

* Sistem Order Kedua

$$G(s) = \frac{K}{s^2 + 2\zeta\omega_n s + \omega_n^2}$$

* $\zeta > 1 \rightarrow$ $G(s) = \frac{K}{(s+a)(s+b)}$ double-pole

$$(s+a)(s+b) = 0 \quad a, b = \frac{2\zeta\omega_n \pm \sqrt{4\zeta^2\omega_n^2 - 4\omega_n^2}}{2}$$

$$\begin{aligned} p_1 &= -a \\ p_2 &= -b \end{aligned}$$

$$s_1 = -a$$

$$s_2 = -b$$

$$s_{1,2} = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$$

$$= \zeta\omega_n \pm \omega_n \sqrt{\zeta^2 - 1} \in \text{Real}$$

$$G(s) = \frac{K_1}{s+a} + \frac{K_2}{s+b}$$

(theorem Heaviside)

$$\frac{K}{(s+a)(s+b)} = \frac{(K_1+K_2)s + K_1b + K_2a}{(s+a)(s+b)}$$

$$K_1 + K_2 = 0 \rightarrow K_1 = -K_2$$

$$K_1b + K_2a = K_1b - K_1a = K$$

$$\begin{aligned} K_1 &= \frac{K}{b-a} \\ K_2 &= \frac{K}{a-b} \end{aligned}$$