Control Systems

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***Abstract*—This manual is an introduction to control systems based on GATE problems.Links to sample Python codes are available in the text.**

Download python codes using

```
svn co https://github.com/gadepall/school/trunk/
    control/codes
```

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1.1 Mason's Gain Formula

1.2 Matrix Formula

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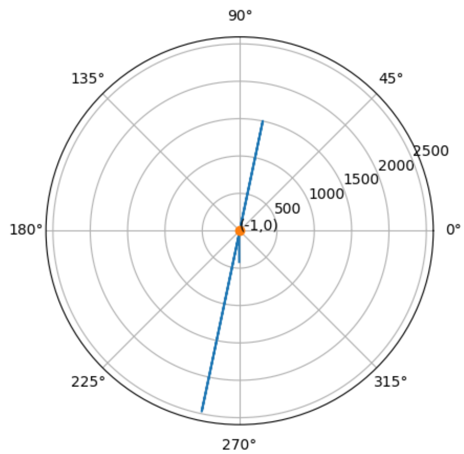
6 Nyquist Plot

6.1. Plot the polar plot of

$$G(s) = \frac{100(s+5)}{s(s+3)(s^2+4)}. \tag{6.1.1}$$

Solution: To plot polar plot,we need to find magnitude and phase of frequency response for different values of ω from 0 to ∞.
The following python code generates the polar plot :



codes/ee18btech11042.py

6.2. From polar plot we can find the stability of system and polar plots are drawn for open loop transfer functions.
6.3. Stability is determined by position of point (-1,0) w.r.t to polar plot
6.4. If (-1,0) is on the left side of the polar plot then the closed loop system is stable.
6.5. If (-1,0) is on the right side of the polar plot then the closed loop system is unstable.
6.6. If t(-1,0) is on the polar plot then the closed loop system is marginally stable.
6.7. Since (-1,0) is on the polar plot the above system is marginally stable.

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