CSI 769   Fall 2010
Solar and Heliospheric Physics

Homework Assignment 2

Assignment Date: Sep. 20, 2010
Due Date: Sep. 30, 2010

1. **Unit System**

   Compare Maxwell equations (5.1.3) (Faraday's Law) and (5.1.4) (Ampere's Law) in Aschwanden book with the corresponding ones in Priest-Forbes book. What are the differences of the equations? and Why.

Note: Think of different unit systems. Refer to Appendix B and C in Aschwanden book.

2. **Dipole Field**

   Using the model that the observed photospheric (surface) bipolar field is created by a magnetic dipole buried underneath the surface:

$$B_r(r,\theta) = \frac{2m\cos\theta}{r^3}$$

$$B_\theta(r,\theta) = \frac{m\sin\theta}{r^3}$$

Assuming that the dipole is 10^5 km below the surface, and the observed (total) magnetic field intensity at the surface but right above the dipole is 1000 Gauss,
(1) calculate the magnetic dipole moment, expressed in unit of G cm^3.
(2) What is the intensity of the magnetic field in the corona, at the location of 3×10^5 km above the photosphere and right above the dipole.
(3) At the location of r = 3×10^5 km, but   =   /4, what are B_r, B , B_x and B_y?

Note: Right above the dipole means   =   /2