% T=1

% z = -1;

SampingTime = 0:1:20;

Input = ones(length(SampingTime),1)\*40;

num = [1.9355];

den = [1 1];

sys = tf(num,den,1);

figure;

lsimplot(sys,Input,SampingTime,'zoh'),grid on

title('Simulation at z = -1 and T =1');

%z =1

SampingTime1 = 0:1:200;

Input = ones(length(SampingTime1),1)\*40;

num = [-(1-exp(-1/15))];

den = [1 -1];

sys = tf(num,den,1);

figure

lsimplot(sys,Input,SampingTime1,'zoh'),grid on

title('Simulation at z = 1 and T =1');

%z= 0

SampingTime = 0:1:20;

Input = ones(length(SampingTime),1)\*40;

num = [.9355];

den = [1 0];

sys = tf(num,den,1);

figure

lsimplot(sys,Input,SampingTime,'zoh'),grid on

title('Simulation at z = 0 and T =1');

% T=10

% z = -1;

SampingTime = 0:10:200;

Input = ones(length(SampingTime),1)\*40;

num = [1.51083];

den = [1 1];

sys = tf(num,den,10);

figure

lsimplot(sys,Input,SampingTime,'zoh'),grid on

title('Simulation at z = -1 and T =10');

%z =1

SampingTime1 = 0:10:2000;

Input = ones(length(SampingTime1),1)\*40;

num = [-(1-exp(-10/15))];

den = [1 -1];

sys = tf(num,den,10);

figure

lsimplot(sys,Input,SampingTime1,'zoh'),grid on

title('Simulation at z = 1 and T =10');

%z= 0

SampingTime = 0:10:20;

Input = ones(length(SampingTime),1)\*40;

num = [.5134];

den = [1 0];

sys = tf(num,den,10);

figure

lsimplot(sys,Input,SampingTime,'zoh'),grid on

title('Simulation at z = 0 and T =10');

num = xlsread('Book1.xlsx');

time = num(:,1);

output = num(:,2);

frequency = 0:.1:50;

plot(time,output); hold on;

for i=1:length(frequency)

y = sin(2\*pi\*i\*time);

Amp = polyfit(output,y,1);

graph = Amp(1,1) \* y;

RootMeanSquare = rms(graph-output);

if RootMeanSquare < .75

% figure(2)

plot(time,graph,'--');

% hold on;

end

end