PHY 712 – Problem Set # 18

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 retangular 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.