

a) sa se det. transf liniara inferioara  $T_i(P,K)$

$u_1=r$

$u_2=u$

$$y_1 = \begin{bmatrix} y \\ v \end{bmatrix} \quad y_2 = v$$

b) sa se det. transf liniara superioara  $T_s(P,D_m(s))$

c) sa se faca prog matlab .....

d) sa se aleaga ponderile  $W_1 W_2 W_3$

e) sa se enunte un caz de stabil. robusta

$$a) \quad G = \frac{2}{s(s+1)}$$

$$y = P(s) * u$$

$$\begin{bmatrix} y_1 \\ y_2 \end{bmatrix} = \begin{bmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{bmatrix} * \begin{bmatrix} u_1 = r \\ u_2 = u \end{bmatrix}$$

$$\begin{bmatrix} y \\ v \\ v \end{bmatrix} = \begin{bmatrix} P_{11} & P_{12} \\ P_{21} & P_{22} \end{bmatrix} * \begin{bmatrix} u_1 = r \\ u_2 = u \end{bmatrix}$$

$$y = u * G$$

$$v = r - y = r - u * G$$

$$\begin{bmatrix} y \\ v \\ v \end{bmatrix} = \begin{bmatrix} 0 & G \\ 1 & -G \\ 1 & -G \end{bmatrix} * \begin{bmatrix} u_1 = r \\ u_2 = u \end{bmatrix}$$

$$P_{11} = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad P_{12} = \begin{bmatrix} G \\ -G \end{bmatrix} \quad P_{21} = 1 \quad P_{22} = G$$

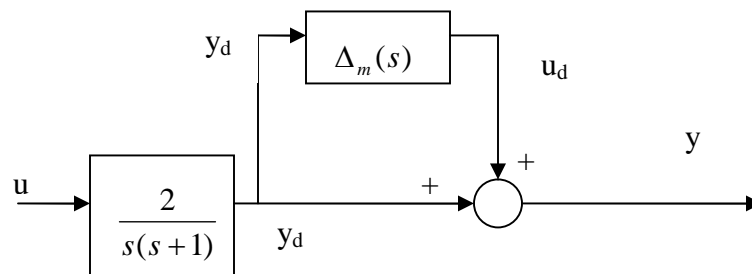
$$T_i(P, K) = P_{11} + P_{12} * K * (1 - P_{22} * K)^{-1} * P_{21}$$

$$T_i = \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \begin{bmatrix} G \\ -G \end{bmatrix} * K * (1 - GK)^{-1} * 1$$

$$T_i = \begin{bmatrix} 0 \\ 1 \end{bmatrix} + \begin{bmatrix} \frac{KG}{1 - KG} \\ -\frac{KG}{1 - KG} \end{bmatrix}$$

$$T_i = \begin{bmatrix} \frac{KG}{1 - KG} \\ 1 - \frac{KG}{1 - KG} \end{bmatrix} = \begin{bmatrix} T \\ S \end{bmatrix}$$

b)  $T_s(P, D_m(s))$



$$\begin{bmatrix} y_d \\ y \end{bmatrix} = \begin{bmatrix} N_{11} & N_{12} \\ N_{21} & N_{22} \end{bmatrix} * \begin{bmatrix} u_d \\ u \end{bmatrix}$$

$$y_d = G * u$$

$$y = u_d + y_d = u_d + G * u$$

$$\begin{bmatrix} yd \\ y \end{bmatrix} = \begin{bmatrix} 0 & G \\ 1 & G \end{bmatrix} * \begin{bmatrix} ud \\ u \end{bmatrix}$$

$$T_s = N_{22} + N_{21} * D_m(s) (1 - N_{11} * D_m(s))^{-1} * N_{12}$$

$$T_s = G + 1 * D_m(s) (1 - 0 * D_m(s))^{-1} * G = G + D_m(s) * G = (1 + D_m(s)) * G$$

c)

```

nump=[...];
denp=[...];
numw1=[...];
denw1=[...];
numw3=[...];
denw3=[...];
numw2=[...];
denw2=[...];
[aw1,bw1,cw1,dw1]=tf2ss(numw1,denw1);
[aw3,bw3,cw3,dw3]=tf2ss(numw3,denw3);
[aw2,bw2,cw2,dw2]=tf2ss(numw2,denw2);
[ap,bp,cp,dp]=tf2ss(nump,denp);
[A,B1,B2,C1,C2,D11,D12,D21,D22]=augment([ap bp;cp dp],[aw1 bw1;cw1
dw1],[aw3 bw3;cw3 dw3],[p1 p2 p3 p4]);
syspack=mksys(A,B1,B2,C1,C2,D11,D12,D21,D22,'tss');
[contr,Ty1u1]=hinf(syspack);
[ac,bc,cc,dc]=branch(contr);
[ay1u1,by1u1,cy1u1,dy1u1]=branch(Ty1u1)
[ad,bd,cd,dd]=series(ap,bp,cp,dp,ac,bc,cc,dc);
[numd,dend]=ss2tf(ad,bd,cd,dd);
[numy1u1,denyum1u1]=ss2tf(ad,bd,cd,dd);
omega=logspace(-3,2,150);
sysd=tf(numd,dend);
sysw1=tf(numw1,denw1);
sysw2=tf(numw2,denw2);
sysw3=tf(denw3,numw3);
figure(1);
bode(sysd,sysw1,sysw3,omega); grid;

```