

$T=1s$ $T_s \leq 4$ (2% error) damping $\zeta \in [0.707, 1]$

Q. Example 4.1.2 sketch the region of poles in s plane

$$T_s = 4T = 4 / \sigma_1$$

$$\sigma_1 = \frac{4}{T_s}$$

$$s = -\sigma + j\omega$$

$$\sigma \geq \sigma_1$$

Solution $T_s \leq 4$

$$\sigma_1 = \frac{4}{T_s} \geq 1$$

$$\zeta \omega \geq \sigma_1 \geq 1 \quad \sigma \geq \sigma_1 \geq 1$$

$$-\zeta \omega_n \pm j \omega_n \sqrt{1-\zeta^2} \quad \star \text{ 替}$$

$$T_s \leq 4 \quad \text{极点表达式}$$

$$T=1$$

$$\zeta \in [0.707, 1]$$

$$T_s \leq 4 \text{ (2\% error)} \quad \overset{98\%}{\curvearrowright} \quad \overset{T_s=4T}{\curvearrowright} \quad \text{更快}$$

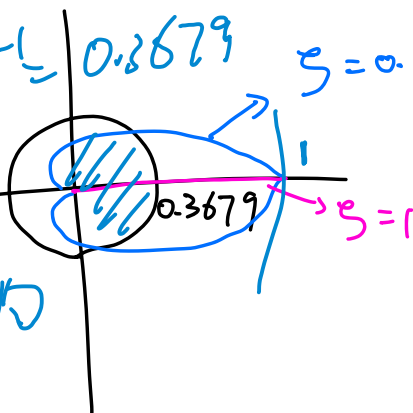
$$\zeta \omega_n \geq \sigma_1 = \frac{4}{4} = 1$$

$$4T = \frac{4}{\sigma_1} \leq 4 \quad \sigma_1 \overset{\uparrow \text{更快}}{\geq} 1$$

$$\geq 1 \quad |r| = e^{-\zeta \omega_n T} = e^{-\zeta \omega_n T} = e^{-\sigma} \leq e^{-1} = 0.3679$$

$$|z| = e^{-\zeta \omega_n T} \leq e^{-1} = 0.3679 \quad \zeta = 0.707$$

极点在 0.3679
为半径的圆内



ζ 是个心
所以在 S 内
极点是