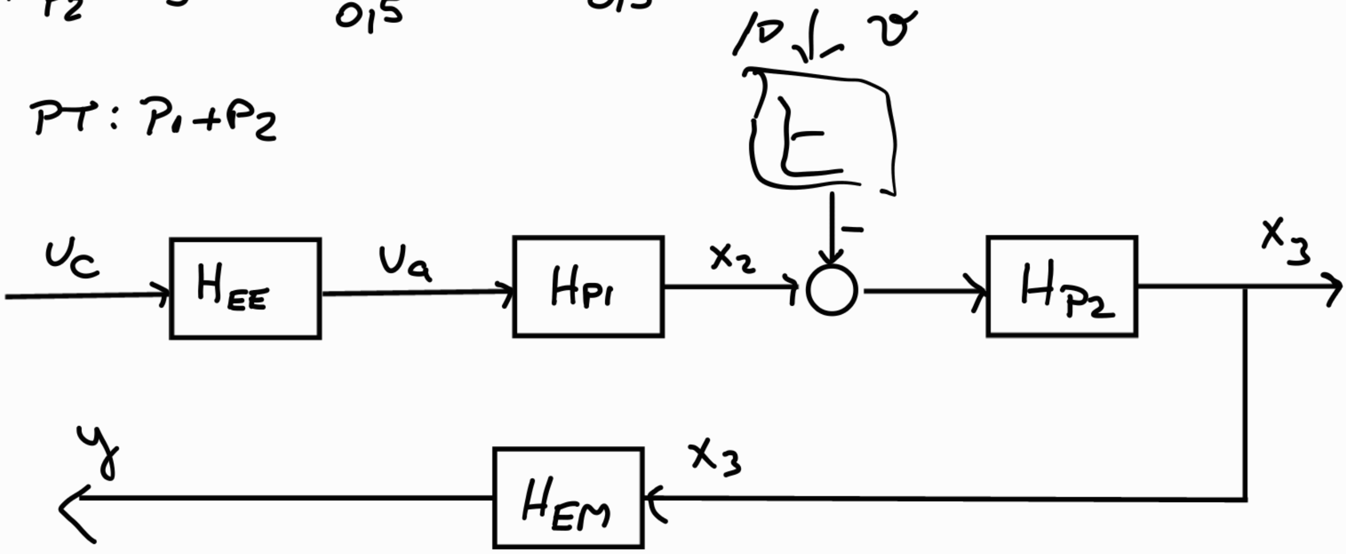
$$H_{EE}(s) = 50 = \frac{U_a(s)}{U_c(s)}$$

$$H_{EM}(s) = 0{,}01 = \frac{y(s)}{x_3(s)}$$

$$H_{P_1}(s) = \frac{40}{1+20s} = \frac{x_2(s)}{U_a(s)}$$

$$H_{P_2}: \dot{x}_3(t) = -\frac{1}{0{,}5}x_3(t) + \frac{1}{0{,}5}\left(x_2(t) - 10V\right)$$

$PT: P_1 + P_2$



$$s x_3(s) = -\frac{1}{0{,}5}x_3(s) + \frac{1}{0{,}5}\left(x_2(s) - 10V(s)\right)$$

$$(s+2)x_3(s) = 2\left(x_2(s) - 10V(s)\right)$$

- $x_2(s) = 0$

$$(s+2)x_3(s) = -20V(s)$$

de la perturbație

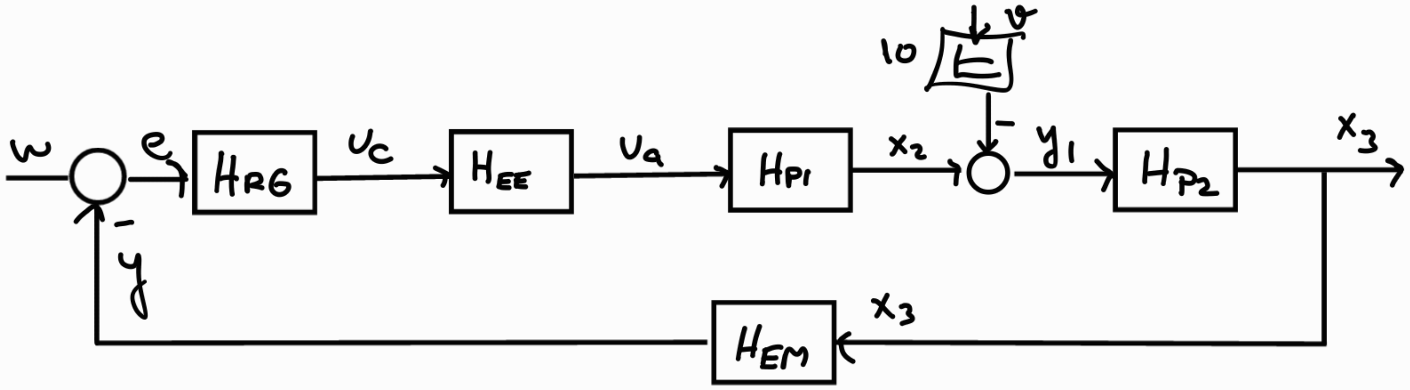
$$\frac{x_3(s)}{V(s)} = - \frac{20}{s+2} = -\frac{10}{0{,}5s+1}$$

- $V(s) = 0$

$$(s+2)x_3(s) = 20x_2(s)$$

$$\frac{x_3(s)}{x_2(s)} = \frac{\cancel{20}\ 2}{s+2} = \frac{1}{0{,}5s+1}$$

$$H_{P_2}(s) = \frac{1}{0{,}5s+1}$$



$$H_{RG}(s) = \frac{2(1+4s)}{1+0{,}4s}$$

$$H_{PC} = H_{EE}\cdot H_{P_1}\cdot H_{P_2}\cdot H_{EM} = 50\cdot\frac{40}{1+20s}\cdot\frac{20}{s+2}\cdot 0{,}01 = \frac{400}{(1+20s)(s+2)}$$

$$H_{x_3 w}(s)\Big|_{v=0} = H_{RG}\cdot H_{PC} = \frac{2(1+4s)}{1+0{,}4s}\cdot\frac{400}{(1+20s)(s+2)} =$$

$$= \frac{800(1+4s)}{(1+20s)(s+2)}$$

$$H_{x_3 v}(s)\Big|_{w=0} = H_{P_2}\cdot 10$$

$$H_{y u_c} = H_{PC}$$

$$H(z) = \frac{z^2-3z+1}{z^3+4z^2+7z-1}$$

$$\Delta(z) = z^3+4z^2+7z-1$$

$n=3$, impar

$$\Delta(1) = 1^3+4\cdot 1^2+7\cdot 1-1 = 11 > 0$$

$$\Delta(-1) < 0$$

$$\Delta(-1) = (-1)^3+4\cdot(-1)^2+7\cdot(-1)-1 =$$

$$= -1+4-7-1 = -5 < 0$$

$|a_0| = |-1| = 1 < a_n = 1 \Rightarrow$ sistemul nu e stabil.

- $w_\infty = 7$, $v_\infty = 3$

(2) $H_{RG}(s) = \frac{1}{s}(1+4s)$

$$H(z) = \frac{2}{z^3 - 3z^2 + 4z + 1}$$

$w_\infty = 6$; $v_\infty = 2$