

Homework 8

Due Tuesday, Nov 29th in class

1. **(Loop Antenna)** A square loop antenna, in which a time-harmonic current $Ie^{j\omega t}$ is circling, is located in the x - z plane as shown in Figure below. Consider a point $P(0,0,z)$ in the far field of the loop antenna.

Calculate the magnetic field \mathbf{H} at P . Show that if $d \ll \lambda$, the strength of the \mathbf{H} field in the far field is proportional to d^2 .



2. **(FEMLAB)** Use FEMLAB 2D In-Plane Waves model to simulate the radiation from a short linear dipole antenna (sinusoidal current distribution on the dipole, last section in the textbook). Assume the working frequency is 1GHz ($\lambda = 0.3$ meter). Plot the E field magnitude of the radiated wave for antenna length $h = \lambda/2, 3\lambda/2, 2\lambda, 5\lambda/2$.