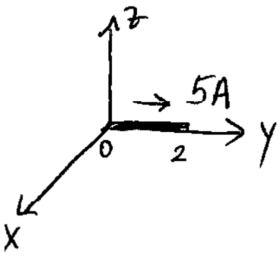
Biot Savart

$$\bar{H} = \int_{lsv} \frac{d\bar{I} \times \hat{R}}{4\pi |\bar{R}|^2}$$



$$\bar{R}_s = 0\hat{x} + y_s\hat{y} + 0\hat{z}$$

$$\bar{R}_p = x_p\hat{x} + y_p\hat{y} + z_p\hat{z}$$

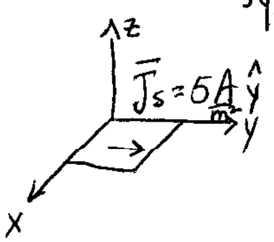
$$\bar{R} = \bar{R}_p - \bar{R}_s = x_p\hat{x} + (y_p - y_s)\hat{y} + z_p\hat{z}$$

$$|\bar{R}| = \left(x_p^2 + (y_p - y_s)^2 + z_p^2\right)^{1/2}$$

$$\hat{R} = \bar{R}/|\bar{R}|$$

$$\bar{H} = \int_{y_s=0}^{2} \frac{5A\hat{y}\,dy_s \times (x_p\hat{x} + (y_p - y_s)\hat{y} + z_p\hat{z})}{4\pi(x_p^2 + (y_p - y_s)^2 + z_p^2)^{3/2}} \qquad \begin{vmatrix} \hat{x} & -\hat{y} & \hat{z} \\ 0 & 5 & 0 \\ x_p & y_p - y_s & z_p \end{vmatrix}$$

$$\bar{H} = \int_{y_s=0}^{2} \frac{5}{4\pi} \frac{(z_p\hat{x} - x_p\hat{z})\,dy_s}{(x_p^2 + (y_p - y_s)^2 + z_p^2)^{3/2}}$$



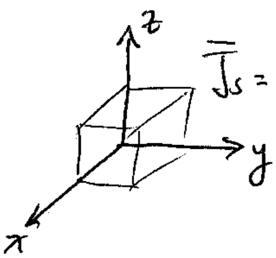
$\bar{J}_s = 5\frac{A}{m^2}\hat{y}$

$$\bar{R}_s = x_s\hat{x} + y_s\hat{y} + 0\hat{z} \qquad \bar{R}_p = x_p\hat{x} + y_p\hat{y} + z_p\hat{z}$$

etc as above

$$\bar{H} = \int_{x_s=0}^{2}\int_{y_s=0}^{2} \frac{5}{4\pi} \frac{\hat{y}\,dy_s \times ((x_p - x_s)\hat{x} + (y_p - y_s)\hat{y} + z_p\hat{z})}{((x_p - x_s)^2 + (y_p - y_s)^2 + z_p^2)^{3/2}}$$

$$= \int_{x_s=0}^{2}\int_{dy_s=0}^{2} \frac{5}{4\pi} \frac{(z_p\hat{x} - (x_p - x_s)\hat{z})\,dx_s\,dy_s}{((x_p - x_s)^2 + (y_p - y_s)^2 + z_p^2)^{3/2}}$$



$\bar{J}_s = 5\frac{A}{m^3}\hat{y}$ $\qquad \bar{R}_s = x_s\hat{x} + y_s\hat{y} + z_s\hat{z}$ etc as above

$$\bar{H} = \int_{x_s=0}^{2}\int_{y_s=0}^{2}\int_{z_s=0}^{2} \frac{5}{4\pi} \frac{\hat{y}\,dy_s \times ((x_p - x_s)\hat{x} + (y_p - y_s)\hat{y} + (z_p - z_s)\hat{z})}{((x_p - x_s)^2 + (y_p - y_s)^2 + (z_p - z_s)^2)^{3/2}}\,dx_s\,dy_s\,dz_s$$