Bode Plots

Let's discuss how to do a Bode Plot

Ex: $T(s) = \frac{(s-1)*(s-1000)}{(s-10)*(s-100)} = \frac{s^2-1001s+1000}{s^2-110s+1000}$

T(s) approaches 1 as ω ➡ 0

T(s) approaches 1 as ω ➡ ∞

Using MatLab

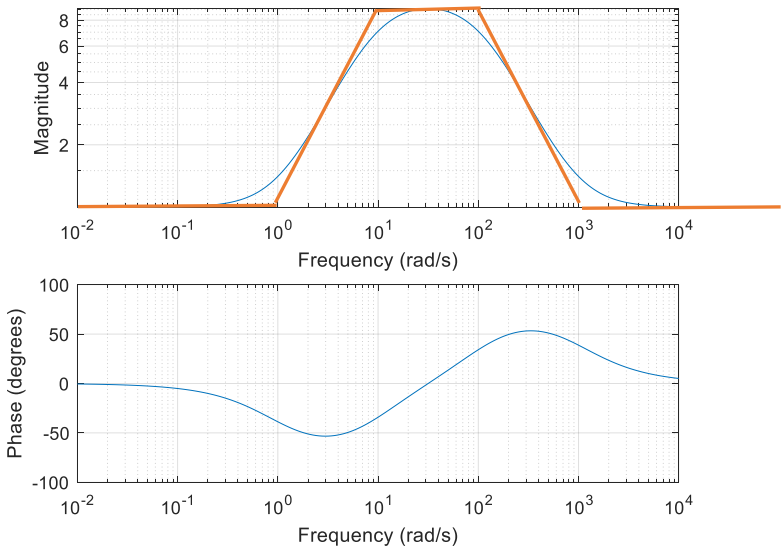
N=[1, -1001, 1000]

N = 1 -1001 1000

>> D=[1, -110, 1000]

D = 1 -110 1000

>> freqs(N,D)



1. So the magnitude plot starts at 1 at $\omega = 0$ at a slope of 0
2. It runs horizontally until $\omega = 1$ where the slope becomes +6 dB per octave (+20 dB per decade) since it passes a 0
3. It continues at this slope until the next break point (the pole at $\omega = 10$) where the slope drops back to zero.
4. The next break point is the pole at $\omega = 100$ so the slope becomes -6 dB per octave
5. Then at the last break point (the zero at $\omega = 1000$) the slope returns to zero.

This method works great as long as the magnitude is defined at either $\omega = 0$ or $\omega = \infty$ (run the process backwards). If neither limit is well defined ($\pm\infty$),

1. find a spot along the plot where the slope runs constant and determine the magnitude at the center of that run.
2. Now work outward from that point in both directions to draw the piecewise linear approximation to the Bode magnitude plot.