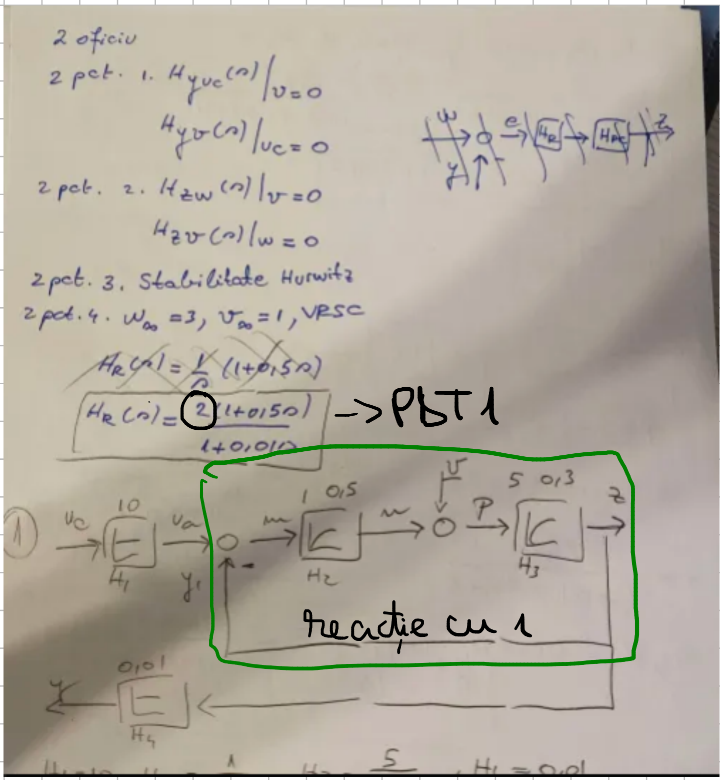


$H_1 \rightarrow$ ET-P

$H_1 = 10$

$H_2 \rightarrow$ ET-PT1

$$H_2 = \frac{1}{1+0,5s}$$

$H_3 \rightarrow$ ET-PT1

$$H_3 = \frac{5}{1+0,3s}$$

$H_4 \rightarrow$ ET-P

$H_4 = 0,01$

H_2, H_3 - serie $\Rightarrow$ $H_{23} = H_2 \cdot H_3 = \dfrac{5}{(1+0,5s)(1+0,3s)}$

$H_{23}, 1$ - reacție $\Rightarrow$

$$H_\alpha = \frac{H_{23}}{1+H_{23}\cdot 1} = \frac{\frac{5}{(1+0,5s)(1+0,3s)}}{1+\frac{5}{(1+0,5s)(1+0,3s)}} =$$

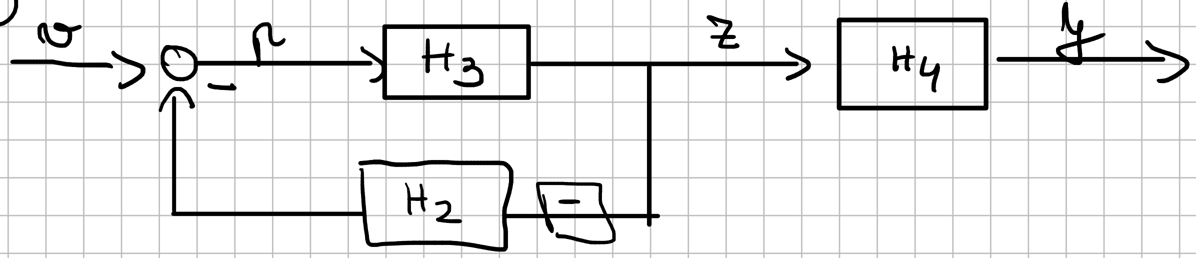
$$= \frac{\frac{5}{\cancel{(1+0,5s)(1+0,3s)}}}{\frac{(1+0,5s)(1+0,3s)+5}{\cancel{(1+0,5s)(1+0,3s)}}} = \frac{5}{(1+0,5s)(1+0,3s)+5}$$

H_1, H_α, H_4 - serie

$$H_{1\alpha 4} = H_1 \cdot H_\alpha \cdot H_4 = \frac{0,5}{(1+0,5s)(1+0,3s)+5}$$

$$H_{yu_c}(s)\Big|_{v=0} = \frac{0,5}{(1+0,5s)(1+0,3s)+5}$$

②

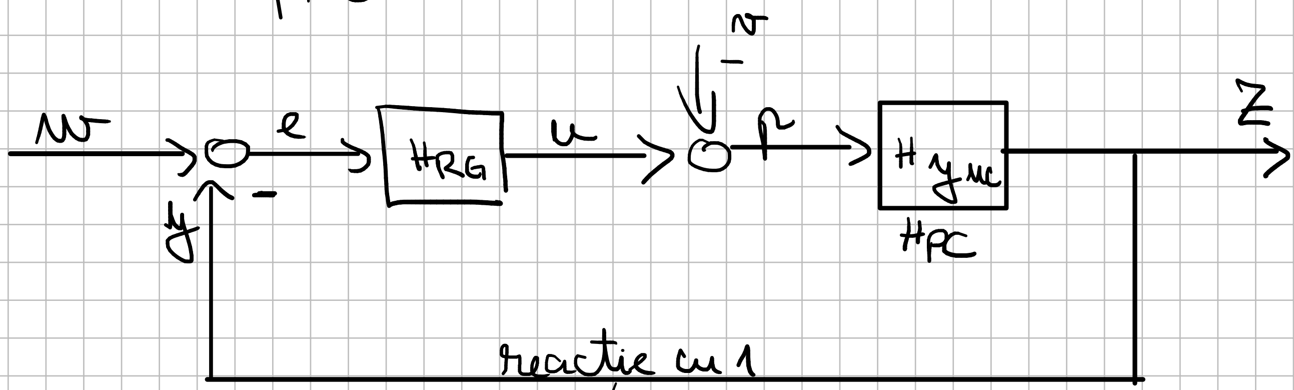


$H_3, H_2, -$ - reacție

$$H_{23} = -\frac{H_3}{1+H_2H_3}$$

H_{23}, H_4 - serie $\quad H_{234} = H_{23} \cdot H_4$

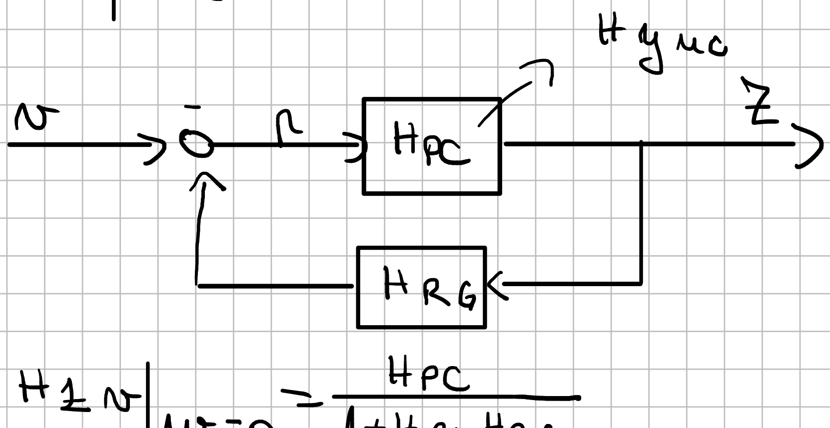
$$\Rightarrow H_{yv(t)}\Big|_{uc=0} = H_{234}$$



$$H_{pc} = H_{y\,uc}$$

$$H_0 = H_{RG} \cdot H_{PC} = \frac{2(1+0{,}5s)}{1+0{,}01s} \cdot \frac{0{,}5}{(1+0{,}5s)(1+0{,}3s)+5}$$

$$H_{zw}\Big|_{v=0} = \frac{H_0}{1+H_0 \cdot 1}$$



$$H_{zv}\Big|_{w=0} = \frac{H_{PC}}{1+H_{PC} \cdot H_{RG}}$$

3.

$$\Delta(s) = 1 + H_0 = 0$$

$$1 + \frac{2(1+0{,}5s)}{1+0{,}01s} \cdot \frac{0{,}5}{(1+0{,}5s)(1+0{,}3s)+5} = 0$$

$$(1+0{,}01s)(1+0{,}5s)(1+0{,}3s) + 5 + 1 + 0{,}5s = 0$$

$$(1+0{,}5s+0{,}01s+0{,}005s^2)(1+0{,}3s) + 6 + 0{,}5s = 0$$

$$1 + \underline{0{,}51s} + 0{,}005s^2 + \underline{0{,}3s} + 0{,}153s^2 + 0{,}015s^3 + 6$$
$$+ \underline{0{,}5s} = 0$$

$$\underset{>0}{0{,}015}s^3 + \underset{>0}{0{,}158}s^2 + \underset{>0}{1{,}31}s + \underset{>0}{7} = 0$$

$$H = \begin{bmatrix} a_2 & a_0 & 0 \\ a_3 & a_1 & 0 \\ 0 & a_2 & a_0 \end{bmatrix}$$

$$H = \begin{bmatrix} 0{,}158 & 7 & 0 \\ 0{,}015 & 1{,}31 & 0 \\ 0 & 0{,}158 & 7 \end{bmatrix}$$

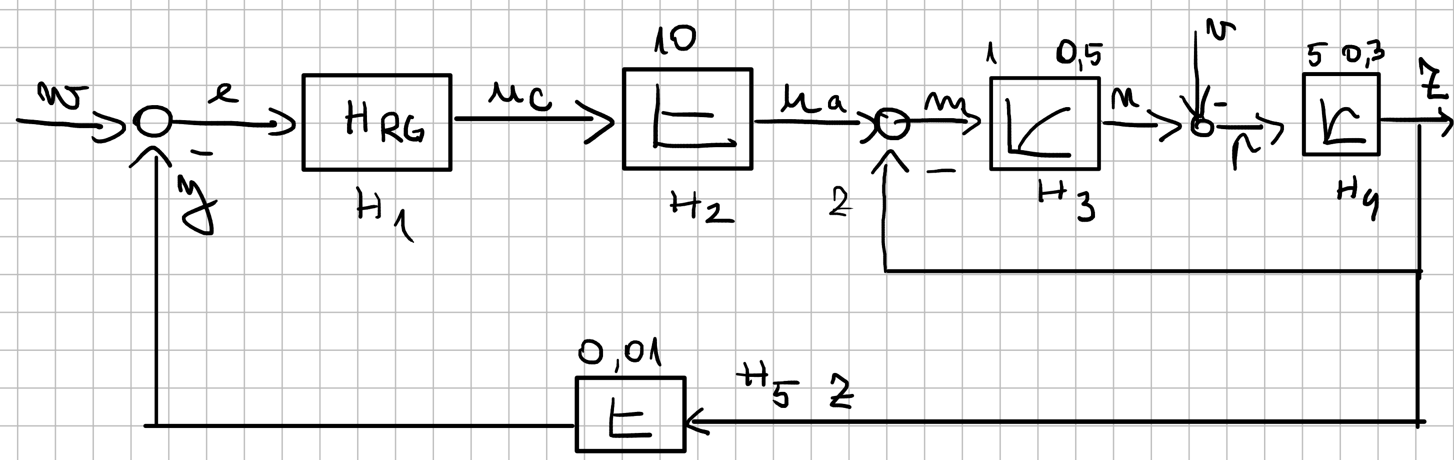
$$H_1 = 0{,}158 > 0$$

$$H_2 = \begin{vmatrix} 0{,}158 & 7 \\ 0{,}015 & 1{,}31 \end{vmatrix} = 0{,}04898 - 0{,}0105 =$$
$$= 0{,}04793 > 0$$

$$H_3 = \overset{??}{7} \cdot H_2 = 0{,}33551 > 0$$

$\Rightarrow$ sistem stabil

(4) $w_\infty = 3$, $v_\infty = 1$



$w_\infty - y_\infty = e_\infty \Rightarrow 3 - y_\infty = e_\infty$

la H_5: $z_\infty \cdot 0{,}01 = y_\infty \Rightarrow z_\infty = 100\, y_\infty$

la H_4: $z_\infty = 5 \cdot p_\infty \Rightarrow p_\infty = \frac{z_\infty}{5}$

$m_\infty - v_\infty = p_\infty \Rightarrow m_\infty - 1 = p_\infty \Rightarrow m_\infty = 1 + p_\infty$

H_3: $n_\infty = m_\infty$

$u_{a\infty} - z_\infty = m_\infty$

H_2: $u_{a\infty} = 10 \cdot u_{c\infty}$

HRG - PbT1 $\Rightarrow u_{c\infty} = k \cdot e_\infty = 2 \cdot e_\infty$

$u_{a\infty} = 10 \cdot u_{c\infty} = 20 e_\infty$

$u_{a\infty} - z_\infty = m_\infty$

$20 e_\infty - z_\infty = m_\infty = m_\infty = 1 + p_\infty = 1 + \frac{z_\infty}{5}$

$20 e_\infty - 100 y_\infty = 1 + \frac{100 y_\infty}{5} = 1 + 20 y_\infty$

$20(3 - y_\infty) - 100 y_\infty = 1 + 20 y_\infty$

$60 - 20 y_\infty - 100 y_\infty = 1 + 20 y_\infty$

$140 y_\infty = 59 \Rightarrow y_\infty = \frac{140}{59}$