3º Miniteste de EeO (14/12/2007)

a) $\lambda f = v \Rightarrow v = 8.44\times10^{14} \times 2.37\times10^{-7}$ m/s $= 2\times10^{8}$ m/s

$n = \frac{c}{v} = 1.5$

b) $\vec{n} = \frac{1}{\sqrt{5}}\vec{e}_y + \alpha\vec{e}_z$ com $|\vec{n}|=1 \Rightarrow \left(\frac{1}{\sqrt{5}}\right)^2 + \alpha^2 = 1 \Rightarrow \boxed{\alpha = -\frac{2}{\sqrt{5}}}$

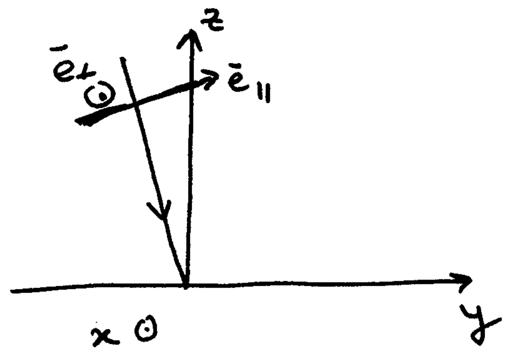
já que era dito, no enunciado, que $\alpha<0$

c) $\vec{k}\cdot\vec{H} = \vec{n}\cdot\vec{H} = 0$ (ondas transversais)

logo

$$\frac{1}{\sqrt{5}} H_0 \operatorname{sen}[\ ] - \frac{2C_2 H_0}{\sqrt{5}} \operatorname{sen}[\cdot\cdot] = 0 \Rightarrow \boxed{C_2 = \frac{1}{2}}$$

d) $\vec{n} = \frac{1}{\sqrt{5}}\vec{e}_y - \frac{2}{\sqrt{5}}\vec{e}_z$



$\vec{e}_\perp = \vec{e}_x$

$\vec{e}_\parallel = \frac{2}{\sqrt{5}}\vec{e}_y + \frac{1}{\sqrt{5}}\vec{e}_z$

$\vec{H} = C_1 H_0 \cos[\cdot\cdot]\,\vec{e}_\perp + H_0 \operatorname{sen}[\cdot\cdot]\left(\vec{e}_y + \frac{1}{2}\vec{e}_z\right)$

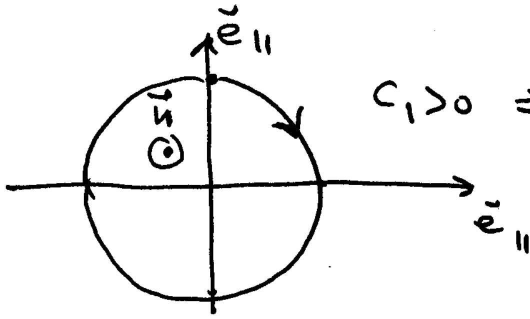
$= C_1 H_0 \cos[\cdots]\,\vec{e}_\perp + \frac{\sqrt{5}}{2} H_0 \operatorname{sen}[\cdot\cdot]\,\vec{e}_\parallel$

$= H_\perp \vec{e}_\perp + H_\parallel \vec{e}_\parallel$

$H_\parallel = \frac{\sqrt{5}}{2} H_0 \operatorname{sen}[\cdot\cdot]$

$H_\perp = C_1 H_0 \cos[\cdots]$

Pol. circular $\Rightarrow |C_1| = \frac{\sqrt{5}}{2}$



$C_1 > 0 \Rightarrow C_1 = \frac{\sqrt{5}}{2}$

e) $\vec{S} = \vec{E} \times \vec{H} = Z\, |\vec{H}|^2 \vec{n}$

$$\langle |\vec{S}| \rangle = Z \, \langle |\vec{H}|^2 \rangle$$

$$|\vec{H}|^2 = \frac{5}{4} H_0^2 \cos^2[\,..\,] + H_0^2 \sin^2[\,..\,] + \frac{1}{4} H_0^2 \sin^2[\,..\,]$$

$$= \frac{5}{4} H_0^2 \quad \text{(óbvio pois pol. é circular)}$$

Logo

$$\langle |\vec{H}|^2 \rangle = \frac{5}{4} H_0^2$$

e

$$H_0 = \sqrt{\frac{4 \langle |\vec{S}| \rangle}{5 Z}} = \sqrt{\frac{4 \langle |\vec{S}| \rangle n}{5 Z_0}} = 4.37 \times 10^{-6} \text{ A/m}$$

<u>Note</u>: $\langle |\vec{S}| \rangle = 0.6 \times 10^{-12}$ W/cm^2 $= 6 \times 10^{-9}$ W/m^2

$n = 1.5$

$Z_0 = 377\ \Omega$