

Lab 1

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Regarding: Lab 1
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Summary

In section 3 of Lab 1 I plotted two 4000hz cosine waves with arbitrary amplitudes and phase shifts. After also plotting the sum of the two original waves I analyzed whether the MATLAB calculation measured the result of the phasor addition theorem. I then recreated the first cosine wave using the real part of a complex exponential in only one line of code.

Main Body

Section 3 - Manipulating Sinusoids with MATLAB

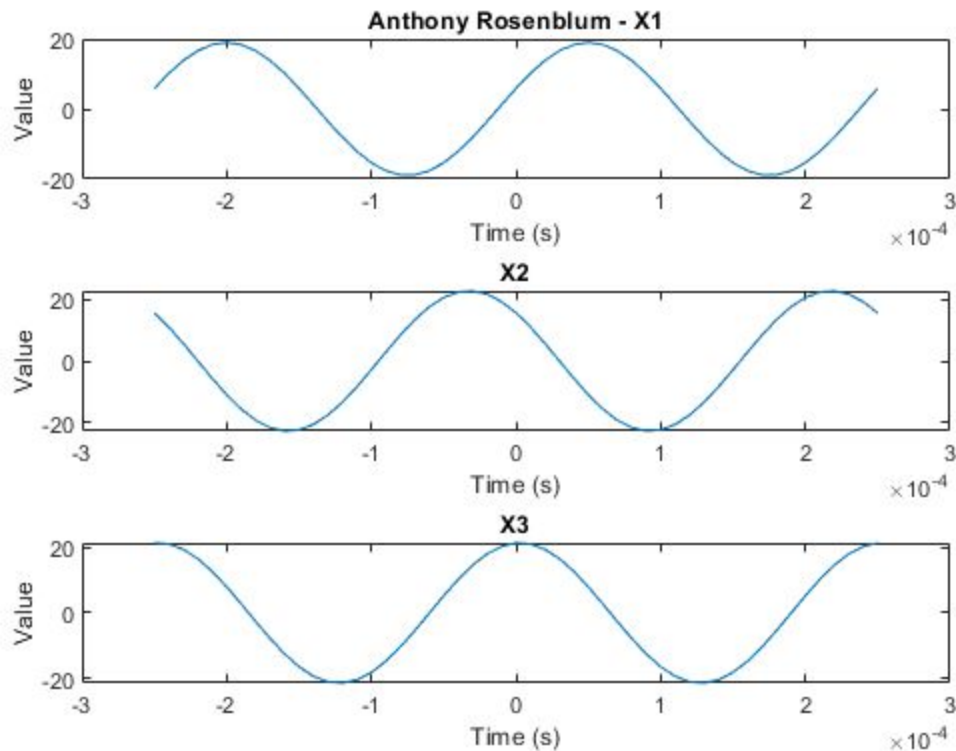


Figure 1: Two 4000hz sin waves (X1,X2) and their sum (X3)

3.1 - Theoretical Calculations

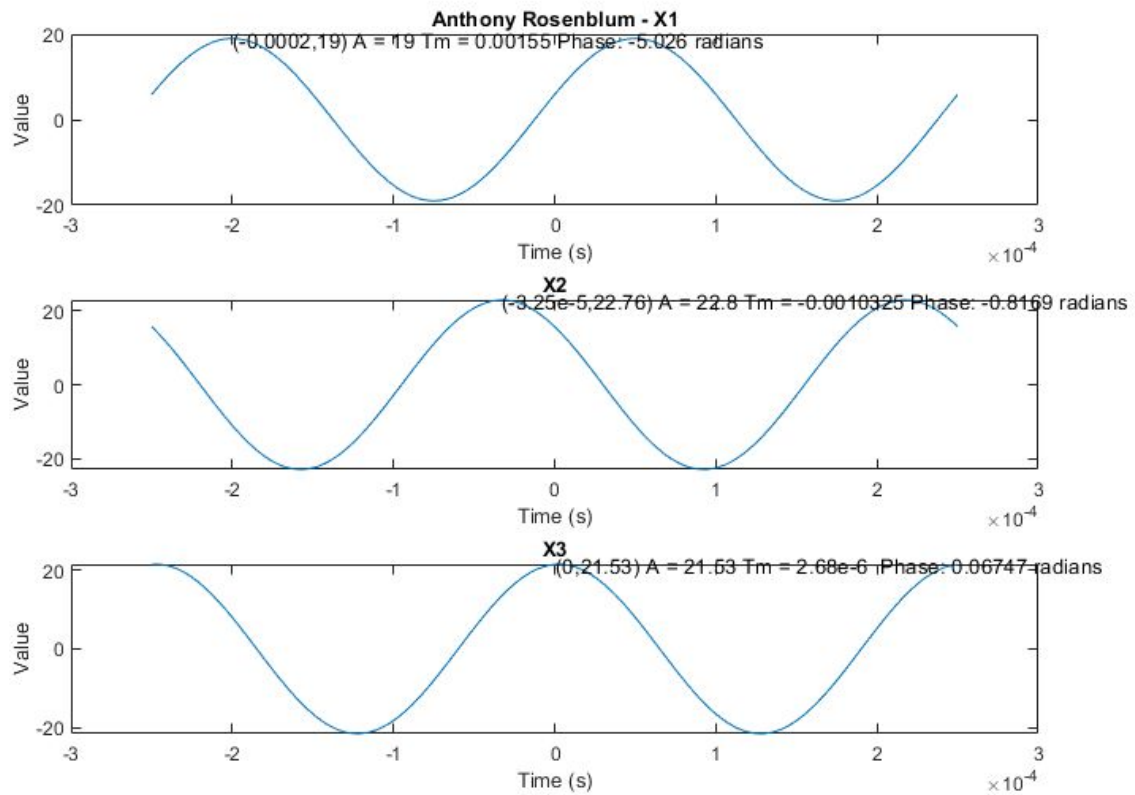


Figure 2: Marked peaks and their corresponding phase shifts

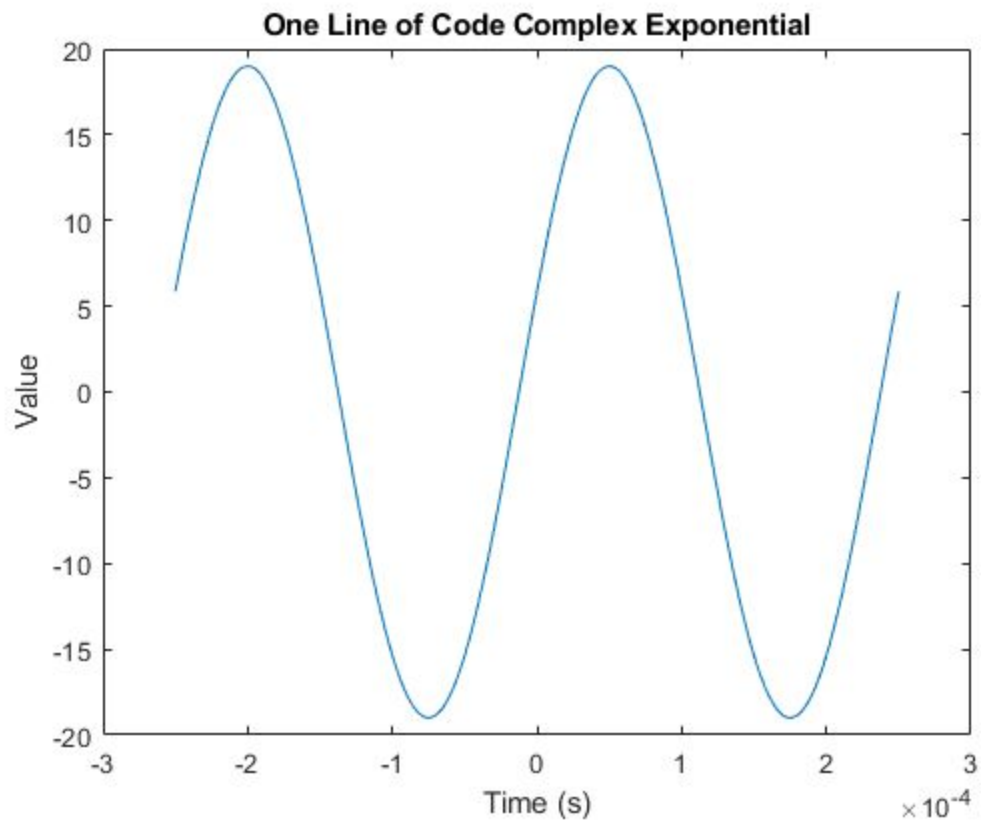
Phasor Addition Calculation:

$$19 \angle -5.026 \text{ rad} + 22.76 \angle -0.8169 \text{ rad}$$

$$5.86 + 18.07j + 15.6 - 16.62j = 21.46 + 1.45j = 21.51 \angle 0.06747 \text{ rad}$$

The Calculations verify the plot measurements.

3.2 Complex Amplitude



Conclusion

Adding two sine waves of the same frequency will only result in a change in amplitude and phase shift but not in frequency. Phasor addition is best performed by converting phasors to rectangular form. It is possible to define a sine wave in one line of code in MATLAB.