Electromagnetics, Spring 2018

Homework 6

说明：

全用英文作答；

每道题要对所有小问作答，要给出全部必要的推导过程，计算题要算出最终的数值结果，比如开根号之类的；

所有计算出来的结果如果是有单位的物理量，一定要写明单位；

每题的分数在括号中给出；

可以互相讨论，也可以上网查，但是不能抄袭，也不能找别人代做；

所有的解答必须全部是手写的原件，不接受扫描件与照片；

有问题就给我发邮件；

4 月 25 日星期三上课之前交，如到时未完成，可以 4 月 27 日星期五上课之前交，但是分数会减去 20%。

第一部分 In textbook book *Fundamentals of Applied Electromagnetics*

7.18 (20 points)

7.22 (10 points)

7.24 (20 points)

7.27 (20 points)

7.35 (20 points)

7.36 (20 points)

7.40 (20 points)

7.42 (20 points)

第二部分 Homemade

1. (50 points) If a material has conductivity of 0.4 S/m at 5 GHz and wavelength in it is 2 cm, express its permittivity in a complex number and determine its loss tangent. Assuming the material is non-magnetic ($\mu = \mu_0$), calculate the phase velocity and wave impedance. How big is the phase difference between the electric field and magnetic field of a plane wave propagating in this material? Is this material a good conductor at 5 GHz? Calculate its complex propagation constant. How many percentage of the electric field intensity is lost after a plane wave propagates 5 cm in this material?

2. (20 points) Calculate the Poynting vector of a left-hand circular polarized plane wave in air using time-domain expressions. Assume the electric field intensity magnitude is a.