FEEDBACK APPLICATIONS

- USING FEEDBACK TO CONTROL FREQUENCY RESPONSE

Let us determine the influence of negative feedback on the amplifier frequency response.

\[ F(s) = \frac{A_0 \omega_H \cdot s}{(s + \omega_L)(s + \omega_H)} \quad \text{for} \quad \omega_L < \omega_H \]

1. LOW FREQUENCY (\( \omega_L < \omega_H \))

\[ A(s) = \frac{sA_0}{s + \omega_L} \quad \quad A_F(s) = \frac{A}{1 + AB} \]

\[ \Rightarrow \quad A_F(s) = \frac{\omega_L A_0 / s + \omega_L}{1 + sA_0B / s + \omega_L} \]
\[ A_F(s) = \left( \frac{A_0}{1 + A_0B} \right) \left[ \frac{s}{s + \frac{WL}{1 + A_0B}} \right] \]

\[ W_{LF} = \frac{WL}{1 + A_0B} \]

2) \text{HIGH FREQUENCY } (\omega \gg \omega_L)

\[ A(s) = \frac{A_0 \omega H}{s + \omega H} \quad ; \quad A_F(s) = \frac{A}{1 + AB} \]

\[ W_{HF} = \omega H \left( 1 + A_0B \right) \]
FREQ. RESPONSE (APPLICATIONS) CONT.

NOTE: TRADEOFF OF BANDWIDTH & GAIN

CALCULATION OF THE COMB GAIN

why do we need comb gain?

1) can estimate the influence of negative feedback on $\frac{R_{in}}{R_{out}}$

shunt: $R_{in} = R_{in} \frac{1 + \text{comb gain}}{1 + \text{comb gain}}$

route: $R_{out} = R_{out} \frac{1 + \text{comb gain}}{1 + \text{comb gain}}$
SERIES: \( R_{fe} = R_{in} (1 + \text{loop gain}) \)
\( R_{of} = R_{out} (1 + \text{loop gain}) \)

2) To find the stability of "-ve" F.B.
There are two methods to calculate the loop gain:

i) DIRECT METHOD

ii) SUCCESSIVE VOLTAGE & CURRENT INJECTION METHOD