Independent University, Bangladesh

Department of Electrical and Electronic Engineering

BAETE Accredited

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Course Title : Digital Signal Processing LAB
Course Code : EEE 321L / ETE 324L (New); ECR 305L (Old)
Instructor : Dr. Kh Shahriya Zaman
Experiment No. : **06**
Experiment Name : **Study on z-transform.**

Objectives:

1. To understand the frequency response.
2. To understand the poles and zeros of a system.
3. To understand the system stability.

MATLAB function for frequency response:

MATLAB provides a function called *freqz* to compute the system function H (z).

- [H, ω] = *freqz* (b, a, N): returns the N-points frequency vector ω and the N points complex frequency response vector *H* of the system, given its numerator and denominator coefficients in vector *b* and *a*.

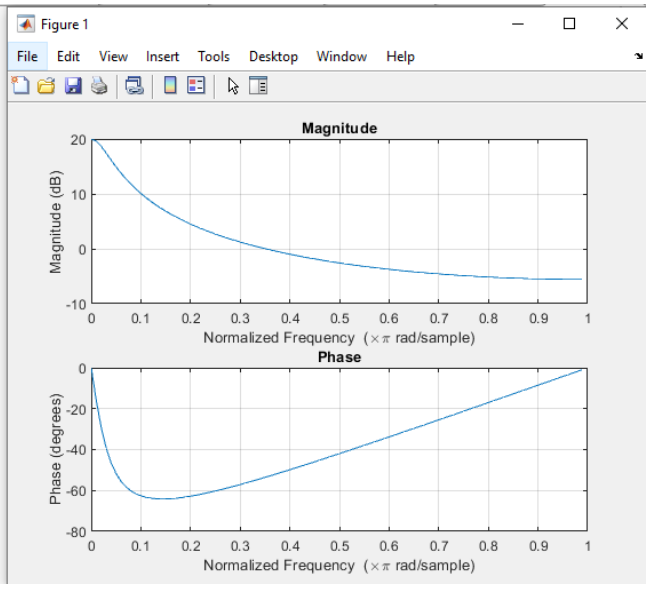
- *zplane* (b,a) function is used for pole-zero plot.

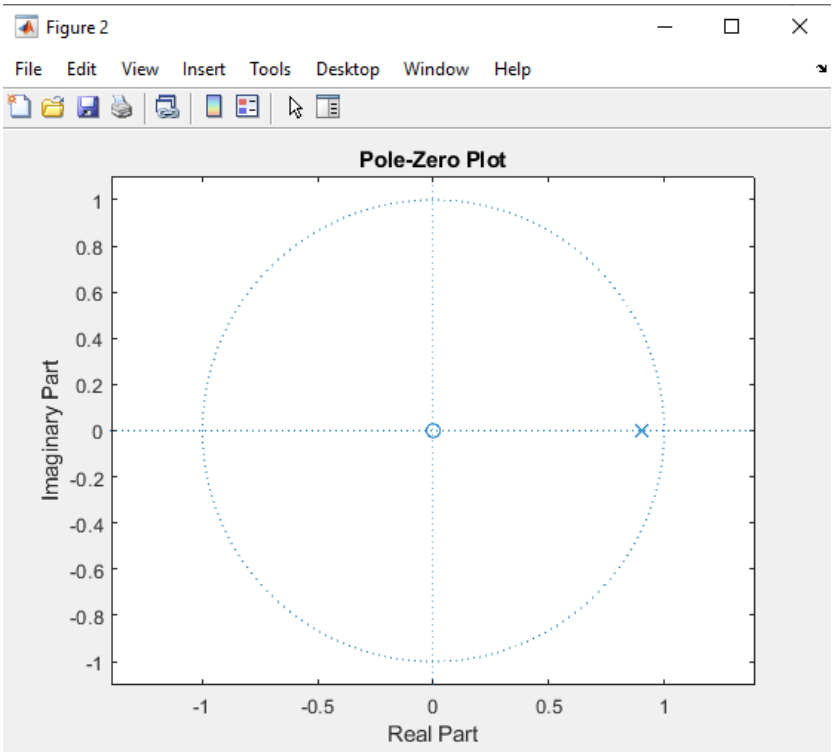
Lab work:

1. Given that $y(n) = 0.9y(n–1) + x(n)$. Determine the frequency response, $H(z)$ and plot the magnitude and phase angle of $H(z)$. Also sketch the pole-zero plot of $H(z)$.

```
%Hemal Sharma
%ID: 2221855
%y(n) = 0.9y(n-1) + x(n)

a = [1,-0.9];
b = [1,0];
freqz(b,a,100)
figure(2)
zplane(b,a)
```





Lab Assignment-6

1. Given that $y(n) = x(n) - 0.9x(n-1) - 0.1x(n-2) - 0.3y(n-1) + 0.04y(n-2)$. Determine the frequency response, $H(z)$ and plot the magnitude and phase angle of $H(z)$. Also sketch the pole-zero plot of $H(z)$.

```
%Hemal Sharma
%ID: 2221855
%y(n) = x(n) - 0.9x(n-1) - 0.1x(n-2) - 0.3y(n-1) + 0.04y(n-2).

a = [1,0.3,-0.04];
b = [1,-0.9,-0.1];
freqz(b,a,100);
figure(2)
zplane(b,a)
```

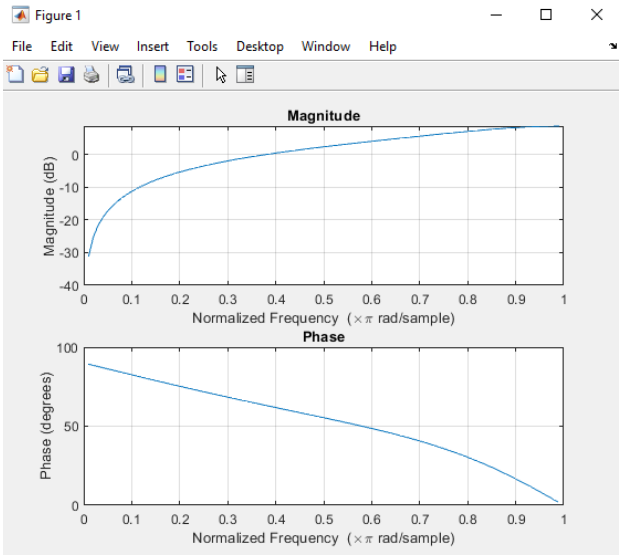


Figure 1
File Edit View Insert Tools Desktop Window Help
Magnitude
Magnitude (dB)
0
-10
-20
-30
-40
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Normalized Frequency (×π rad/sample)
Phase
Phase (degrees)
100
50
0
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1
Normalized Frequency (×π rad/sample)

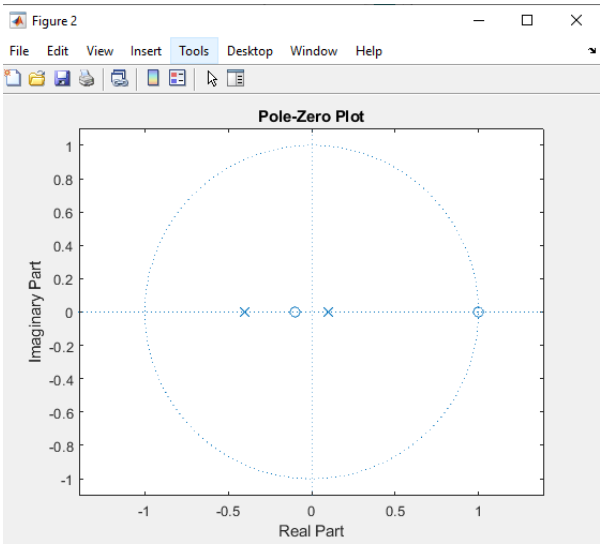


Figure 2
File Edit View Insert Tools Desktop Window Help
Pole-Zero Plot
Imaginary Part
1
0.8
0.6
0.4
0.2
0
-0.2
-0.4
-0.6
-0.8
-1
-1 -0.5 0 0.5 1
Real Part