## 医用超音波原理

## Computer Homework #1: Speckle Statistics Due 5:00pm 4/3/2007 by emailing to <u>paichi@cc.ee.ntu.edu.tw</u>

- 1. Create an array of 10,000 complex data with the following statistics:
  - (i) Uniform distribution of amplitude in [0, 1].

(ii) Uniform distribution of phase in  $[0, 2\pi]$ .

Plot the histograms of the amplitude and intensity of the above data.

- 2. Create a new array of N data points based on the original array (N=10,000, 5,000, 2,000, 1,000 and 500). The i<sup>th</sup> point of the new array is the sum of M consecutive data points (M=1, 2, 5, 10 and 20) of the original array (from (i-1)\*M+1 to i\*M). Calculate and plot the ratio of the mean to the standard deviation of the amplitude and intensity arrays as a function of M.
- 3. Repeat 1 and 2 by making the amplitude distribution normal with (0, 1).
- 4. Repeat 1 and 2 by making the phase distribution normal with (0, 1).
- 5. Repeat 2 by using amplitude of the data obtained from 1. Discuss the results with the results from 2.
- 6. (bonus, not required) Use the program to investigate any issues relevant to this topic (speckle statistics).