Lead & Lag Compensation

Step 3. Evaluate steady-state tracking and choose $z_{\text{lag}}, p_{\text{lag}}$ to satisfy specs

So far:

$$K \underbrace{D(s)}_{\substack{\text{lead} \\ \text{only}}} G(s) = 4 \frac{\dfrac{s}{0.8} + 1}{\dfrac{s}{5} + 1} \cdot \frac{10}{\left(\dfrac{s}{0.2} + 1\right)\left(\dfrac{s}{0.5} + 1\right)}$$

$$KD(0)G(0) = 40 \quad \implies \quad e(\infty) = \frac{1}{1 + KD(0)G(0)} = \frac{1}{1 + 40}$$

— this is not small enough: need $1\% = \dfrac{1}{100} = \dfrac{1}{1 + 99}$

We want $D(0) \geq \dfrac{99}{40}$ with lag $\qquad \dfrac{z_{\text{lag}}}{p_{\text{lag}}} \approx 2.5$ will do