tesis teorica. 28/5/2009

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Analise de sistema no Dominio das frequências

$$G(s) = \frac{10\,(s+2)(s+4)}{s\,(s+8)(s+20)} \cdot e^{-st}$$

$$= \frac{\boxed{10 \times 2 \times 4}\,(1+\frac{s}{2})(1+\frac{s}{4})}{\boxed{8 \times 20} \times s\,(1+\frac{s}{8})(1+\frac{s}{20})} \cdot e^{-st}$$ 1° passo

$$K_B = K \frac{z_1 \cdot z_2}{p_1 \cdot p_2}$$ $z_1 = 2$; $z_2 = 4$; $p_1 = 8$; $p_2 = 20$

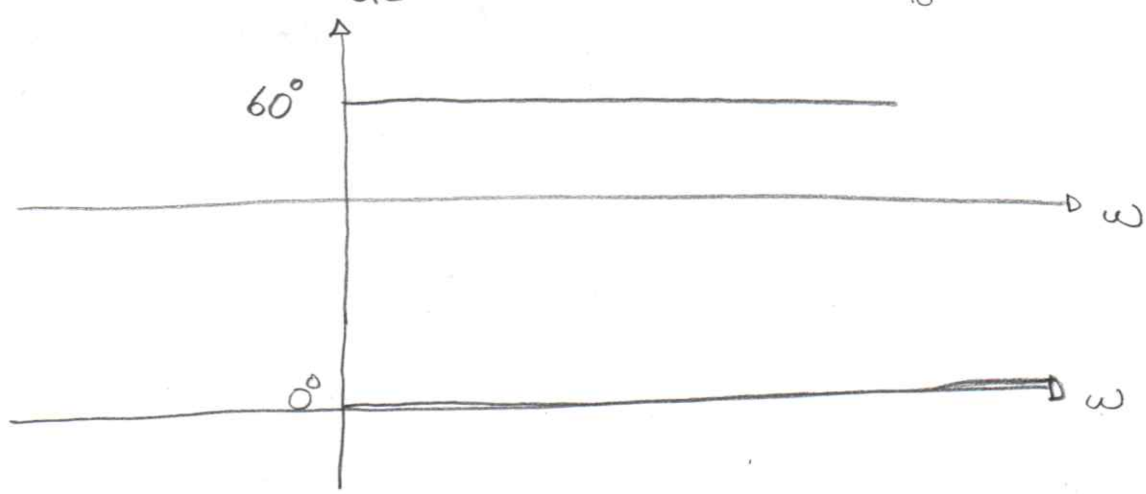
$$G(s) = \frac{\omega_n^2}{s^2 + 2\xi\omega_n s + \omega_n^2}$$

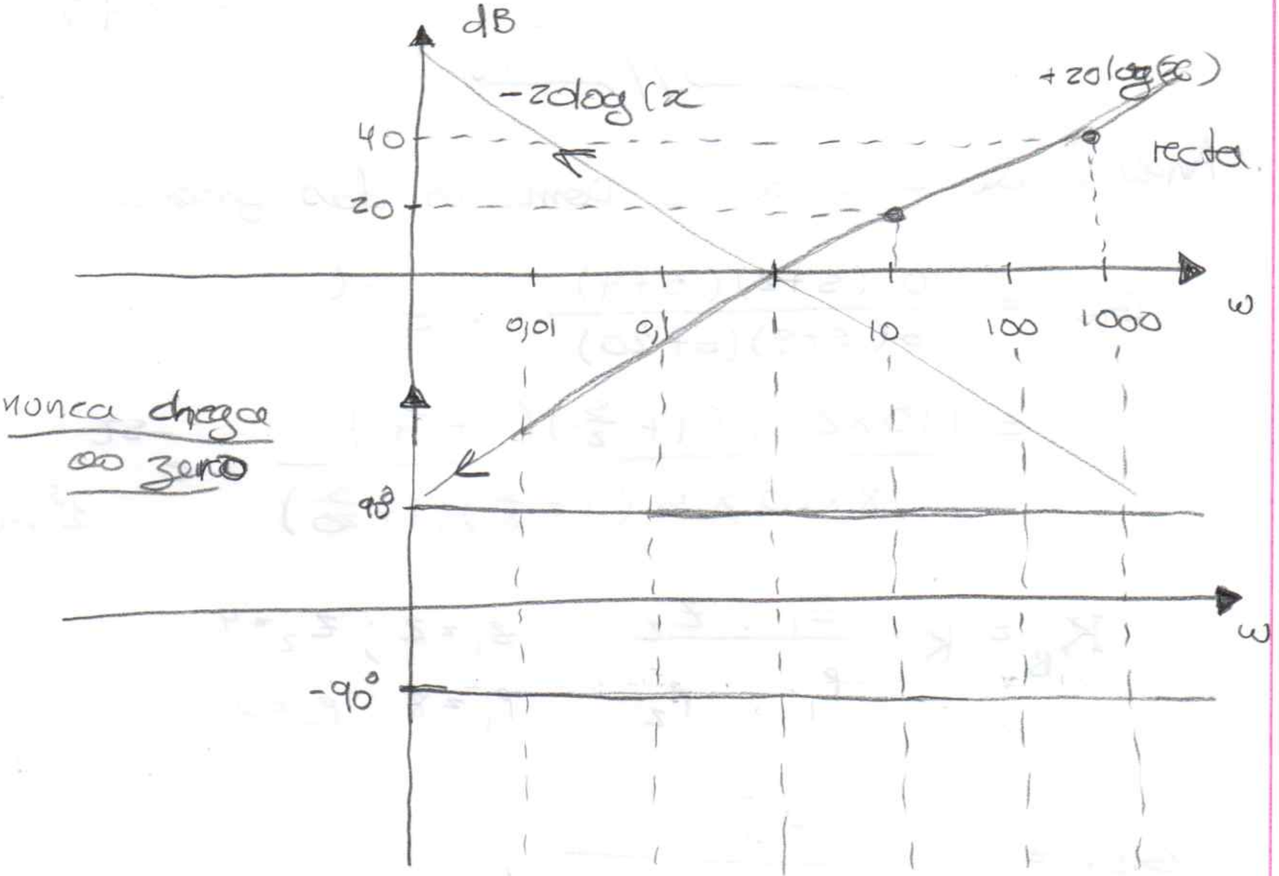
$$G(s) = \frac{\frac{\omega_n^2}{\omega_n^2}}{\frac{s^2}{\omega_n^2} + 2\frac{\xi\omega_n}{\omega_n^2}s + \frac{\omega_n^2}{\omega_n^2}}$$

$$= \frac{1}{\left(\frac{j\omega}{\omega_n}\right)^2 + 2\frac{\xi j\omega_n}{\omega_n} + 1}$$ 1° passo 2ª ordem

ex)

K=1000 $20\log_{10}(1000) = 60.$





$G(s) = s$ $\quad$ $G(j\omega) = j\omega$ } => 90°

$G(s) = \frac{1}{s}$ $\quad$ $G(j\omega) = \frac{1}{j\omega}$ } => -90°

$G(s) = s$ $\quad$ $|G(s)| = |j\omega| = \omega \ \underline{+90°}$

$G(j\omega) = \frac{1}{j\omega}$

1 polo	-90°		1 zero	+90°
2 polos	-180°		2 "	180°
3	-270°		3 "	270°

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Diagrama Baud

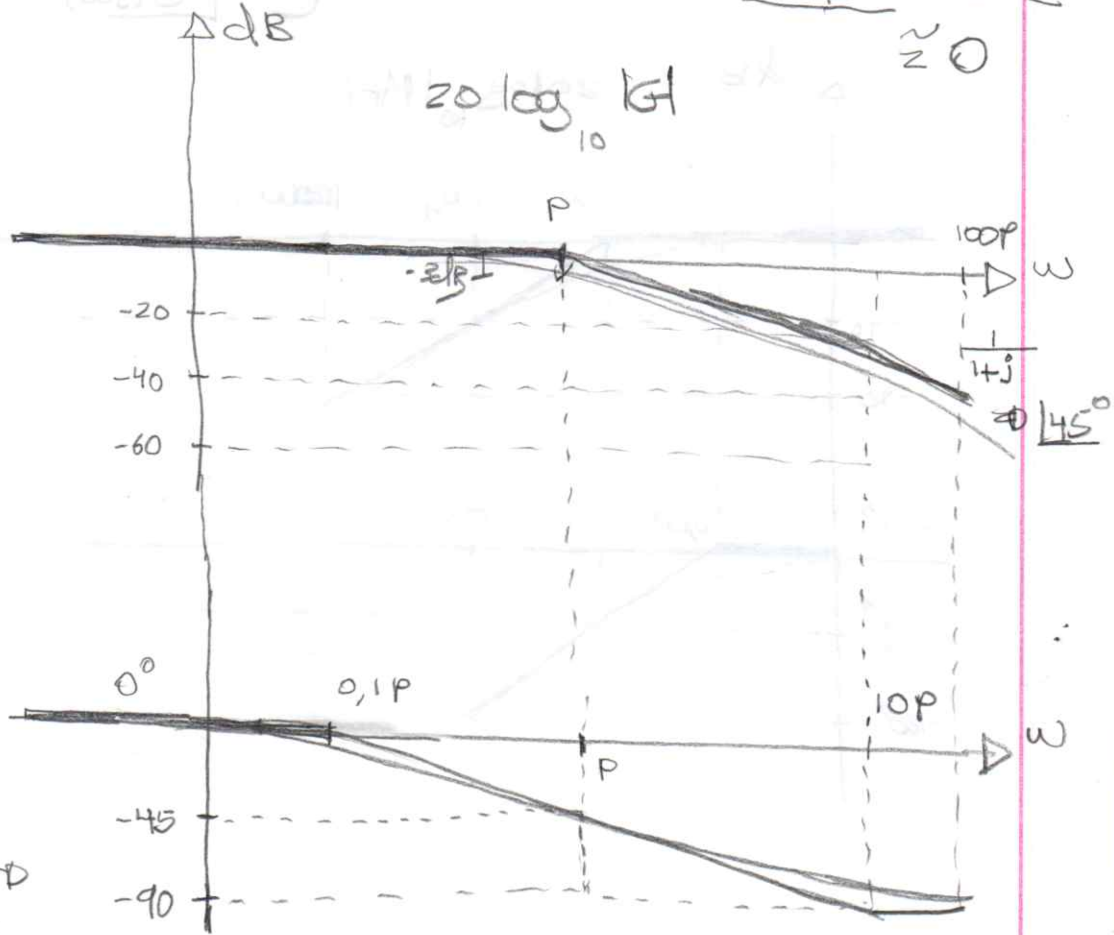
$$\frac{1}{(1+\frac{s}{p})} \xrightarrow[s=j\omega]{} \frac{1}{(1+\frac{j\omega}{p})}$$

assimptotas

$\omega \to 0 \quad (\omega \ll p)$

$\omega \to +\infty \quad (\omega \gg p)$

$$\left\{ \begin{array}{l} \left|\frac{1}{(1+\frac{j\omega}{p})}\right| \cong 1 \\ \Rightarrow 0\,dB \\ \angle\frac{1}{1+\frac{j\omega}{p}} \cong \angle\frac{1}{1} \\ \cong 0 \end{array} \right.$$



Polos em zeros anulam-se

$$\left\{ \begin{array}{l} \left|\frac{1}{1+\frac{j\omega}{p}}\right| \cong \frac{1}{\frac{\omega}{p}} = \frac{p}{\omega} \\ \angle\frac{1}{1+\frac{j\omega}{p}} \cong \angle\frac{1}{j\frac{\omega}{p}} \cong 90^\circ \end{array} \right.$$

Diagramas de Bode

$$\frac{1}{1 + 2\xi\left(\frac{j\omega}{\omega_n}\right) + \left(\frac{j\omega}{\omega_n}\right)^2}$$

$\omega \to 0 \qquad \omega << \omega_n \qquad \begin{cases} |G(j\omega)| \cong 1 \to 0dB \\ \angle G(j\omega) \cong 0 \end{cases}$

$\omega \to +\infty \qquad \omega >> \omega_n \qquad \begin{cases} |G(j\omega)| = \frac{\omega_n^2}{\omega^2} \\ \angle G(j\omega) = -180^\circ \end{cases}$