



24.8200 Engineering Electromagnetics

ASSIGNMENT 5

Due Date: Tuesday November 7, 2006

Instructor: J. LoVetri

- 1) In Sec. 3-12 of Harrington's book, he claims that "*an arbitrary [electromagnetic] field in a homogeneous source-free region can be expressed as the sum of a TM field and a TE field.*" (p. 131) Discuss his proof of this claim addressing the following points: (1) is his method of construction for the two scalar potentials ψ^a and ψ^f from E_z and H_z , given at the top of page 131, appropriate for any arbitrary field? and (2) can an arbitrary field in a homogeneous source-free region be represented using TM and TE fields that are transverse to any arbitrary direction, only one, or only some?
- 2) Show that no average power is transmitted by the evanescent waves down a PEC tube of constant but arbitrary cross-section.

