

Step 2: Choose z & p to Shape Tracking Error

So far: $KG(s) = \frac{0.4 \cdot 10}{\left(\frac{s}{0.2} + 1\right) \left(\frac{s}{0.5} + 1\right)}$

$$e(\infty) = \frac{1}{1 + KG(s)} \Big|_{s=0} = \frac{1}{1 + 4} = \frac{1}{5} = 20\% \quad (\text{too high})$$

To have $e(\infty) \leq 10\%$, need $KD(0)G(0) \geq 9$:

$$e(\infty) = \frac{1}{1 + KD(0)G(0)} \leq \frac{1}{1 + 9} = 10\%.$$

So, we need

$$D(0) = \frac{s + z}{s + p} \Big|_{s=0} = \frac{z}{p} \geq \frac{9}{4} = 2.25 \quad \text{--- say, } z/p = 2.5$$

Not to distort PM and ω_c , let's pick z and p an order of magnitude smaller than $\omega_c \approx 0.5$: $z = 0.05$, $p = 0.02$