

CEE 598WP: Advanced MATLAB Homework Assignment

Due End of Class Friday (Email pdf to Jbittn2@illinois.edu)

Advanced Data Types

1. Read in Transverse Resonance .csv files into an array of structs. (The columns are Time(s)
Amplitude(v))
Use the dir command to generate a struct array of files
2. Generate multiple plots with 2 subplots of each time series, and FFT with the filename of each plot as the title in **25 lines of code maximum** not including comments. (can be done in 17 lines with all axis labels)

Hint: SimpleFFT.m is provided that accepts a struct with a mystruct.samplerate and mystruct.amplitude defined.

Automatic Reporting

1. Generate a PDF report of the above section with headings, and sub headings explaining the results and your observations for fundamental. Submit this pdf to the email above.

Optimization

1. Write a PI calculator using multiple 'for loops' with 10k, 50k, 100k random points.
How accurate are your values?
2. Optimize your calculator.
What is the speed up experienced for equivalent number of points?

Steps to Calculate Pi:

(From William Scullin @ Chipy <http://dev.pyvideo.org/video/586/python-for-scientific-and-high-performance-compu2>)

- Generate random points inside a square (rand)
- Identify fraction (f) that fall inside a circle with radius equal to box width
 $X^2+y^2 < r$
- So fraction is also considered: $f = \text{Area of quarter of a circle} / \text{Area of square}$
- Solve for approximation of pi

Parallel Processing

Parallelize your Pi code. (Matlabpool & parfor)
How accurate is your calculated pi to the matlab pi() function?

For help at any point: in MATLAB type 'doc <function_name>', example 'doc struct'