

ECEn 560
Electromagnetic Wave Theory

Homework #21

Due March 31, 2016 (may be turned in late for half credit)

1. Plot the scattering width as a function of angle for PEC cylinders of radius 0.1 m, 1 m, and 10 m for a TM polarized incident field at a frequency of 300 MHz. Use a semilogy scale and plot all three curves on the same figure (in Matlab, this can be done using the command `hold on`). Identify the backscattering and forward scattering directions on the plot.
2. Find the scattering amplitude and scattering width of a PEC cylinder of radius a illuminated by a normally incident plane wave with magnetic field in the z direction. Hint: expand H_z^s as a sum over cylindrical waves. Use this to find a series expansion for E_ϕ^s . Find the unknown mode amplitudes by matching the boundary condition at the cylinder surface with a series for E_ϕ^i .