-1} E$$

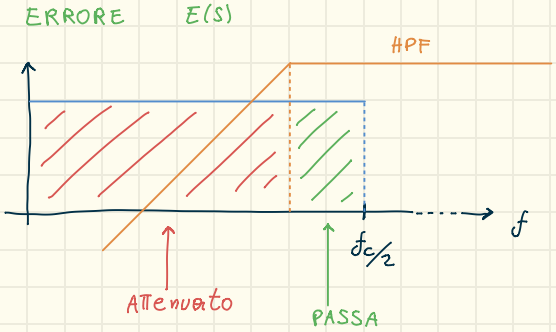
$$\frac{S-1}{S}$$

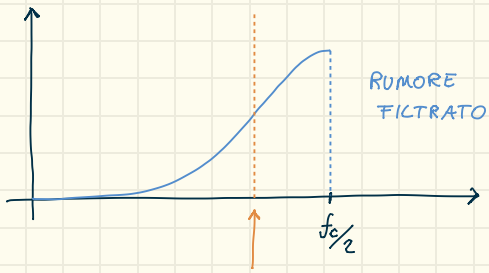
$$\rightarrow \quad Y(S) = \underbrace{\frac{1}{S-1}}_{\text{LPF}} X(S) + \underbrace{\frac{S}{S-1}}_{\text{HPF}} E(S)$$



Esempio Visivo

ERRORE E(S)





Il rumore si concentra solo sulle alte frequenze prossime a f_c. Dopo $\frac{f_c}{2}$ non "assimiliamo" piu' niente

SEGNALE X(S)