ECE61014 Fall 2019
Homework 2

1. Chapter 2, Problem 23 from book.
2. Refer to Example 2.8D from book. Download this example from http://booksupport.wiley.com. There you can also find the MEC 3.2 toolbox. Run the example and generate the flux linkage versus current characteristic. In your homework, only provide the plot, as you won't be changing the code. Note that although the code gives the correct answer, there is a one-character mistake in the UI_mec routine. Find it and get a small bonus (i.e. look at the code but don't waste too much time looking for the error if you don't see it).
3. Make the following change to Example 2.8D. First, instead of using ferrite, change the core to M19 steel. To do this, check out the steel_catalog.m in the 'PMD Library' directory of the files you will get from the Wiley download discussed in Problem 2. Plot the resulting flux linkage versus current characteristic, changing the current range from 0 to 100 A and the flux linkage range from 0 to 150 mVs. Your homework should include a listing of everything you change from the examples, and the plot. You don't need to include the measured data in this plot. If you highlight your changes in yellow, it will make it easier to grade. If it is easier to grade, I will be in a better mood while I grade. And if I am in a better mood while grading, it can only help everyone's grade.
4. Make the following change to Problem 3. Replace both airgaps with a SmCo permanent magnet material. Assume a residual flux density of 1 T, and a susceptibility of 0.05. Orient the magnets so that their flux tends to oppose that produced by positive current. Plot the flux linkage versus current, and the H in the magnet versus the current, as the current is varied from -100 A to 100 A. Plot flux linkage on the scale -0.15 Vs to 0.15 Vs. Plot the field intensity on a scale of -2000 kA/m to 500 kA/m. Again, list all routines which you use and modify, and I really would appreciate if you highlight where you change code. Also, explain what you did in terms of modeling the air gap region and this portion of the magnetic equivalent circuit.
5. Chapter 3, Problem 1 from book.
6. Chapter 3, Problem 2 from book.
7. Chapter 3, Problem 3 from book.
8. Chapter 3, Problem 4 from book.
9. Chapter 3, Problem 5 from book.

On problems 7-9 please list all routines you modified, and highlight changes.