

ECE 107 Electromagnetism

Homework 1

1. Electric and magnetic fields: What is the force on each of two electrons that are one μm apart?
What is the magnitude of the magnetic field one cm away from a long wire carrying one mA?
2. Waves: Problem 1.9
3. Waves: Problem 1.13
4. Complex numbers: Problem 1.17 (but use $z_1=5+j4$, and $z_2=-3+j3$ instead)
5. Phasors: Problem 1.26
6. Transmission line model: Problem 2.3
7. Transmission line model: A standard semi-rigid coax cable has the following characteristics:
 - Center conductor diameter: 0.91 mm
 - Dielectric diameter: 2.98 mm
 - Dielectric material: Teflon – assume $\epsilon=2.1$, $\sigma=0$
 - Conductor material: Copper –assume $\sigma_c=59.6\times 10^6 \text{ S/m}$Calculate R' , L' , G' , and C' , and Z_0
Calculate the wavelength of a 10 GHz guided wave
Calculate the phase velocity
8. Reflection coefficient: Problem 2.20
9. Reflection coefficient: Problem 2.22
10. Reflection coefficient: Problem 2.26, but replace the capacitor with an inductor, and find its inductance
11. Wave impedance: Problem 2.30
12. Wave impedance: Problem 2.34