Jonathan Westerfield

Lab 2 Report

224005649

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Objective:

The purpose of the lab is to investigate the frequency response of second order circuits and further practice circuit design and analysis techniques in the frequency domain. This will be done by setting up and analyzing a 2nd order low pass, high pass and band pass circuit.

Introduction:

First using the circuit diagrams, we derive the transfer functions for all 3 circuits. From there we run simulations to confirm our calculations. After that, we then set up the physical circuits and analyze them to see if the simulations match up with our experimental measurements.

Calculations:

Simulation Plots:

The difference between my calculations and my simulations was negligible. My values for both were pretty much the same. The voltages and phase angles matched up.

Experimental Plots:

Conclusion:

My simulations were very similar to my experiments. However, there were slight difference in the values that I got. These can be attributed to unknown resistances in the wires, the breadboard, and the sensitivity of the Analog Discovery. It is also important to note that my resistance values were not exactly the same as my calculated component values. This is because it is impossible to get those exact resistances with the components that I have available.

As for justifying the component values that I used even though the transfer function can be achieved with different values, I went for simplicity of setup. I started by setting my capacitance values when solving for my component values. However, what I found is that different capacitance value result is very, very different resistance values. Some resistances were impossibly small and I didn’t have the resistors necessary and some resistances were massive, leading to the same problem. To that end, I went with values that I not only had components for, but I also went for values that I could easily set up with only 2-4 resistors for the whole circuit.