## Experiment no.8: Nyquist Stability

### Object:
Creating the Nyquist

### Introduction:

From a Nyquist plot, we can tell a number of closed-loop poles on the right half plane If there is any closed-loop pole on the right half plane, the system goes unstable .If there is no closed-loop pole on the right half plane, the system is stable.

### Command :
nyquist(num,den)

### Cases:

$$1-G(s)=\frac{20}{s(1+2s)(1+s)}$$

$$2-G(s)=\frac{1+4s}{s^2(1+s)(1+2s)}$$

$$3-G(s)=\frac{10(1-s)}{(s+1)}$$

$$4-G(s)=\frac{60}{(1+s)(s+2)(s+5)}$$

### Discussions:

**1** -Discuses the Stability of each cases?
2-Draw the Nyquist path of all cases by using Matlab program and rules (Theoretical).
3-Compare between the theoretical solution and the results of program .

## Experiment no.9:

### Bode Diagram (Frequency – domain plots)

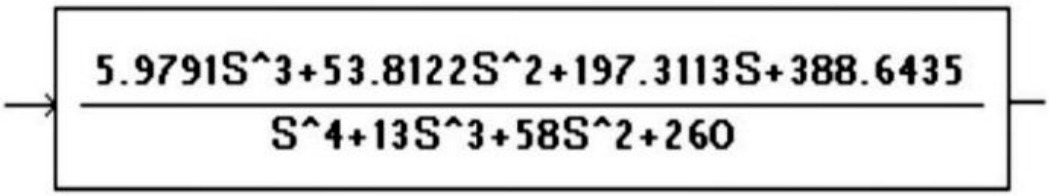
## Object:

Creating a bode diagram

## Theory:

Matlab makes it extremely easy to create frequency – domain plots using the command bode.

1. for known transfer function:




program:

```
clf
num=[0  5.979  53.8122  197.3113  388.6435];
den=[1  13  58  0  260];
bode(num , den)
```

2.for known zeros &poles of the system:

program:

```
clf
z=[-2  -2+5*i  -2-5*i];
p=[-1  -5  -7  -1+7*i  -1-7*i];
k=(35*50)/(2*29)   %k is chosen to give a d.c. gain of 1
[num , den]=zp2tf(z' , p' , k);
bode(num,den)
```

Cases:

$$1-G(s)=\frac{1000}{s(1+0.1s)(1+0.001s)}$$

$$2-G(s)=\frac{20}{s\ (1+0.5s)(1+0.05s)}$$

$$3-G(s)=\frac{20}{s(0.2s+1)}$$

$$4-G(s)=\frac{30}{s(1+0.1s)(0.2s+1)}$$

Discussions:

1-Discuses the Stability of each cases-?
2-Draw the bode diagram of all cases by using Matlab program and rules (Theoretical).
3-Compare between the theoretical solution and the results of program.