

Creating and Combining Sinusoids in MATLAB

Circuits & Signals

EECE2150

Michael BRODSKIY

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Partner: Juan ZAPATA

Instructor: Professor SUN

0 Introduction

The purpose of this laboratory experimentation is to familiarize oneself with the concept of sinusoids, as well as developing them in MATLAB. By integrating MATLAB and sinusoid construction together, the knowledge gained may be applied to alternating current circuits.

0.1 Q1

In both formulas, $x(t) = A \sin(\omega t + \theta) = A \sin(2\pi f t + \theta)$, the value within the sin parameters are radian values because ω is the angular frequency, measured in radians per second, multiplying it by seconds obtains simply radians, which are added to the phase shift value θ , also measured in radians. Thus, the first formula correctly uses radians. In the second formula, 2π has units of radians, f has units of Hertz, or inverse seconds, and t has units of seconds. Multiplying these together, units of radians are once again obtained, and subsequently added to the phase shift value.

1 Part I

1.1 Q2

$F = \frac{1}{16}$ cycles per sample, which means there are 16 samples per cycle.

1.2 Q3

Changing the phase value to .5 shifts the graph to the left by .5 radians.

1.3 Q4

There is no major difference in the sound; rather, the difference is in that the sound starts from a different point.

1.4 Q5

Due to the decreased amplitude, the sound seems to be a bit quieter than it was before.

1.5 Q6

It seems that, as the sampling frequency decreases, the quality of the blocks decreases as well; they blocks appear to shift from solid to rectangles to triangles.

1.6 Q7

As the sampling frequency decreases, it seems that the quality and pitch of the sound are simultaneously decreasing. This could be because it samples less, so it produces a less precise sound.

2 Part II

2.1 Q8

A controls the amplitude of the sinusoid.

2.2 Q9

The sinusoids all seem to have a phase difference, as they are shifted over to the left by the phase shift value.

2.3 Q10

The graphs for the 0 and 4π phase shifts are identical, as 4π is an integer multiple of 2π , meaning that it returns to the same state as if the phase shift had been 0.

2.4 Q11

The sound of the sinusoid is not influenced by the phase change; rather, all that changes is that the noise at which the sinusoid begins is different.

3 Part III

4 Conclusion

Overall, this laboratory experiment allowed us to develop a rudimentary knowledge of fabrication and combination of sinusoids in the MATLAB environment; in doing so, the idea of alternating current was reinforced, as alternating current itself is a sinusoid.