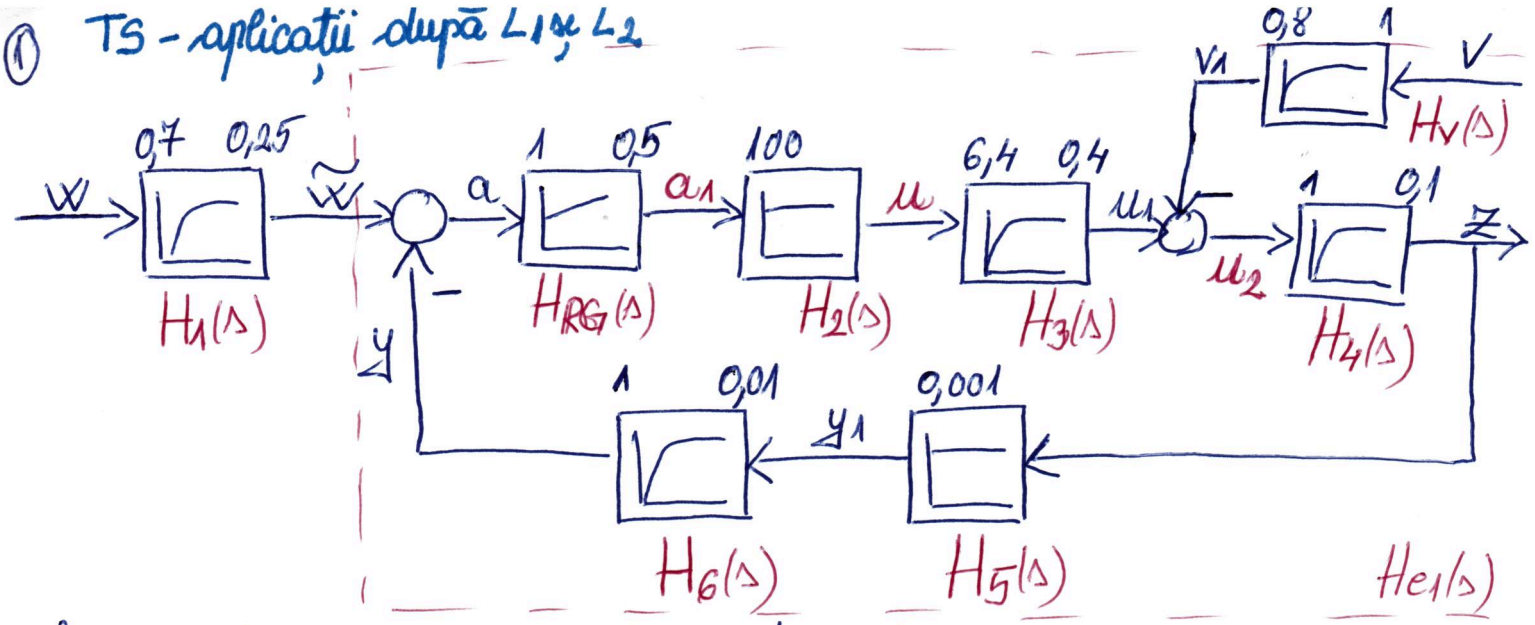
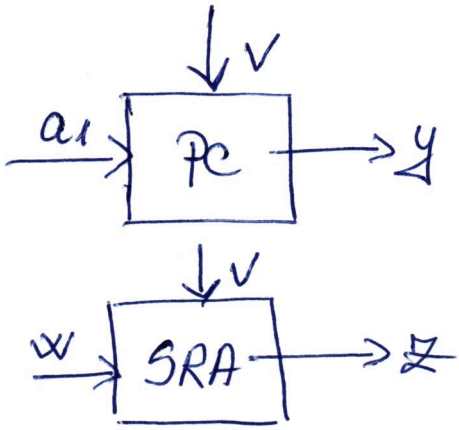
① TS - aplicații după L1 și L2



Să se determine funcțiile de transfer:

$H_{ya_1}(\Delta) = ?$
$H_{yv}(\Delta) = ?$
} aferente PC (buclă deschisă)

$H_{zw}(\Delta) = ?$
$H_{zv}(\Delta) = ?$
} aferente SRA (buclă închisă)



$$H_1(\Delta) = \frac{0,7}{1+0,25\Delta} \quad (ET\text{-}PT_1)$$

$$H_2(\Delta) = 100 \quad (ET\text{-}P)$$

$$H_3(\Delta) = \frac{6,4}{1+0,4\Delta} \quad (ET\text{-}PT_1)$$

$$H_4(\Delta) = \frac{1}{1+0,1\Delta} \quad (ET\text{-}PT_1)$$

$$H_5(\Delta) = 0,001 \quad (ET\text{-}P)$$

$$H_6(\Delta) = \frac{1}{1+0,01\Delta} \quad (ET\text{-}PT_1)$$

$$H_{RG}(\Delta) = \frac{k(1+\Delta T)}{\Delta T} = \frac{1\cdot(1+0,5\Delta)}{0,5\Delta}$$

$$\Rightarrow H_{RG}(\Delta) = \frac{1+0,5\Delta}{0,5\Delta} \quad (ET\text{-}PI)$$

$$H_v(\Delta) = \frac{0,8}{1+\Delta} \quad (ET\text{-}PT_1)$$

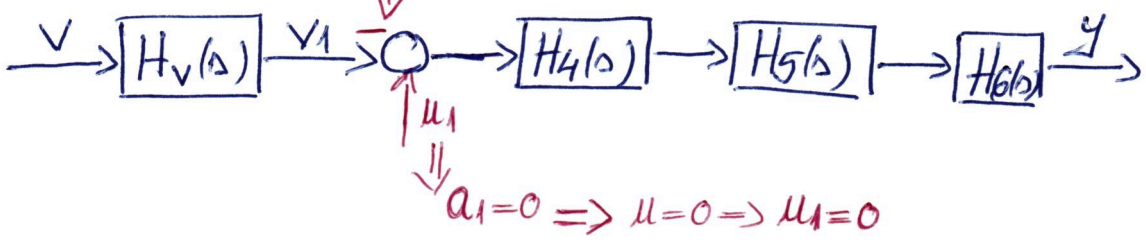
$$H_{ya_1}(\Delta) = \left.\frac{y(\Delta)}{a_1(\Delta)}\right|_{v=0} = H_2(\Delta)\cdot H_3(\Delta)\cdot H_4(\Delta)\cdot H_5(\Delta)H_6(\Delta) =$$

$$= 100\cdot\frac{6,4}{1+0,4\Delta}\cdot\frac{1}{1+0,1\Delta}\cdot 0,001\cdot\frac{1}{1+0,01\Delta} = \frac{0,64}{(1+0,4\Delta)(1+0,1\Delta)(1+0,01\Delta)}$$

$\Delta \to \lambda$

$$\Rightarrow \boxed{H_{yq_1}(\Delta) = \frac{0{,}64}{(1+0{,}01\Delta)(1+0{,}1\Delta)(1+0{,}4\Delta)}}$$

$$H_{yv}(\Delta) = \frac{y(\Delta)}{V(\Delta)}\Big|_{q_1=0} = -H_v(\Delta)\cdot H_4(\Delta)\cdot H_5(\Delta)\cdot H_6(\Delta) \Rightarrow$$



$$H_{yv}(\Delta) = -\frac{0{,}8}{1+\Delta}\cdot\frac{1}{1+0{,}1\Delta}\cdot 0{,}001\cdot\frac{1}{1+0{,}01\Delta} \Rightarrow \boxed{H_{yv}(\Delta) = -\frac{0{,}0008}{(1+\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)}}$$

$$H_{zw}(\Delta) = \frac{z(\Delta)}{w(\Delta)}\Big|_{v=0} = H_1(\Delta)\cdot H_{e_1}(\Delta) = H_1(\Delta)\cdot\frac{H_{RG}(\Delta)\cdot H_2(\Delta)\cdot H_3(\Delta)\cdot H_4(\Delta)}{1+H_{RG}(\Delta)H_2(\Delta)H_3(\Delta)H_4(\Delta)[H_5(\Delta)+H_6(\Delta)]}$$

$$= \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{\frac{1+0{,}5\Delta}{0{,}5\Delta}\cdot 100\cdot\frac{6{,}4}{1+0{,}4\Delta}\cdot\frac{1}{1+0{,}1\Delta}}{1+\frac{640(1+0{,}5\Delta)}{0{,}5\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)}\cdot 0{,}001\cdot\frac{1}{1+0{,}01\Delta}} =$$

$$= \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{\frac{1280(1+0{,}5\Delta)}{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)}}{1+\frac{1{,}28(1+0{,}5\Delta)}{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)}} = \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{\frac{1280(1+0{,}5\Delta)}{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)}}{\frac{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)+1{,}28(1+0{,}5\Delta)}{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)}}$$

$$= \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{1280(1+0{,}01\Delta)(1+0{,}5\Delta)}{\Delta(1+0{,}4\Delta)(1+0{,}1\Delta)(1+0{,}01\Delta)+1{,}28(1+0{,}5\Delta)} =$$

$$= \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{1280(1+0{,}01\Delta)(1+0{,}5\Delta)}{(0{,}4\Delta^2+\Delta)(0{,}001\Delta^2+0{,}11\Delta+1)+1{,}28+0{,}64\Delta} =$$

$$= \frac{0{,}7}{1+0{,}25\Delta}\cdot\frac{1280(1+0{,}01\Delta)(1+}{0{,}0004\Delta^4+0{,}044\Delta^3+0{,}4\Delta^2+0{,}001\Delta^3+0{,}11\Delta^2+\Delta+1{,}28+0{,}64\Delta}$$

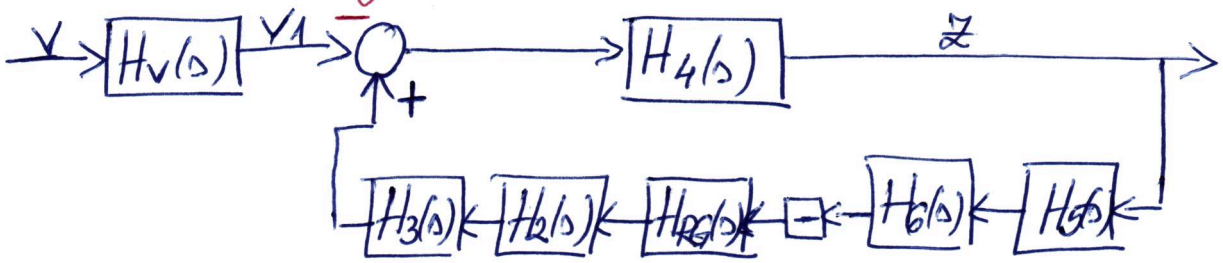
$$= \frac{896(1+0{,}01\Delta)(1+0{,}5\Delta)}{(1+0{,}25\Delta)(0{,}0004\Delta^4+0{,}045\Delta^3+0{,}51\Delta^2+1{,}64\Delta+1{,}28)}$$

NON

$$\boxed{H_{zw}(s) = \frac{896(1+0{,}01s)(1+0{,}5s)}{(1+0{,}25s)(0{,}0004s^4+0{,}045s^3+0{,}51s^2+1{,}64s+1{,}28)}}$$

$$H_{zv}(s) = \left.\frac{Z(s)}{V(s)}\right|_{w=0} = -H_v(s)\cdot H_{e_2}(s) = -H_v \cdot \frac{H_4(s)}{1-H_4(s)[H_5(s)H_6(s)(-)H_{RG}(s)H_2(s)H_3(s)]}$$

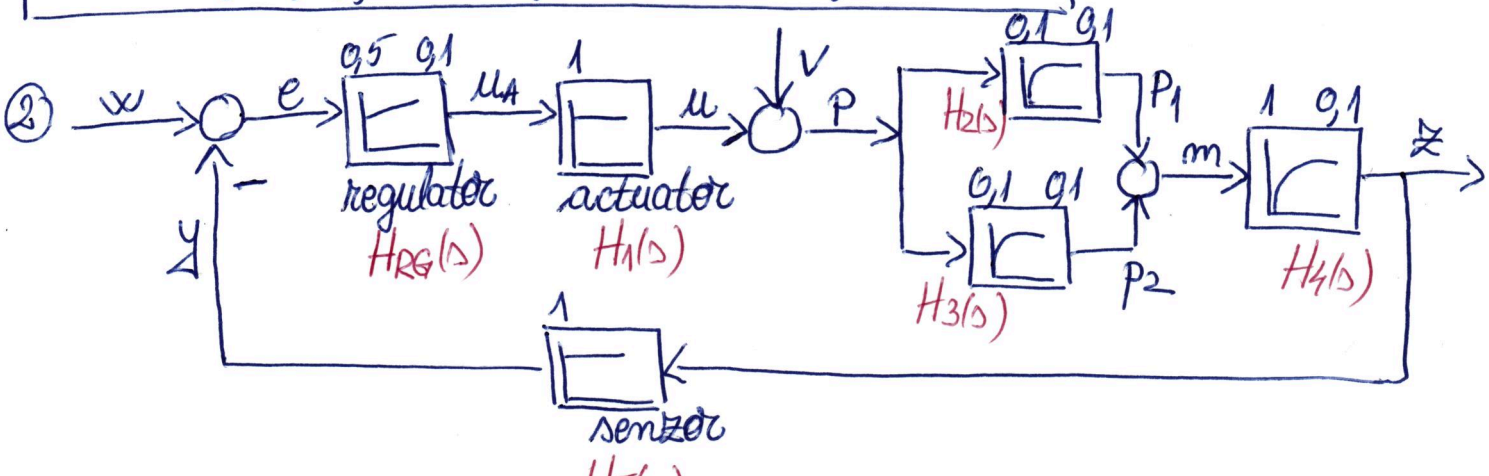
$$1+H_{RG}(s)H_2(s)H_3(s)H_4(s)H_5(s)H_6(s)$$



$$H_{zv}(s) = -\frac{0{,}8}{1+s}\cdot\frac{\frac{1}{s+0{,}1s}}{\frac{0{,}0004s^4+0{,}045s^3+0{,}51s^2+1{,}64s+1{,}28}{s(1+0{,}4s)(s+0{,}1s)(1+0{,}01s)}} =$$

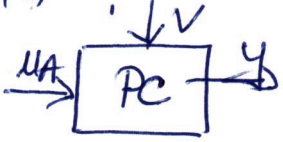
$$= -\frac{0{,}8}{1+s}\cdot\frac{s(1+0{,}01s)(1+0{,}4s)}{0{,}0004s^4+0{,}045s^3+0{,}51s^2+1{,}64s+1{,}28} \Rightarrow$$

$$\boxed{H_{zv}(s) = \frac{-0{,}8s(1+0{,}01s)(1+0{,}4s)}{(1+s)\cdot(0{,}0004s^4+0{,}045s^3+0{,}51s^2+1{,}64s+1{,}28)}}$$

② 

Să se determine funcțiile de transfer:

$H_{yu_A}(s) = ?$ } aferente PC
$H_{yv}(s) = ?$ } (buclă deschisă)



$H_{zw}(s) = ?$ } aferente SRA
$H_{zv}(s) = ?$ } (buclă închisă)

$$H_{RG}(s) = \frac{k_2(1+sT)}{sT} = \frac{0,5(1+0,1s)}{0,1s} = \frac{5(1+0,1s)}{s} \quad (ET-PI^*)$$

$$H_1(s) = 1 \quad (ET-P)$$

$$\left.\begin{aligned} H_2(s) &= \frac{0,1}{1+0,1s} \quad (ET-PT_1) \\ H_3(s) &= \frac{0,1}{1+0,1s} \quad (ET-PT_1) \end{aligned}\right\} \Rightarrow H_{23}(s) = H_2(s) + H_3(s) = \frac{0,2}{1+0,1s} \quad (ET-PT_1)$$

$$H_4(s) = \frac{1}{1+0,1s} \quad (ET-PT_1)$$

$$H_5(s) = 1 \quad (ET-P)$$

$$H_{y\mu_A}(s) = \left.\frac{y(s)}{\mu_A(s)}\right|_{v=0} = H_1(s) \cdot H_{23}(s) \cdot H_4(s) \cdot H_5(s) = 1 \cdot \frac{0,2}{1+0,1s} \cdot \frac{1}{1+0,1s} \cdot 1 \Rightarrow$$

$$\boxed{H_{y\mu_A}(s) = \frac{0,2}{(1+0,1s)(1+0,1s)}}$$

$$H_{yv}(s) = \left.\frac{y(s)}{v(s)}\right|_{\mu_A=0} = H_{23}(s) \cdot H_4(s) \cdot H_5(s) = \frac{0,2}{1+0,1s} \cdot \frac{1}{1+0,1s} \cdot 1 \Rightarrow$$

$$\boxed{H_{yv}(s) = \frac{0,2}{(1+0,1s)(1+0,1s)}}$$

$$H_{zw}(s) = \left.\frac{z(s)}{w(s)}\right|_{v=0} = \frac{H_{RG}(s) \cdot H_1(s) H_{23}(s) H_4(s)}{1 + H_{RG}(s) H_1(s) H_{23}(s) H_4(s) \cdot H_5(s)} =$$

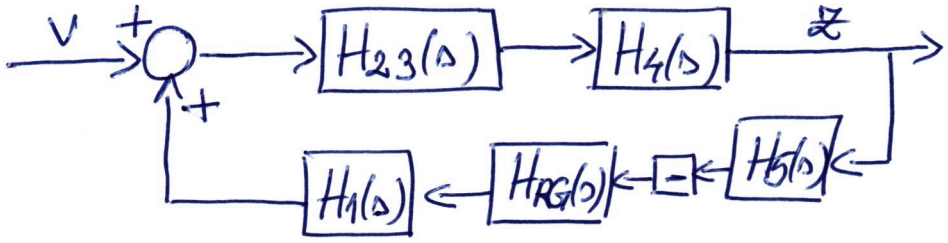
$$= \frac{\frac{5(1+0,1s)}{s} \cdot 1 \cdot \frac{0,2}{1+0,1s} \cdot \frac{1}{1+0,1s}}{1 + \frac{(1+0,1s)}{s(1+0,1s)(1+0,1s)} \cdot 1} = \frac{\frac{(1+0,1s)}{s(1+0,1s)(1+0,1s)}}{\frac{s(1+0,1s)^2 + (1+0,1s)}{s(1+0,1s)(1+0,1s)}} =$$

$$= \frac{1+0,1s}{(1+0,1s)[s(1+0,1s)+1]} = \frac{1+0,1s}{(1+0,1s)(0,1s^2+s+1)} \Rightarrow$$

$$\boxed{H_{zw}(s) = \frac{1+0,1s}{(1+0,1s)(0,1s^2+s+1)}}$$

$$\Delta(s)$$

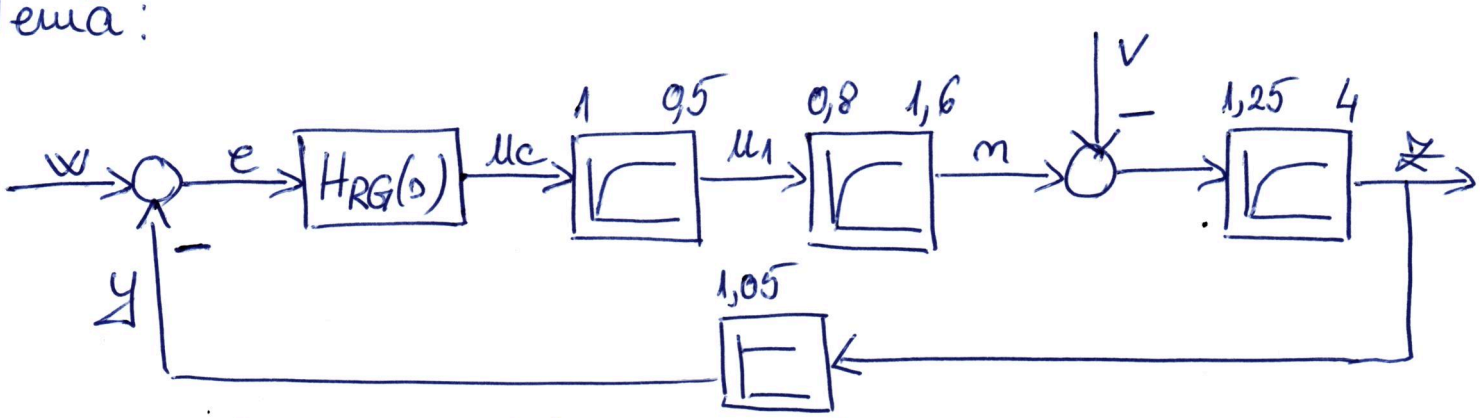
$$H_{zv}(s) = \left.\frac{Z(s)}{V(s)}\right|_{w=0} = \frac{H_{23}(s)H_4(s)}{1 - H_{23}(s)H_4(s)[(-)H_{RG}(s)H_1(s)H_5(s)]} \Rightarrow$$



$$H_{zv}(s) = \frac{H_{23}(s)H_4(s)}{1 + H_{RG}(s)H_1(s)H_{23}(s)H_4(s)H_5(s)} = \frac{\frac{0,2}{(1+0,1s)} \cdot \frac{1}{(1+0,1s)}}{\frac{(1+0,1s)(0,1s^2+s+1)}{s(1+0,1s)(1+0,1s)}}$$

$$\Rightarrow \boxed{H_{zv}(s) = \frac{0,2s}{(1+0,1s)(0,1s^2+s+1)}}$$

Temă:



Să se determine f.d.t: $H_{yu_c}(s) = ?$

$H_{yv}(s) = ?$

$H_{zw}(s) = ?$

$H_{zv}(s) = ?$

Funcția de transfer a regulatorului este: $H_{RG}(s) = \frac{2(1+2s)}{1+0,1s}$ (ET-PDT1)