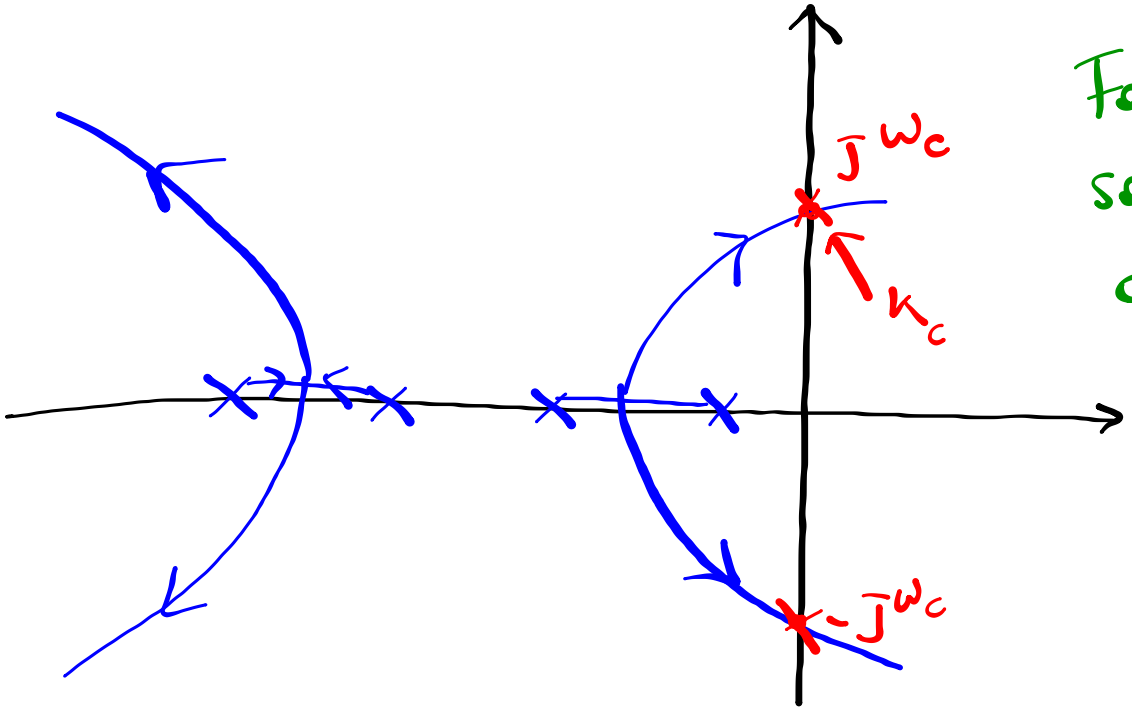
Regolatore PID

$$G(s) = \frac{1}{(1+s)(1+0.25s)(1+0.5s)(1+0.75s)}$$

$$\left(R(z) = K \frac{z - z_0}{z - 1} \right)$$



Formule ZN sono funzione di (K_c, P_c)

$$P_c = \frac{2\pi}{\omega_c}$$

PID parallela

ZN

$$\begin{cases} K_p = 0.6\, K_c \\ K_i = 2 \cdot K_p / P_c \\ K_d = K_p \cdot P_c / 8 \end{cases}$$

$$PID = K_p + \frac{K_i}{s} + \frac{K_d \cdot s}{1 + \frac{K_d s}{N}}$$

PID discreto

$$PID(s) = K_p + \frac{K_i}{s} + \frac{K_d\, s}{1 + \frac{K_d\, s}{N}}$$

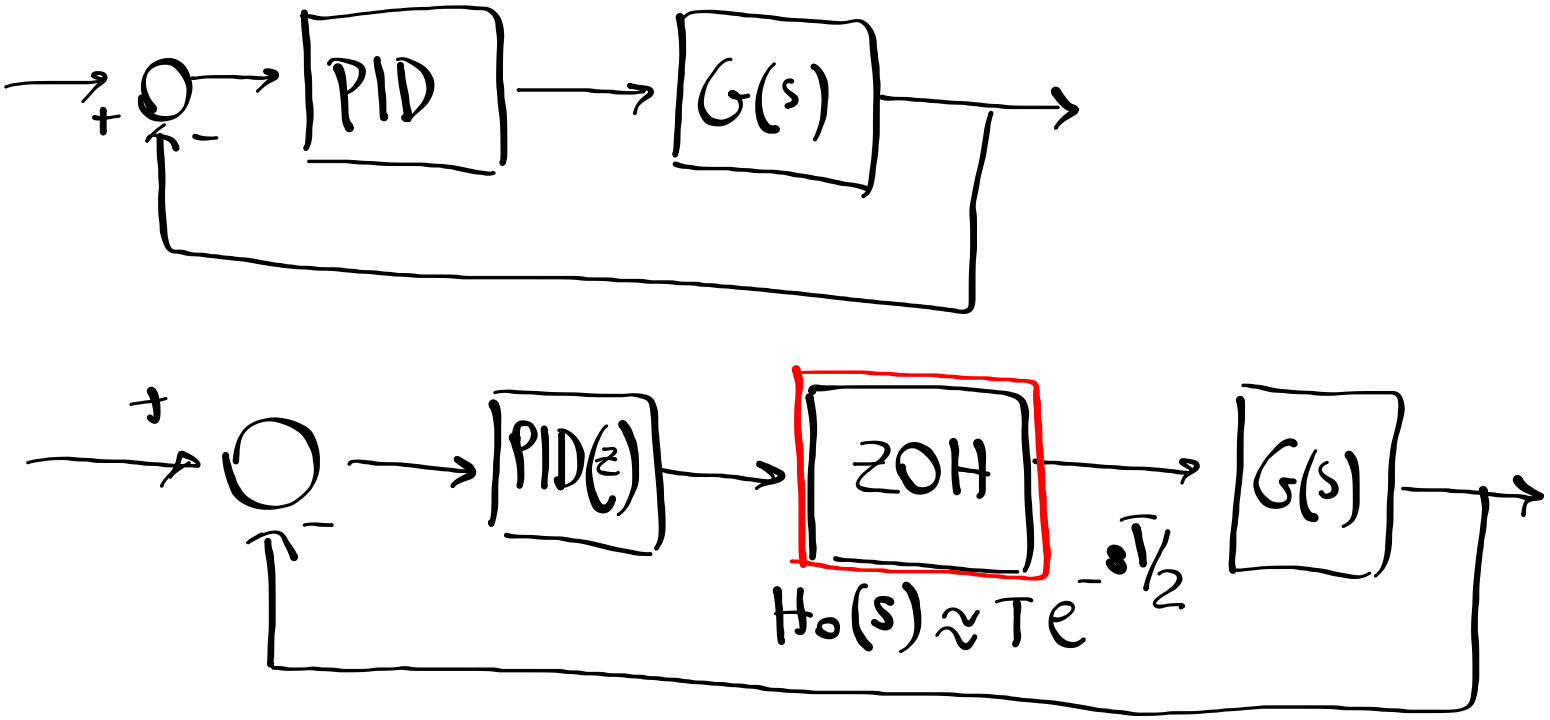
EA

$$s = \frac{z-1}{T}$$

EI

$$s = \frac{1 - z^{-1}}{T}$$

$$z = e^{sT}$$


+
−
PID
G(s)
+
−
PID(z)
ZOH
G(s)
$H_0(s) \approx T e^{-s\frac{T}{2}}$