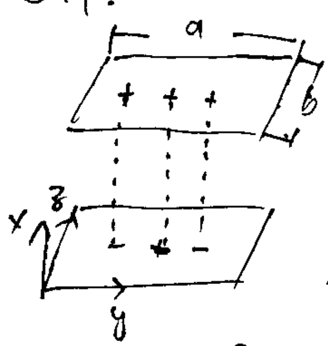
then Biot-Savart law tell us

$$\vec{B}_1(x) = \frac{\mu_0 i}{2\pi(d+x)}\hat{y} \qquad \vec{B}_2(x) = \frac{\mu_0 i}{2\pi(d-x)}\hat{y}$$

$$\therefore \vec{B} = \vec{B}_1 + \vec{B}_2 = \frac{\mu_0 i d}{\pi(d^2-x^2)}\hat{y}.$$

8H:




from the problem, we see $\frac{\partial}{\partial z}, \frac{\partial}{\partial y}$ are zero. let a and b be the dimensions of each plate, and d their distance of seperation. Let $\rho_s$ be the density of surface charge on the top plate, and $-\rho_s$ the density on the lower plate. Since the charges are stationary, the resulting field is independent of time, and $\vec{J}=0$. The differential laws at a point not on the plates, consequently, reduce to the simpler forms.

$$\vec{\nabla}\times\vec{E} = 0 \qquad \vec{\nabla}\cdot\vec{B} = 0$$
$$\vec{\nabla}\times\vec{H} = 0 \qquad \vec{\nabla}\cdot\vec{D} = 0.$$

Introducing $D = \varepsilon_0 \vec{E}$, $\vec{B} = \mu_0\vec{H}$. $\Rightarrow \vec{\nabla}\cdot\vec{H} = 0 \quad \vec{\nabla}\cdot\vec{E} = 0$

$\therefore \vec{E}$ Satisfy : $\vec{\nabla}\times\vec{E} = 0 \quad \nabla\cdot\vec{E} = 0$

$\vec{H}$ " : $\vec{\nabla}\times\vec{H} = 0 \quad \nabla\cdot\vec{H} = 0$

$\vec{E}$ and $\vec{H}$ are uncoupled, deal with the $\vec{E}$ field first.