

PHY 712 – Problem Set # 20

Read Chapter 8 in **Jackson**.

Consider a TM wave propagating within a medium having, real dielectric constant ϵ and permeability μ , along the z axis within an ideal rectangular waveguide with a cross section as shown in Fig. 8.5 and with z - component of electric field given by:

$$E_z(x, y, z, t) = E_0 \sin\left(\frac{m\pi x}{a}\right) \sin\left(\frac{n\pi y}{b}\right) e^{ikz - i\omega t}.$$

Here m and n are integers.

1. Determine the value of k .
2. Determine the other 5 components of electric and magnetic fields:
 - (a) E_x .
 - (b) E_y .
 - (c) H_x .
 - (d) H_y .
 - (e) H_z .