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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6.1. Using Nyquist Criterion, find out whether this system is stable or not.

$$G(s) = \frac{50}{s(s+3)(s+6)} \quad (6.1.1)$$

$$H(s) = 1. \quad (6.1.2)$$

6.2. **Solution:**

Nyquist Stability:

$$N = Z - P \quad (6.2.1)$$

where Z is number of unstable poles of closed loop transfer function, P is number of unstable poles of open loop transfer function. and N is number of clockwise encirclement of $-1 + j0$. Closed Loop Transfer Function:

$$T(s) = \frac{50}{s^3 + 9s^2 + 18s + 50} \quad (6.2.2)$$

$$Z = 0, P = 0 \quad (6.2.3)$$

$$N = 0 \quad (6.2.4)$$

Thus, system is stable, which can be verified from Nyquist Plot in Fig 6.2

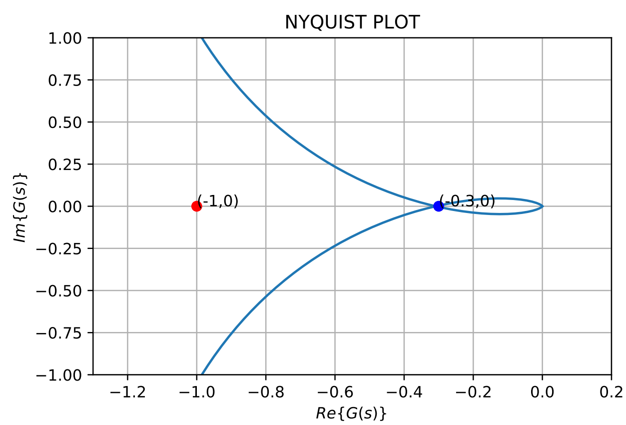

Fig. 6.2

The following code generates Fig 6.2

codes/ee18btech11050_1.py

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