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Project 2 Modeling a Network Using Spice

EE 4360

1. Network

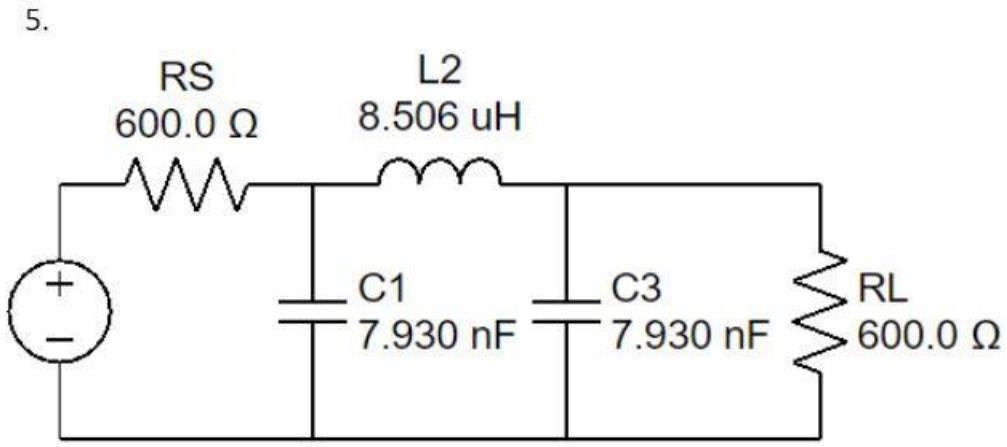

Figure 1: This is an image of the network I was assigned, network 5. It is a 3rd order system because it consists of three energy storage elements. The values of each element are labled above.

2. Bode Plot in Spice

2.1 Magnitude Plot

Figure 2: The magnitude plot of my network has a frequency range from 1kHz to 100kHz. At approximately 33.32kHz the passive filter has a magnitude of -3dB. This means the signal is at half of its original at 33.32kHz.

2.2 Magnitude Plot

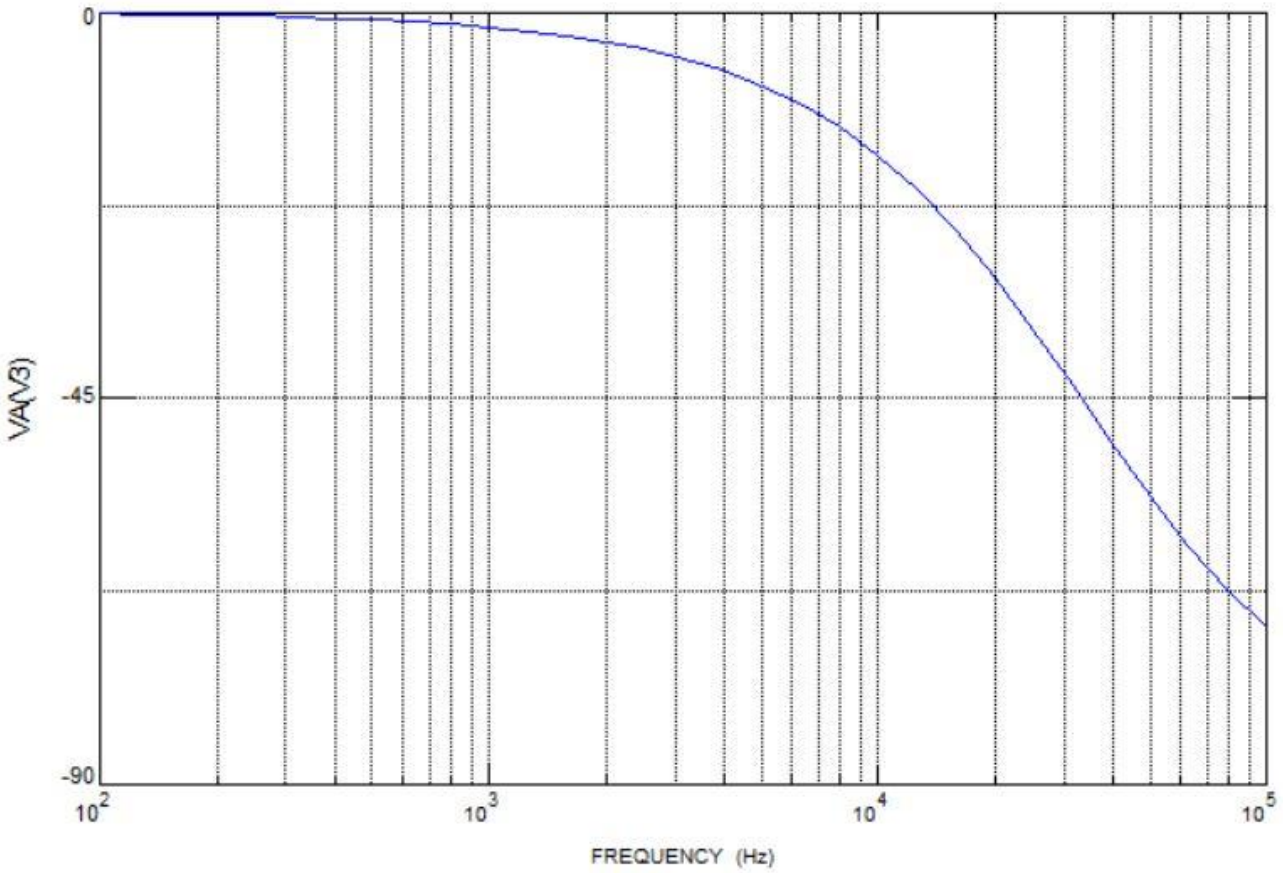

Figure 3: The phase plot of my network has a frequency range from 100Hz to 100kHz. The signal starts to fall out of phase around 1kHz and hits the 45-degree mark at around 12.4kHz. The Y axis is labeled in increments of 45 degrees.

2.3 SPICE Schematic

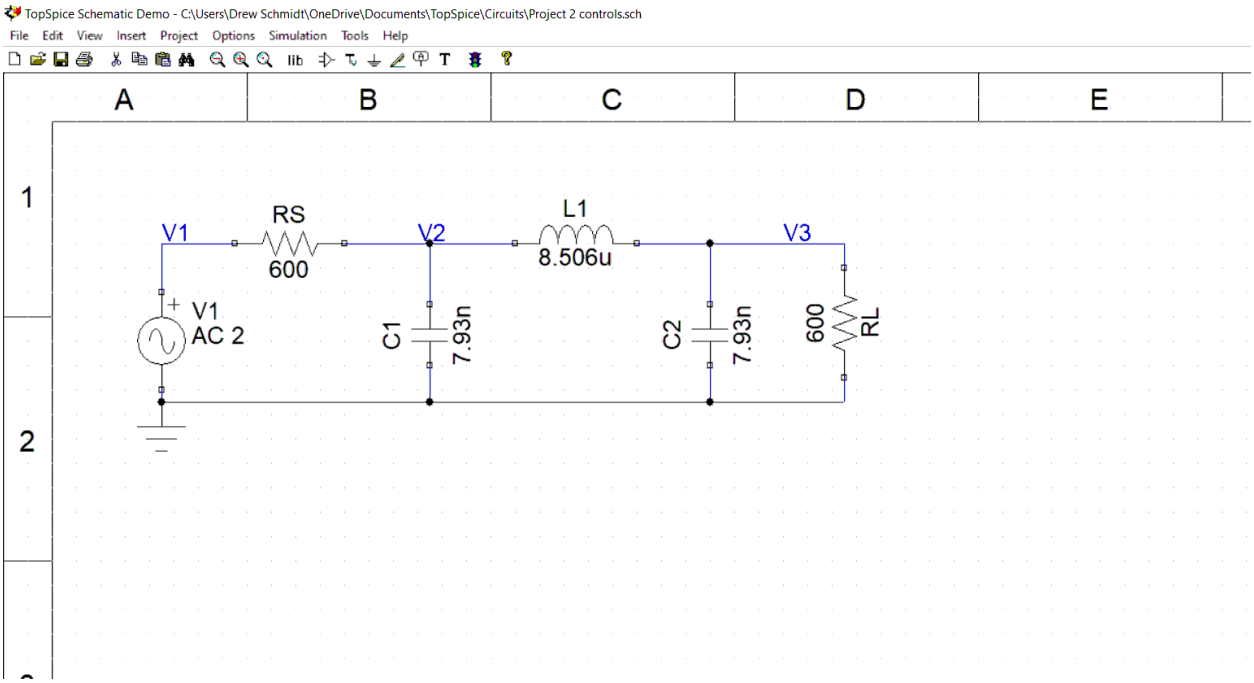

Figure 4: The capture of my network in spice shows the layout of my circuit along with all component values. The nodes are labeled V1, V2, and V3. The magnitude of my voltage source is 2 volts. This had to be done to compensate for the voltage divider and give my network an output of 0dB inside the baseband.

3. Discussion

3.1 The bode plot for my network resembles a lowpass filter. The cut off frequency is at approximately 33.12kHz because this is when the gain is at -3dB.

3.2 One application of a bode plot is in designing filters. When designing a filter, you might want to see how the system is going to respond over a frequency sweep before building it. Knowing the gain of a filter or amplifier over a range of frequencies is useful because it saves time and resources in your design. When achieving the desired response from the body plot all component values are known which takes the guess work out of designing the circuit.

3.3 Bode plots are useful because they show the power vs frequency of a system. This can be useful to analyze a systems response over a frequency range. If you were to design a filter and you only wanted frequencies to pass in the range of 1 to 33kHz this would be a very useful system. Any frequency above 33kHz the signal power is reduced to half or more. The bode plot tells us exactly which frequencies are optimal for the filter.