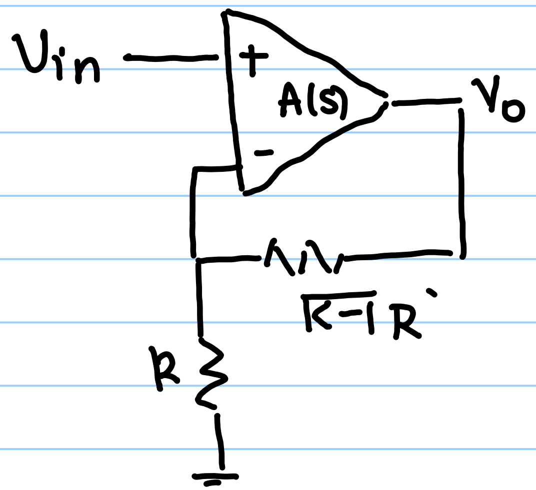
Note Title

Lecture # 17

04-03-2021

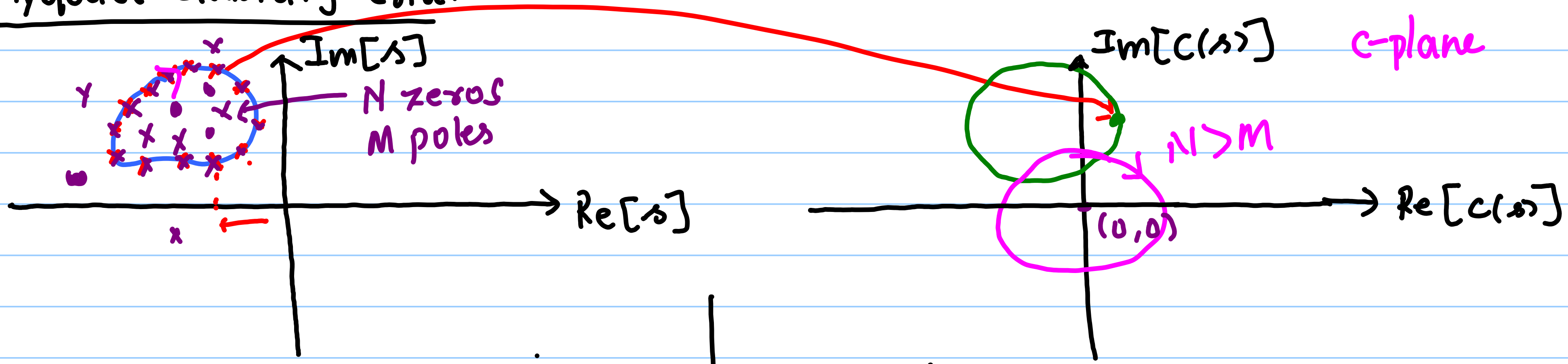


First order: $A(s) = \dfrac{A_0}{1+s/p_1}$

2nd order: $A(s) = \dfrac{A_0'}{\left(1+\frac{s}{p_1}\right)\left(1+\frac{s}{p_2}\right)}$

3rd order: $A(s) = \dfrac{A_0''}{\left(1+\frac{s}{p_1}\right)\left(1+\frac{s}{p_2}\right)\left(1+\frac{s}{p_3}\right)}$

Nyquist Stability Crite.



$$C(s) = \frac{(s-z_1)(s-z_2)\ldots(s-z_N)}{(s-p_1)(s-p_2)\ldots(s-p_M)}$$

⇒ # of zeros − # of poles in closed contour in s-plane is > 0, then in C[s], closed contour will encircle (0,0)

$$H(s) = \frac{K}{1+\frac{K}{A(s)}} = \frac{K}{1+\frac{K\,D(s)}{N(s)}} = \frac{K.N(s)}{(N(s)+K\,D(s))} = \frac{N(s)/D(s)}{\frac{1}{K}\frac{N(s)}{D(s)}+1}$$

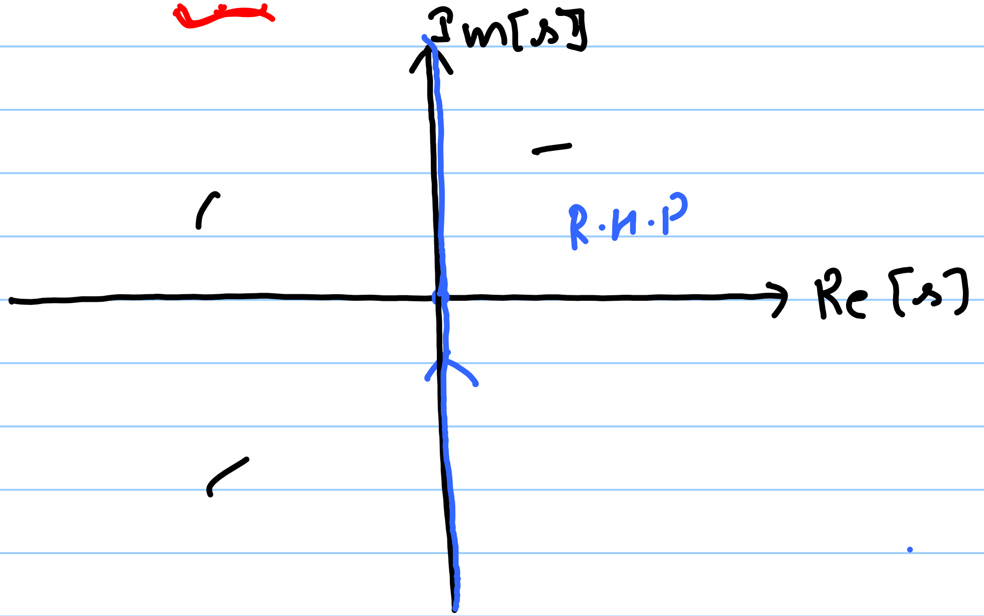
$$N(s) + K\,D(s) = 0$$

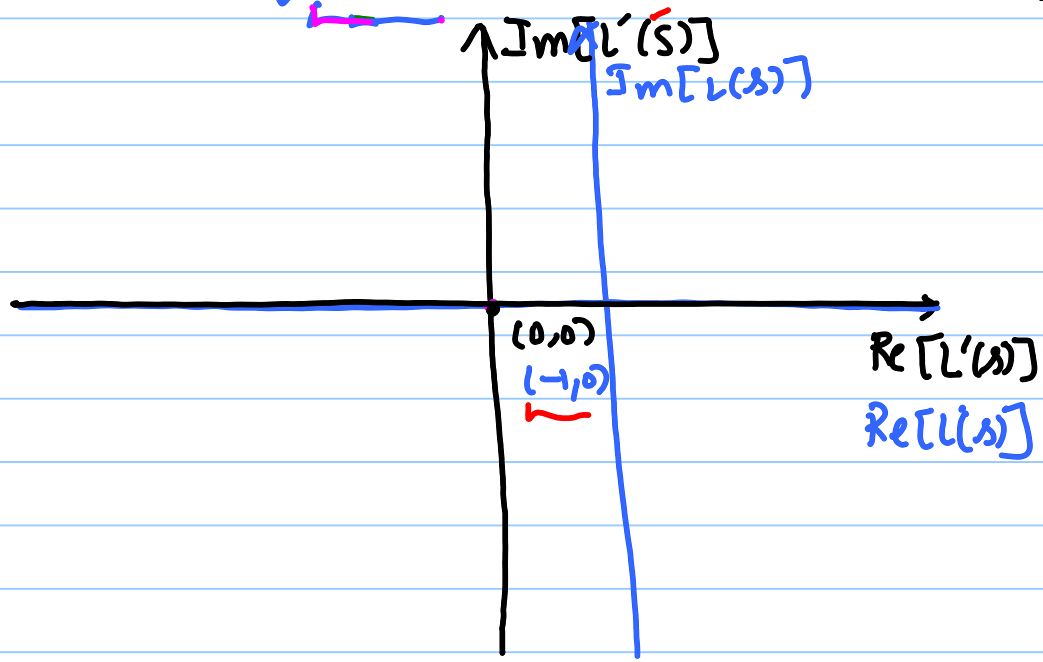
$$\frac{1}{K}\frac{N(s)}{D(s)} + 1 = 0$$

Poles of $H(s)$ are same as zeros for

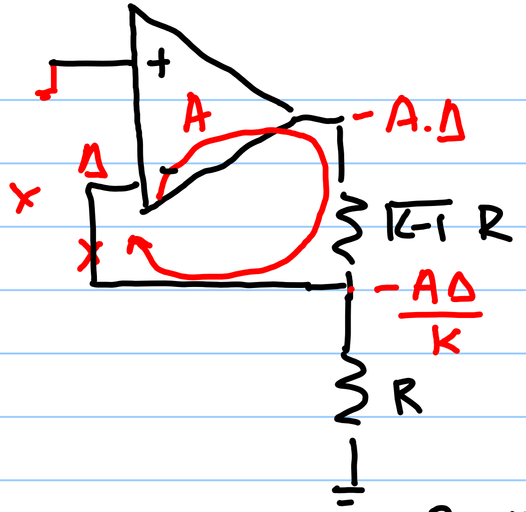
$$\underbrace{\frac{1}{K}\frac{N(s)}{D(s)}}_{L'(s)} + 1 = 0 \qquad L(s) = L'(s) - 1$$

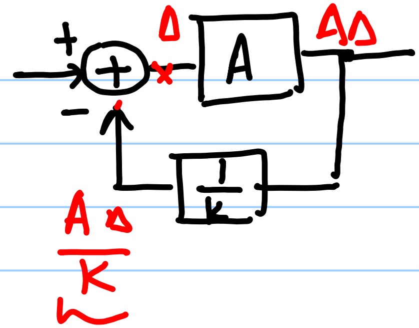
$$L'(s) = L(s) + 1$$





$$H(s) = \frac{K}{1 + \frac{K}{A(s)}} = \frac{A(s)}{\underbrace{\frac{1}{K}A(s) + 1}_{L(s)+1 = L'(s)}}$$





$$L(s) = \frac{1}{K}\frac{A_0}{1+s/p_1}$$

$$L(j\omega) = \left|\frac{1}{K}\frac{A_0}{\sqrt{1+\left(\frac{\omega}{p_1}\right)^2}}\right| e^{-j\tan^{-1}\left(\frac{\omega}{p_1}\right)}$$