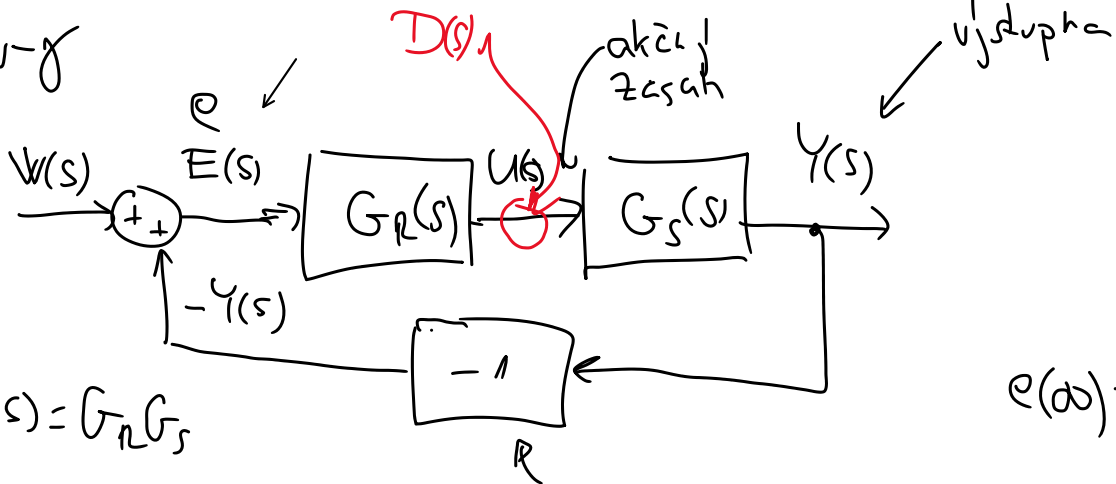


$$e = w - y$$



$$G_{\text{oro}}(s) = G_R G_S$$

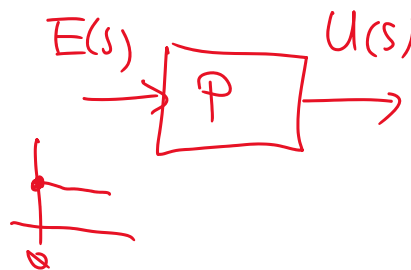
$$G_{\text{uro}}(s) = \frac{G_{\text{oro}}}{1 - (-1)G_{\text{oro}}}$$

$$e(\infty) = w(\infty) - y(\infty)$$

$$G_R = ?$$

PID ?

PC+  
P



$$U(s) = s \frac{1}{s}$$

$$U(s) = 1 ?$$

I



PI



D

?

$$G_R(s) = \frac{v_0 + v_{-1} \frac{1}{s} + v_1 s}{s^2 + v_0 s + v_{-1}} = \frac{U(s)}{E(s)}$$

$$\frac{r_1 s + r_0 s + r_{-1}}{s}$$

↓ Struktur 2, PID

$$G_R = r_0 + r_{-1} \frac{1}{s} \quad G_s = \frac{k}{T_s s + 1}$$

$$G_{UR0} = ?$$

$$G_{ono} = \frac{(r_0 s + r_{-1}) k}{s (T_s s + 1)} = \frac{k r_0 s + k r_{-1}}{T_s s^2 + s}$$

$$G_{UR0} = \frac{G_{ono}}{1 + G_{ono}} = \frac{\frac{k r_0 s + k r_{-1}}{T_s s^2 + s}}{(T_s s^2 + s) + k r_0 s + k r_{-1}} = \frac{k r_0 s + k r_{-1}}{T_s s^2 + (1 + k r_0) s + k r_{-1}}$$

$$e(\infty) = ?$$

$$w = ? \Rightarrow w(t) = 1$$

$$w(s) = \frac{1}{s}$$

$$g(\infty) = \lim_{s \rightarrow 0} G_{UR0}(s) = \frac{k r_{-1}}{k r_{-1}} = 1$$

$$e(\infty) = 1 - 1 = 0$$

