ECE 484/584 Antenna Theory and Design
Spring 2018
Homework Assignment 2

Date: January 11, 2018
Due Date: January 27, 2018

This assignment is to get you started in the development of an antenna evaluation toolbox. The goal is to have you develop your antenna computation skills. Although MATLAB has been the most widely used program by students, there are other equally good tools available. This includes EXCEL, C, FORTRAN and others. Note: this assignment has been moved to early in the semester….as suggested on past student evaluations….. This is to give the students a head start on some of the course engagement activities for 484/584. Hint: You may have to look ahead into Chapter 2 to become familiar with terms and equations related to sidelobes, nulls, antenna main beam, directivity, dB, numerical integration. A discussion thread on D2L has been created so you can assist one another and some sample MATLAB code is available on the course D2L page as well (to get you jump started).

All to do

1. There are sample files for plotting on the web-site. One file is a matlab file and two are files of pattern data. Plot the patterns on separate plots. How many sidelobes do you get? How many nulls do you get?.

2. Now modify your program to compute directivity of each pattern. To do this, you will need to use numerical integration. (Matlab has some automatic routines or you can write your own.) Please refer to Section 2.7 in your text for assistance on numerical integration.

3. Once you complete your program to compute directivity, then evaluate how many points you need to obtain accurate results. You should see how fine your integration increments need to be in order to obtain a converged result. Do you need the same number of points to get a converged result.

4. Use your *program to compute* the angles of the sidelobe peaks. Make a chart that shows the sidelobe number, the angular location of the sidelobe peak and the relative height of the sidelobe compared to the main beam height.

5. Use your integration program to compute the directivity of the pattern with a larger number of sidelobes. Then evaluate the number of points you need to obtain accurate results. Do you need more or less points to get an accurate estimate of directivity for this pattern than used for the first case?

ECE 584 students also to do:

6. You must implement two different forms of numerical integration. You can do the piecewise integration suggested in the book, but you must also implement one additional higher level of numerical integration such as Simpson's or trapezoidal, etc. You must then provide a table that shows how fine you are integrating the interval (by degree for instance), and then the final number for Directivity obtained for each method. You should compare which method is faster.