

HW 6, #3

Consider an infinite planar waveguide comprising perfect conductors at $y = 0$ and $y = b$, as discussed in class. A TE mode electromagnetic wave propagates along the waveguide in a zigzag fashion at an angle θ with respect to the z -axis. We found in class that the electric field of this wave is

$$\vec{\mathbf{E}} = \vec{\mathbf{E}}_{zig} + \vec{\mathbf{E}}_{zag} = 2iE_0 \hat{x} e^{i(k_0 z \cos \theta - \omega t)} \sin(k_0 y \sin \theta)$$

- a) How does the boundary condition on the electric field constrain this solution for the electric field?
- b) Find the magnetic field of this wave and show that it satisfies the appropriate boundary conditions.