

P2 - Controler - Ryan Furber - 1420 9393

2)

$$G(s) = K (s+62)(s+75)$$

$$s(s+46)(s+114)(s+535)(s+208)$$

$$x = \left(\frac{\ln(37)}{\pi} \right)^2 = 0.1002$$

$$\xi = \sqrt{x} = 0.3017$$

$$\phi_m = 90 - \arctan \frac{\sqrt{-2(0.3017)^2 + \sqrt{4(0.3017)^4 + 1}}}{2(0.3017)}$$

$$\phi_m = 33.450$$

$$A \phi_m = -146.549$$

Verifiando Bode $\rightarrow \omega = 388$

$$|G(j\omega)| = 3.8 \times 10^{-9}$$

$$K = \frac{1}{|G(j\omega)|} = 2.57 \times 10^8$$

$$K_V = \lim_{s \rightarrow 0} s G(s) = 470.30$$

$$K_{malo} = 5.47 \times 10$$

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$$G(j\omega)_{mag} = \phi_m + 5,13 = 38.58 \quad 16$$

$$\text{Ang } G(j\omega) = -180 + \phi_m = -191.41$$

$$Syste d = G(s) \cdot Km$$

$$= \frac{5.47 \times 10^8 (s+62)(s+75)}{s(s+46)(s+114)(s+535)(s+908)}$$

$$W2 = 350$$

$$db2 = 7,8$$

} Verificando por Bode

$$|G(j\omega)_2| = 10^{(7,8/20)} = 2.4547$$

or use Bode calculator

$$W2_{zc} = \frac{350}{10} = 35$$

$$W2_{pc} = \frac{W2_{zc}}{G(j\omega)_2} = \frac{35}{2.4547} = 14.2583$$

$$Kc = \frac{W2_{pc}}{W2_{zc}} = \frac{14.2583}{35} = 0.40738$$

$$C = \frac{0.40738(s+35)}{(s+14.25)}$$