[lex105] Surface charge and current in rectangular wave guide I

Consider the electric field $\mathbf{E}(\mathbf{x}, t)$ and magnetic field $\mathbf{B}(\mathbf{x}, t)$ of the TE(1,0) mode in a rectangular wave guide as determined in [lln18].
(a) Infer the surface charge densities σ_{h} on the horizontal conductor (in the xz-plane) and σ_{v} on the vertical conductor (in the yz-plane).
(b) Infer the surface current densities $\mathbf{K}_{\mathrm{h}}$ on the horizontal conductor and $\mathbf{K}_{\mathrm{v}}$ on the vertical conductor.
(c) Establish the relation $\mathbf{K}_{\mathrm{h}} \cdot \hat{\mathbf{k}} = \sigma_{\mathrm{h}} v$ and determine the velocity v in this expression.

Solution: