clc();

clear all();

close all;

sysorder=5;

N=2000;

inp=randn(N,1); %pseudo random values drawn from standard normal distributions

n=rand(N,1);

[b,a]=butter(2,0.25);%designs an order 2 lpf with cut off frequency 0.25

Gz=tf(b,a,-1);

h=[0.0976;0.2873;0.3360;0.2210;0.0964;];

y=lsim(Gz,inp);%time response

n=n\*std(y)/(10\*std(n));

d=y+n;

N=60;

w=zeros(sysorder,1);

for n=0:N

u=inp(n:-1:n-sysorder+1);

y(n)=w'\*u;

e(n)=d(n)-y(n);

if n<20

mu=0.32;

else

mu=0.15;

end

w=w+mu\*u\*e(n);

end

hold on

plot(d)

plot(y,'r');

legend('channel response with noise','channel response');

title('system output');

xlabel('samples');

ylabel('true and estimated output');

figure

plot(h,'b+');

hold on

plot(w,'r\*');

legend('actual weights','estimated weights');

title('comparison of actual and estimated weights');

axis([0 6 0.05 0.35]);

figure

semilogy(e.^2);

xlabel('samples');

ylabel('error value');