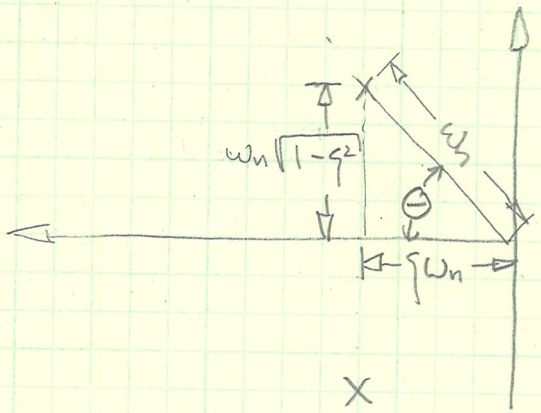
ECE/MAE 5310 Time Performance on a Root Locus Plot

Using the Dominant Pole Pair Approximation



$\cos\theta = \zeta$

Peak Time

$$T_p = \frac{\pi}{\omega_n\sqrt{1-\zeta^2}}$$

Settling Time

$$T_s = \frac{4}{\zeta\omega_n}$$

Percent Overshoot

$$P.O. = 100\, e^{-\zeta\pi/\sqrt{1-\zeta^2}}$$

10 to 90% Rise Time

$$T_{r1} \simeq \frac{2.16\zeta + 0.60}{\omega_n}$$