ECE61014 Fall 2019
Homework 5

1. Chapter 7, Problem 1 (hand/Matlab)
2. Chapter 7, Problem 2 (hand/Matlab)
3. Chapter 7, Problem 12 (Matlab)
4. Chapter 7, Problem 13 (Matlab)
5. The point of this problem is to gain insight as to whether the mean path approximation causes an error in the magnetizing flux linkage characteristic of the transformer. Consider a toroid with a square cross section. The toroid has an inner radius of 1 cm, and outer radius of 3 cm, and a height of 1 cm. Assume M19 steel with parameters taken from the book. Suppose there are 100 turns. Evaluate the accuracy of the mean path approximation in predicting the flux linkage versus current. Vary the current from 0 to 1 A. What do you conclude? (Matlab).
6. The point of this problem is to gain insight as to whether the mean path approximation causes any error in the core loss calculation of the transformer. Consider a toroid with a square cross section. The toroid has an inner radius of 1 cm, and outer radius of 3 cm, and a height of 1 cm. Assume M19 steel with parameters taken from the book. Suppose the flux linking the waveform is given by

$$\lambda = 0.025\sin(2\pi 60t)$$

Calculate the toroid loss based on the mean path approximation. Calculate the toroid loss not making the mean path approximation. What is the percent error? Plot the power loss density versus radius. What do you conclude about the error due to the mean path approximation?