Sample Lab Report

B EE 235

Lab 1: Introduction to MATLAB

(NAMES HERE)

Date: XX XX, 2019

Abstract

This lab introduced the basic operations of MatLab, involving matrix manipulations such as inverse and array-wise multiplication. We performed basic operations on variables, vectors, matrices, and complex numbers. Using the basics, we generated 2-D and 3-D plots, and used and wrote script files. We also loaded and plotted a sound.

Graphs & Code:

Exercise 1:

```
>> a=[2;4] ; b=[3;1]

b =

     3
     1

>> a'

ans =

     2     4

>> a * b'

ans =

     6     2
    12     4

>> a' * b

ans =

    10

>> a .* b

ans =

     6
     4

>> 3 .* b

ans =

     9
     3
```

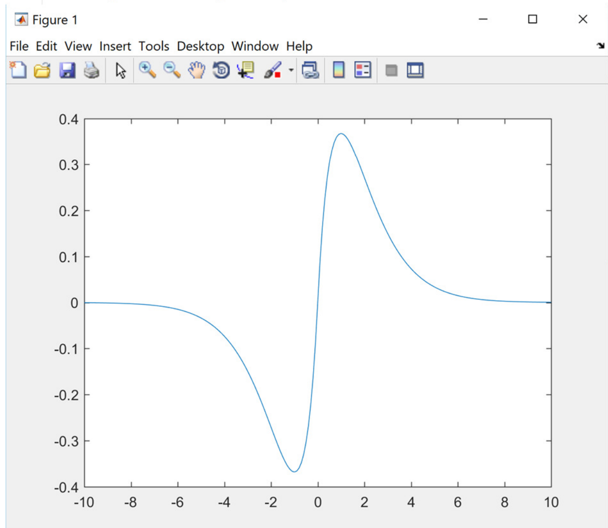
‘ means matrix transpose

* means matrix multiplication

.* means matrix element-wise multiplication

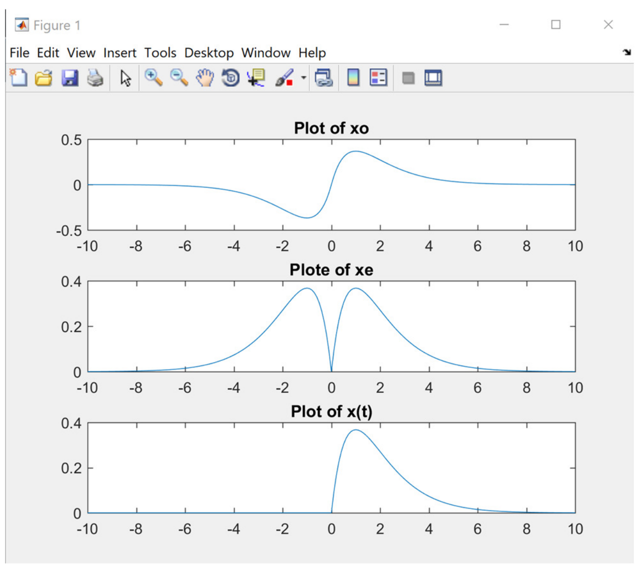
Exercise 6:

```
>> %Exercise 6
>> t=-10:0.1:10;xo = t.*exp(-abs(t));plot(t,xo)
>> xe=abs(t).*exp(-abs(t));
>> x=0.5*[xo+xe];
>> subplot(311)
>> title('Plot of xo')
>> plot(t,xo)
>> subplot(312);plot(t,xe);title('Plote of xe')
>> subplot(313);plot(t,x);title('Plot of x(t)')
```



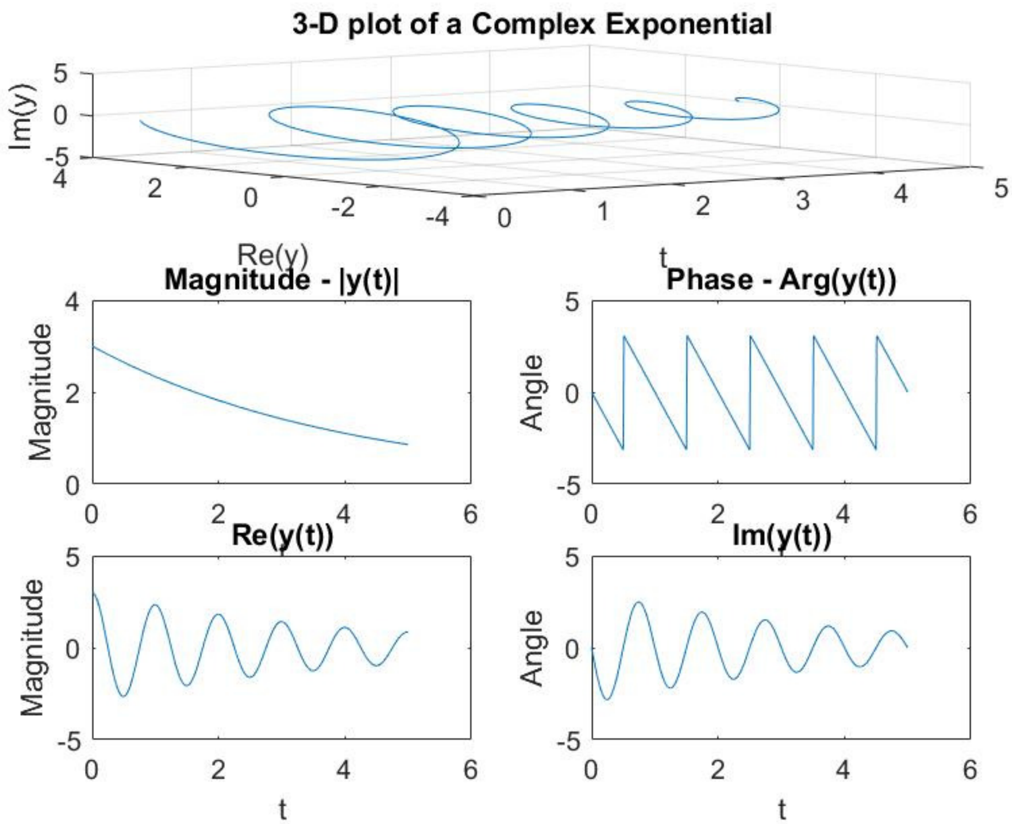
Code Notes

- In this exercise we practiced graphing signals within Matlab. We created a time varying function and graphed the odd, even and the function composed of the even and odd parts.



- Xe(t) is the even part of the function of X(t) and Xo(t) is the odd part of the X(t) function. We can see this by looking at the individual functions and their relationship to the y-axis.

Exercise 13:



(include other plots)

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The 2D is a projection of the 3D on each 2D plane.
Looking at the 3D graph in the three figures, we can see that the the phase angle signal in Figure 2 oscillates faster than that in Figure 1, both having the same decaying rate because we did not change its decaying speed (damping factor).

Conclusion

This lab introduced the fundamental operations of MatLab, which uses matrices to do calculations. The first 5 exercises consisted of learning and executing basic matrix operations of MatLab. An important thing to note was the importance of matching dimensions for matrix operations, else an error will show. The exercises also helped distinguish the difference between matrix multiplication and array multiplication, the latter multiplying element by element. We also looked into how the output is either shown and stored, or suppressed and stored.

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The last few exercises (10 and 11) gave an in-depth look into script files. The files can produce plots for periodic and complex functions. Exercise 10 plotted two different damped cosine to show how changing the period affects the envelopes of each graph, mainly a larger oscillation period creates less envelopes that are more elongated. Exercise 11 further demonstrated how changing the period affects the decay and oscillation of the function, with a smaller oscillation period causing the function to decay more noticeably and oscillate faster. Additionally, from a 3-D plot of the complex function, we can derive graphs of its magnitude, phase, real part, and imaginary part.

Or the following conclusion:

Conclusion:

In conclusion, Matlab is a powerful tool for performing matrix math, and for constructing, plotting, and manipulating signals. The creation and use of scripts is a useful time-saver when working with multiple plots for an experiment. In this lab we learned that syntax is very important when performing Matlab operations because matrix operations and plotting rely on precise commands. For example, we had to redo Exercise 6 as we inputted the commands for each plot in the wrong order. In our future studies, Matlab will be a vital, graphical teaching tool when learning about the manipulation of signals.