

BPHS 4090 (Fall 2013) - Computer Exercise 3: Fourier Transforms

Due Date: Dec. 4, 2013 5:00 PM

Questions

On the course website is a Matlab code called **specREP2.m**. This code will take a user-specified time waveform, plot it, and also compute/plot the Fast Fourier transform (FFT). Note that you may also need the following subroutines (also provided on the course website): **rfft.m**, and **irfft.m**.

- a. Briefly explain the interrelationship between the time waveform and the spectrum obtained via the FFT. Specifically, how do the magnitude and phase values of the spectrum ultimately compose the time waveform?
- b. Go through each of the pre-coded 'stimulus types'. Generate each spectrum and briefly explain why its features give rise to the subsequent waveform. Also, make sure to 'listen' to the stimuli and note what it sounds like (there is an option built in to the code which should play the time waveform back to the speakers/headphones).
- c. Create your own waveform that differs from those already built in. Make a prediction as to what you think the spectrum looks like (based upon intuition gained from the previous parts). Does such match up with the actual spectrum?
- d. Suppose you computed the *inverse Fourier transform* from the spectrum (an option allowed at the bottom). Briefly explain what was done by this operation. Was any information lost?
- e. Pick three of the questions posed at the top of the code and answer them briefly.

You should hand in a short writeup addressing the above questions, along with the code including any modifications you made.