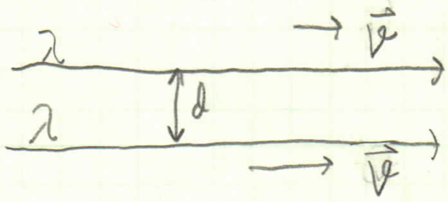
5.13



$E = \frac{\lambda}{2\pi y \varepsilon_0}\hat{y}$ We require $\vec{F}=0$, hence

$Q\left[E + (\vec{v}\times\vec{B})\right] = 0 \Rightarrow \vec{E} = -(\vec{v}\times\vec{B}) = \vec{B}\times\vec{v}$

Since $\hat{E} = \hat{y}$, and $\hat{v} = \hat{x}$, we required $\hat{B}\times\hat{v} = \hat{E}$

$\Rightarrow \hat{B}\times\hat{x} = \hat{y}$ $\therefore$ $\hat{B} = \hat{z}$. So $E = Bv$

$B = \frac{\mu_0 I}{2\pi y} = \frac{\mu_0 \lambda v}{2\pi y}$ then $\frac{\lambda}{2\pi y \varepsilon_0} = \frac{\mu_0 \lambda}{2\pi y} v^2 \Rightarrow v = \frac{1}{\sqrt{\varepsilon_0 \mu_0}} = c$, the speed of light!