

CIEG 675

Homework #5 Due **Wednesday, April 8, 2009**

In a m-file do the following and verify it works by copy and pasting into the command window or running your m-file.

Load the data file from my website called `frfsep2006_H_T.txt`. It is a file from Duck, North Carolina of peak wave height (column 1) and period (column 2) in 8 m water depth. Each data point is obtained over 3 hours.

- 1) First remove all NaN's (these are location in the huge original data matrix where wave heights and periods were not recorded). To do this, use your experience with the `find` command and a new command called **isnan**. The output from `isnan` is either 1 where the data is a nan or 0 where the data is not a nan. Data can be removed from a vector or matrix by setting it equal to empty defined in matlab as `[]`.
- 2) make a time vector starting at 0 with 3 hour spacing and plot the data as 2 subplots.
- 3) Calculate the mean, median, min and max significant wave heights and periods for this month.
- 4) Make a histogram of each data set using appropriate bin centers.
- 5) Plot the cumulative probability of wave height and period from these data sets.

- 6) Develop a data set that is 10000 points long composed of random numbers from a normal distribution. Make a histogram of this data set and then overlay the Gaussian curve on top. You will have to determine how to normalize your plot or histogram to get the y-axis to scale appropriately.

- 7) From the following data you will generate, perform a power spectral density calculation using `pwelch`

`[Pxx,F] =PWELCH(X,WINDOW,NOVERLAP,NFFT,Fs)`.

Make the time vector, `t`, long say out to 1000 with spacing of 0.01. Mess with the different parameters in `pwelch` to see what they do to change the result. We talked briefly about them in class.

$$y = 4 \cos(2\pi t) + \sin(2\pi / 0.2) + 0.01 \text{randn}(1, \text{length}(t))$$

To see data from `pwelch`, you normally plot on a semilogy plot with `Pxx` as a function of `F` (frequency). Tell me what the plot tells you with respect to the given function `y`.