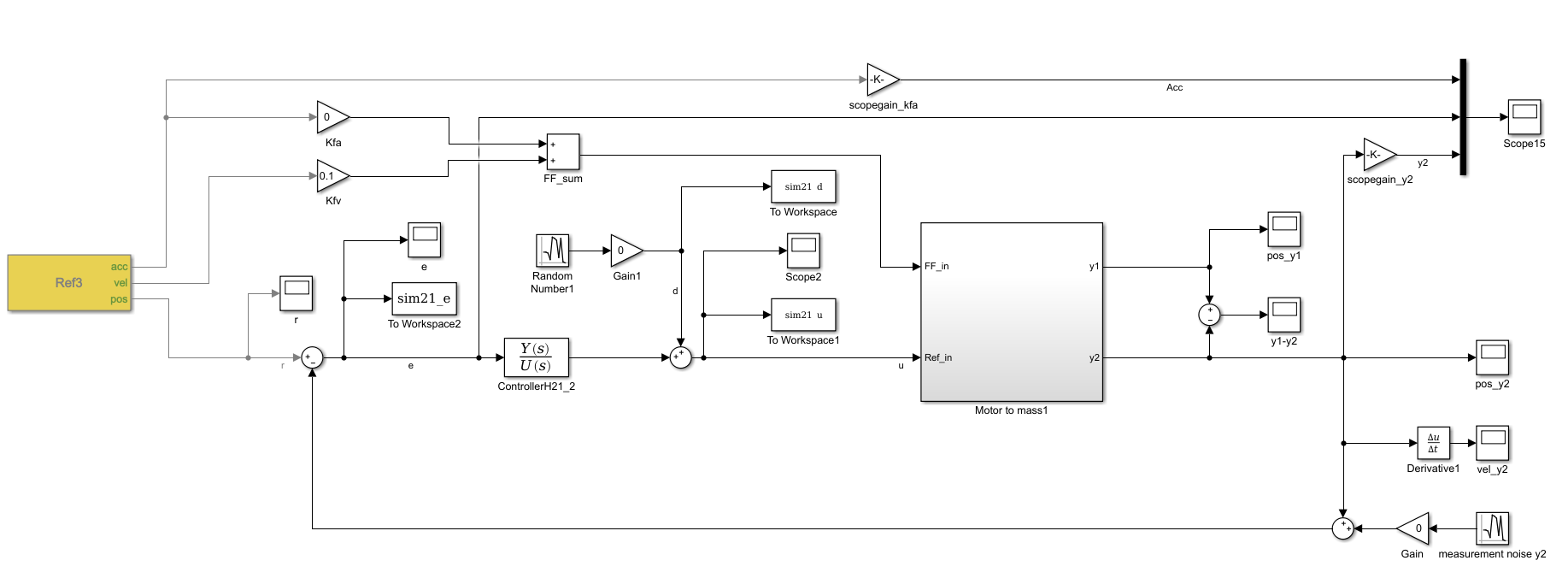
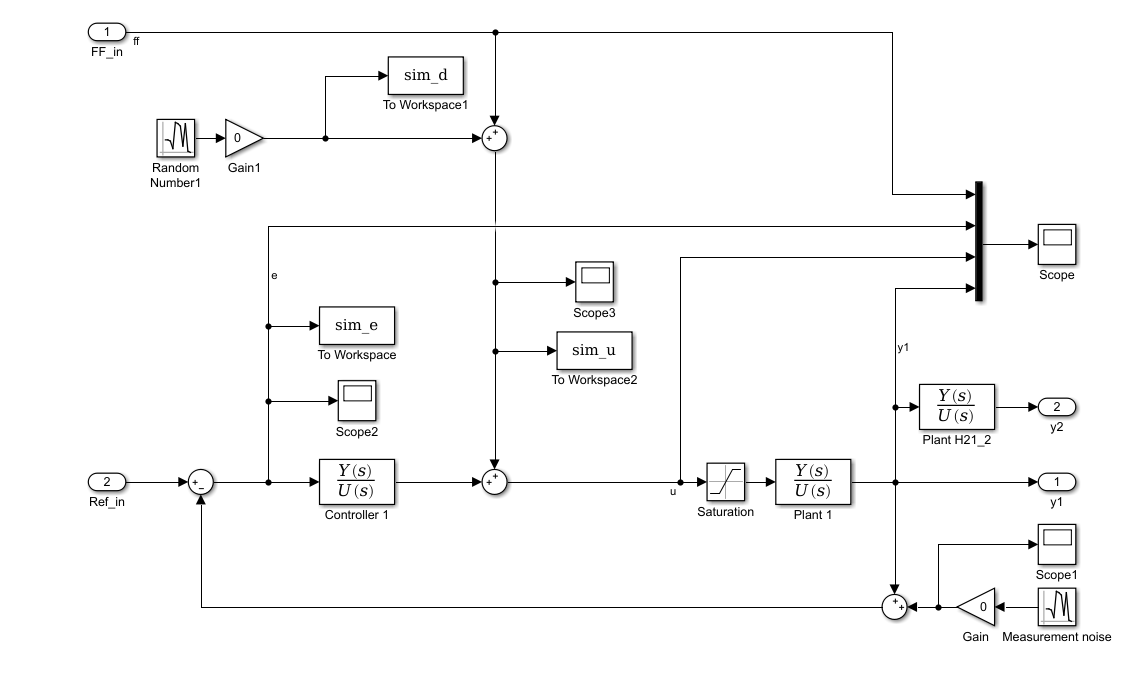
Nested loop system





Controller from motor to mass 1 (inner loop)

H1\_gain = 130; %130

Nf1 = 58.1; % Location of zeros [hz]

Nf2 = 41.1; % Location of poles [hz]

Nbeta1 = 0.02;

Nbeta2 = 0.013;

H1\_notch = ((1/(2\*pi\*Nf1)^2)\*s^2+(2\*Nbeta1/(2\*pi\*Nf1))\*s+1)/((1/(2\*pi\*Nf2)^2)\*s^2+(2\*Nbeta2/(2\*pi\*Nf2))\*s+1);

P = 0.05;

D = 0.001;

H1\_pd = P+D\*s;

f\_LP = 500;

H1\_LP = 1/((1/(2\*pi\*f\_LP))\*s+1);

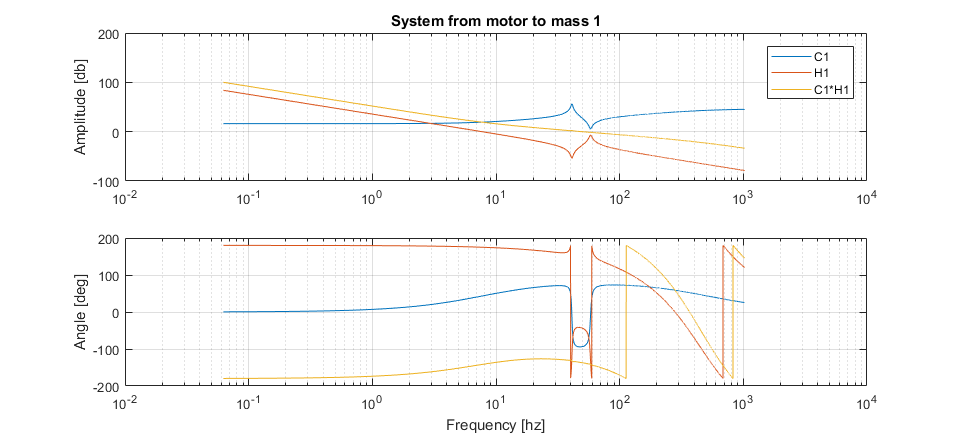
C1 = H1\_gain\*H1\_notch\*H1\_pd\*H1\_LP;

C1\_resp = squeeze(freqresp(C1,f\*2\*pi));

BW: 50 Hz

Gain margin -7,2 dB

Phase margin: 42 deg



Controller for mass 1 to mass 2 (outer loop)

H21\_gain = 15; %15

I\_I = 1;

H21\_I = (1+(I\_I\*2\*pi/s));

Nf21 = 40.75; % Location of zeros [hz]

Nf22 = 150; % Location of poles [hz]

Nbeta21 = 0.01;

Nbeta22 = 0.1;

H21\_notch = ((1/(2\*pi\*Nf21)^2)\*s^2+(2\*Nbeta21/(2\*pi\*Nf21))\*s+1)/((1/(2\*pi\*Nf22)^2)\*s^2+(2\*Nbeta22/(2\*pi\*Nf22))\*s+1);

f1\_LP21 = 10;

H21\_LP1 = 1/((1/(2\*pi\*f1\_LP21))\*s+1);

f2\_LP21 = 0.5;

H21\_LP2 = 1/((1/(2\*pi\*f2\_LP21))\*s+1);

C21 = H21\_gain\*H21\_notch\*H21\_LP1\*H21\_LP2\*H21\_I;

C21\_resp = squeeze(freqresp(C21,f\*2\*pi));

BW: 6.4 Hz

Gain margin -20.18 dB

Phase margin: 49 deg

