Problem A7.16  A linearly polarized uniform plane wave traveling in free space is incident obliquely upon a flat, non-magnetic, dielectric surface at \( z = 0 \) whose dielectric constant is \( \varepsilon_r \). Assume that the incident electric field is given by

\[ \mathbf{E} = \hat{y}E_0 e^{-j\beta_0 (x + \sqrt{3}z)/2}. \]

Derive expressions for the equivalent volume electric and magnetic current densities, and the regions over which they exist. These current densities can then be used, in principle, to find the fields scattered by the dielectric surface.