R3

① Construiți schema bloc - informațională

② Funcțiile de transf: y_u, y_V

③ Construim, punem și regulatorul

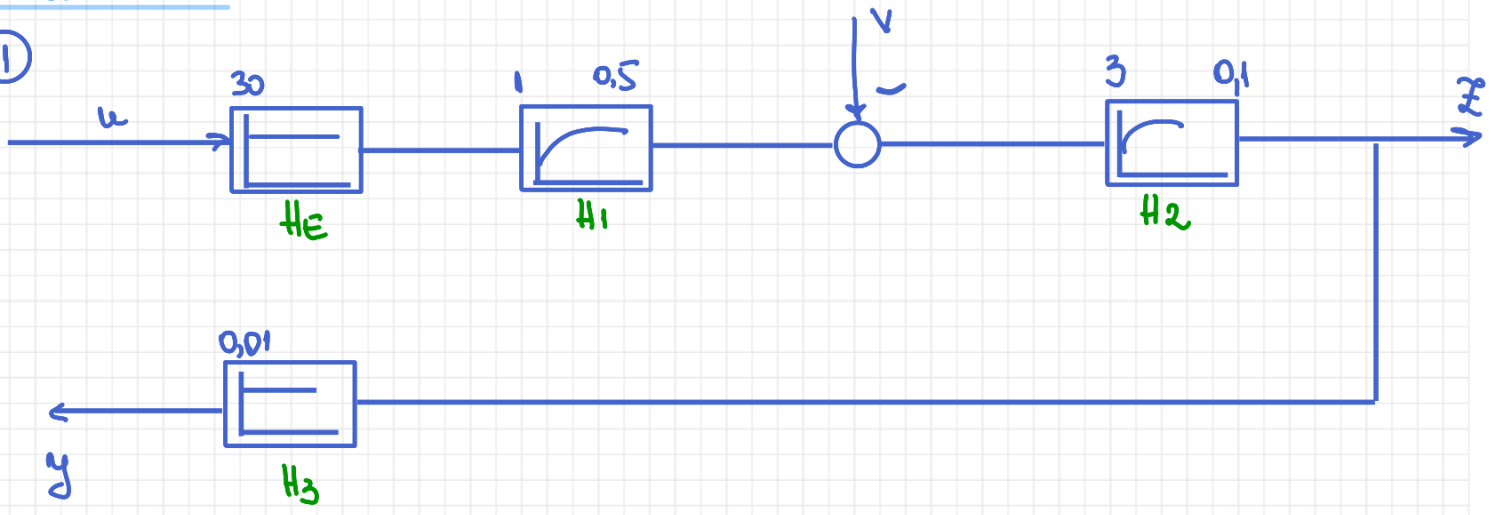
④ Stabilitatea

⑤ VRSC

⑥ $H(z) = \dfrac{1+9z}{z^3+0,5z^2+0,7z+0,2}$

REZOLVARE:

①



②

$H_E = 30$, $H_1 = \dfrac{1}{1+0,5s}$, $H_2 = \dfrac{3}{1+0,1s}$, $H_3 = 0,01$

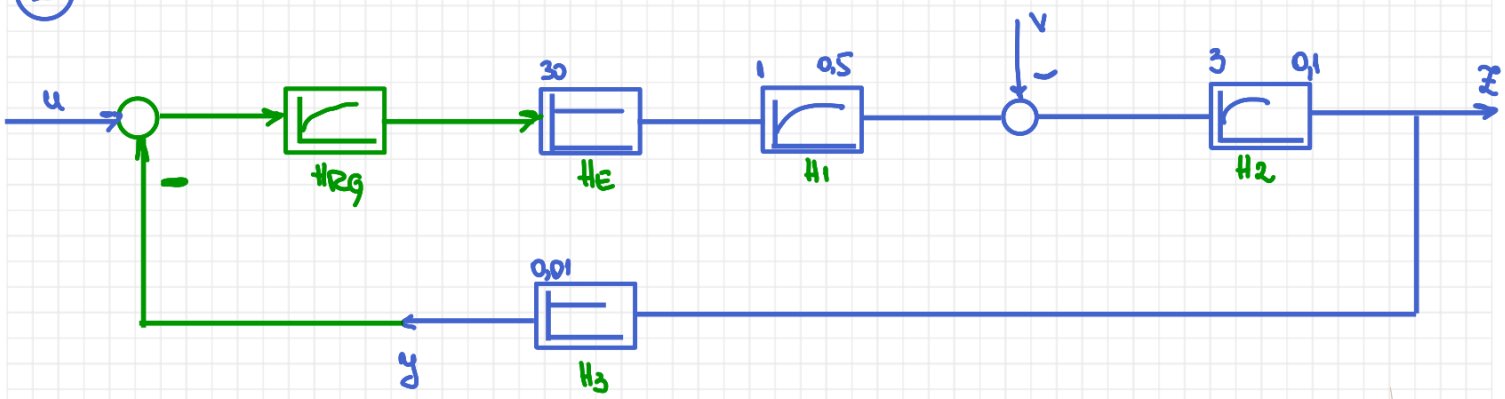
H_{yu} H_E, H_1, H_2, H_3 → serie ⇒

$\Rightarrow H_{yu} = H_E \cdot H_1 \cdot H_2 \cdot H_3 = 30 \cdot \dfrac{1}{1+0,5s} \cdot \dfrac{3}{1+0,1s} \cdot 0,01 = \dfrac{0,9}{(1+0,5s)(1+0,1s)}$

H_{yv} H_2, H_3 → serie, minus la V ⇒

$\Rightarrow H_{yV} = -H_2 \cdot H_3 = -\dfrac{0,03}{1+0,1s}$

③



$$\Rightarrow H_{PC} = \frac{0,9}{(1+0,5S)(1+0,1S)} = K_{PC}$$

T_1 T_2

$$\Rightarrow K_R = \frac{1}{2 \cdot K_{PC} \cdot T_2} = \frac{1}{2 \cdot 0,9 \cdot 0,1} = 5,56$$

$T_R = 0,5$

$$\Rightarrow K_R = K_R \cdot T_R = 2,78$$

RG - PI : $H_{RG-PI}(S) = \frac{0,3}{S}(1+13S)$

$$H_W = \frac{H_{RG} \cdot H_{PC}}{1 + H_{RG} \cdot H_{PC}} = \frac{\frac{0,3(1+13S)}{S} \cdot \frac{0,9}{(1+0,5S)(1+0,1S)}}{1 + \frac{0,3(1+13S)}{S} \cdot \frac{0,9}{(1+0,5S)(1+0,1S)}} =$$

$$= \frac{0,27(1+13S)}{S(1+0,5S)(1+0,1S) + 0,27(1+13S)}$$

$$\Delta(S) = 0 \Rightarrow (S+0,5S^2)(1+0,1S) + 0,27 + 3,51S = 0$$

$$\Rightarrow S + 0,5S^2 + 0,1S^2 + 0,05S^3 + 0,27 + 3,51S = 0$$

$$\Rightarrow 0,05S^3 + 0,6S^2 + 4,51S + 0,27 = 0$$

- $0,05 > 0$ (a_3)

  $0,6 > 0$ (a_2) $\Rightarrow$ trec la matricea Hoerwitz :

  $4,51 > 0$ (a_1)

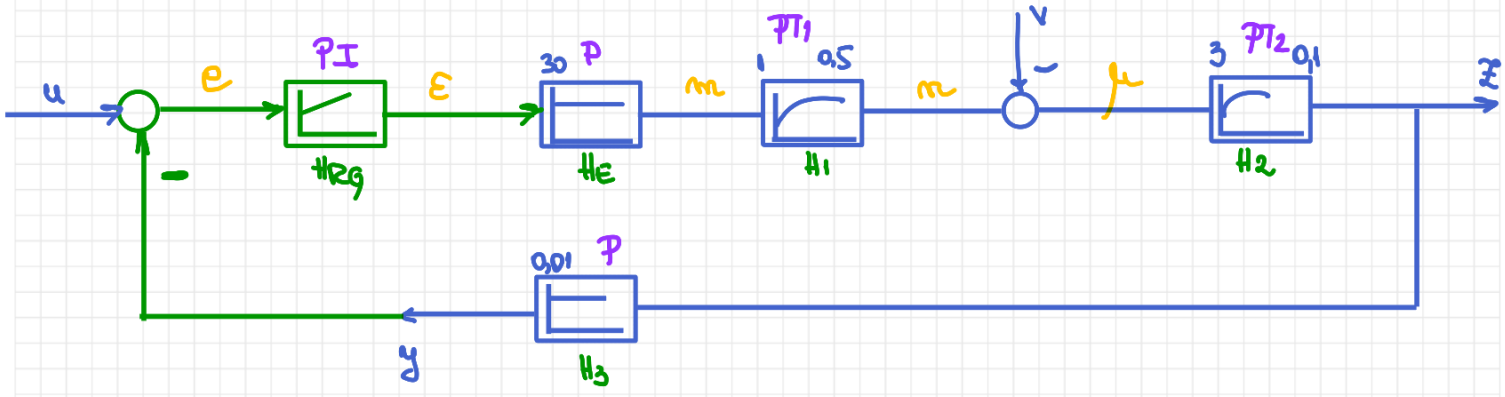
  $0,27 > 0$ (a_0)

- $\mathcal{H} = \begin{bmatrix} a_2 & a_0 & 0 \\ a_3 & a_1 & 0 \\ 0 & a_2 & a_0 \end{bmatrix} = \begin{bmatrix} 0,6 & 0,27 & 0 \\ 0,05 & 4,51 & 0 \\ 0 & 0,6 & 0,27 \end{bmatrix}$

$\delta_1 = 0,6 > 0$

$\delta_2 = \begin{vmatrix} 0,6 & 0,27 \\ 0,05 & 4,51 \end{vmatrix} = 2,6925 > 0$

$\delta_3 = 0,27 \cdot \delta_2 = 0,727 > 0$ $\Rightarrow$ sistemul RG + PC este stabil



$u_\infty = 10$

$V_\infty = 0.$

- H_{RG} - PI $\Rightarrow$ $e_\infty = 0.$

- $e_\infty = u_\infty - y_\infty \Rightarrow y_\infty = u_\infty - e_\infty = 10.$

- H_3 - P $\Rightarrow y = 0,01 \cdot z \Rightarrow z = \frac{y}{0,01} = 1000.$

- H_2 - PT2 $\Rightarrow z_\infty = 3 \cdot \mu_\infty \Rightarrow \mu_\infty = 333,33$

- $\mu_\infty = m_\infty - V_\infty \Rightarrow m_\infty = \mu_\infty + V_\infty = 333,33 + 0 = 333,33$

- $H_1 - PT_1 \Rightarrow n_\infty = 1 \cdot m_\infty \Rightarrow m_\infty = 333{,}33$

- $H_E - P \Rightarrow m_\infty = \varepsilon_\infty \cdot 30 \Rightarrow \varepsilon_\infty = 11{,}111$

⑥ $H(z) = \dfrac{1+9z}{1 \cdot z^3 + 0{,}5 z^2 + 0{,}7 z + 0{,}2}$

$a_3 \quad a_2 \quad a_1 \quad a_0$

$n = 3 \Rightarrow$ impar

Cond: 0: $a_3 = 1 > 0$ ✓

1: $\Delta(1) = 1 + 0{,}5 + 0{,}7 + 0{,}2 = 2{,}4 > 0$ ✓

2: $\Delta(-1) = -1 + 0{,}5 - 0{,}7 + 0{,}2 = -1 < 0$ ✓

3: $|a_0| < a_3 \Rightarrow 0{,}2 < 1$ ✓ → matricea Jury:

	z^0	z^1	z^2	z^3
Lin 1	0,2	0,7	0,5	1
Lin 2	1	0,5	0,7	0,2
Lin 3	−0,96	−0,36	−0,6	—
Lin 4	−0,6	−0,36	−0,96	—

$b_0 = \begin{vmatrix} a_0 & a_3 \\ a_3 & a_0 \end{vmatrix} = \begin{vmatrix} 0{,}2 & 1 \\ 1 & 0{,}2 \end{vmatrix} = -0{,}96$

$b_1 = \begin{vmatrix} a_0 & a_2 \\ a_3 & a_1 \end{vmatrix} = \begin{vmatrix} 0{,}2 & 0{,}5 \\ 1 & 0{,}7 \end{vmatrix} = -0{,}36$

$b_2 = \begin{vmatrix} a_0 & a_1 \\ a_3 & a_2 \end{vmatrix} = \begin{vmatrix} 0{,}2 & 0{,}7 \\ 1 & 0{,}5 \end{vmatrix} = -0{,}6$

$\Rightarrow |0,96| > |0,6| \hookrightarrow 0,96 > 0,6$ adev $\Rightarrow$ sistemul este stabil din criteriul lui Jury