SCILAB 5.4.1 Report on Linear Systems

Linear Systems in S-Domain:

EXAMPLE 1

- Consider a Transfer function $H(s) = \frac{1}{(s+1)}$. The bode plot of magnitude is obtained by plotting $20 \cdot log_{10}(H(j\omega))$ v/s ω in logarithmic scale.
- The prediction from approximation in standard practice on paper will obtain the break-way at -20db slope at ω=1 for $H(s) = \frac{1}{(s+1)}$. This visualized in figure 1 below.

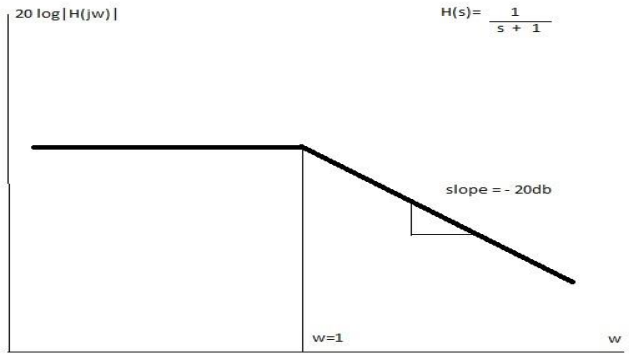

Figure 1

- The bode plot for H(s) is obtained in SCILAB code as shown in appendix- I:
- The bode plot returned in SCILAB depicted in figure 2:

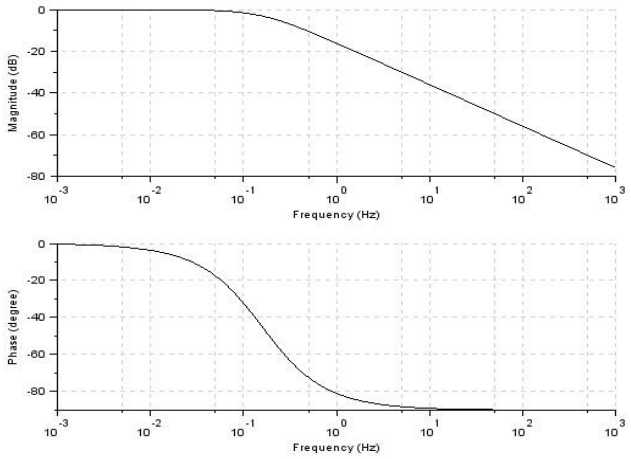

Figure 2

- **Observation:** <u>The theory predicts the break away point with -20db slope at $\omega = 1\ or\ 10^0$ but the plot returned by scilab predicts the break away point with -20db slope at $\omega = 0.1\ or\ 10^{-1}$</u>

EXAMPLE 2

- Consider a Transfer function $H(s) = \frac{1}{(\frac{s}{0.1}+1)}$. The bode plot of magnitude is obtained by plotting $20 \cdot log_{10}(H(j\omega))$ v/s ω in logarithmic scale.
- The prediction from approximation in standard practice on paper will obtain the break-way at -20db slope at ω=0.1 for $H(s) = \frac{1}{(\frac{s}{0.1}+1)}$.. This visualized in figure 3 below.

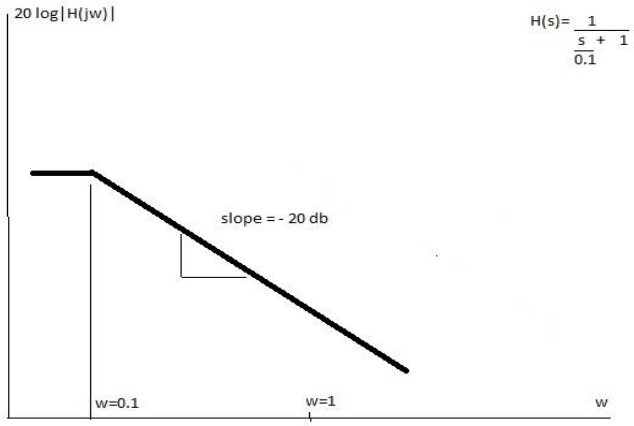

Figure 3

- The bode plot for H(s) is obtained in SCILAB code as shown in appendix-II:
- The bode plot returned in SCILAB depicted in figure 4:

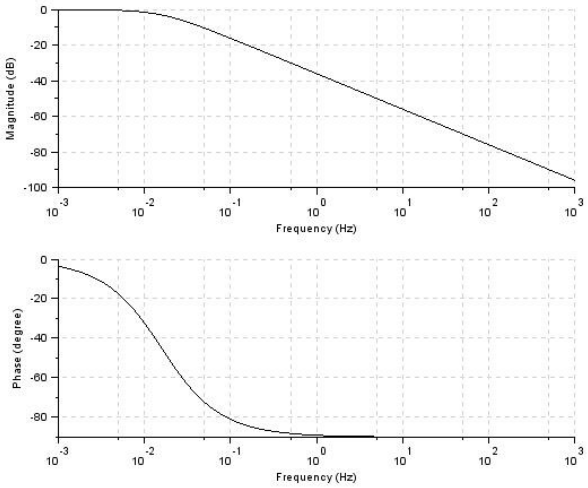

Figure 4

- **Observation:** <u>The theory predicts the break away point with -20db slope at $\omega = 0.1\ or\ 10^{-1}$ but the plot returned by scilab predicts the break away point with -20db slope at $\omega = 0.01\ or\ 10^{-2}$.</u>

Author Intention:

My intention is to obtain a logical/mathematical reason for the difference in GAIN BODE PLOT from theoretical prediction (that I have understood) and SCILAB prediction.

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Appendix-I

```
clear;
clc;
s=poly(0,'s');
N=1;
D=(s+1);
TF=syslin('c',N/D);
bode(TF);
```

Appendix – II

```
clear;
clc;
s=poly(0,'s');
N=1;
D=(s/0.1)+1;
TF=syslin('c',N/D);
bode(TF);
```

Note: Command bode(TF) and gainplot(TF) are producing same results which deviated from authors prediction.