ECEn 560
Electromagnetic Wave Theory

Homework #22
Due April 5, 2016 (may be turned in late for half credit)

1. (a) Use the physical optics approximation to find the backscattering cross section and backscattering coefficient of a square PEC plate of side a at normal incidence (the scattering coefficient is the scattering cross section normalized by the area of the target).
   (b) What is the gain of a uniformly illuminated aperture antenna of the same size as the plate?
   (c) Use the formula for directivity of an aperture antenna to obtain an estimate of the backscattering RCS of a flat PEC plate.
2. Model the loss of a guided beam in an optical fiber using the Rayleigh scattering approximation. Assume a wavelength of one micron, a fiber diameter of 1 mm, particle radius of 0.1 nm, particle relative permittivity of 2, and estimate the fiber loss in dB/km.