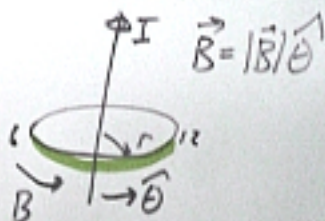


220

$$\sum_{\Delta S_i} \vec{B}_i \cdot \Delta \vec{S}_i = \mu_0 I_c$$



on  $S$ :

$$|\vec{B}| \text{ constant, } \vec{B} \parallel \vec{S}$$

$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \sum B_i \Delta S_i = B (\sum \Delta S_i)$$

$$\left. \begin{array}{l} \mu_0 = 4\pi \times 10^{-7} \\ \end{array} \right\} = B(2\pi r) \quad \parallel \quad I_c = I$$
$$\vec{B} = \frac{\mu_0 I}{2\pi r} \hat{\theta}$$



$$\vec{J} = \frac{I}{\pi a^2} \hat{z} \quad \frac{A}{m^2}$$



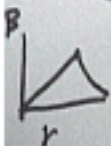
$$I_c = \frac{I}{\pi a^2} \pi r^2 = I \left( \frac{r^2}{a^2} \right)$$

$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \mu_0 I_c$$

$$|\vec{B}| \cdot \text{const}, \vec{B} \parallel \vec{S}$$

$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \cancel{2\pi r} B (2\pi r)$$

$$B = \frac{\mu_0 I \left( \frac{r^2}{a^2} \right)}{2\pi r} \Rightarrow \frac{\mu_0 I r}{2\pi a^2} \hat{\theta} = \vec{B}$$




$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \mu_0 I_c$$

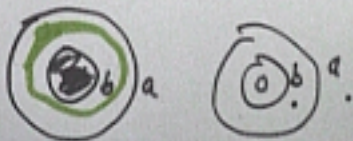
$$|\vec{B}| \cdot \text{const}, \vec{B} \parallel \vec{S}$$

$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = B (2\pi r)$$

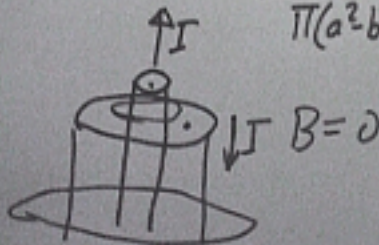
$$B = \frac{\mu_0 I \left(\frac{r^2}{a^2}\right)}{2\pi r} \Rightarrow \frac{\mu_0 I r}{2\pi a^2} \hat{\theta} = \vec{B}$$

DC : uniform  $J$

AC :   $R = \rho \frac{L}{A}$   
 $R \propto \text{freq} \propto \phi$



$$J = \frac{I}{\pi(a^2 - b^2)}$$



$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \mu_0 I_c$$

$$|\vec{B}| \cdot \text{const}, \vec{B} \parallel \vec{S}$$



$$\sum \vec{B}_i \cdot \Delta \vec{S}_i = \cancel{2\pi} B (2\pi r)$$

$$B = \frac{\mu_0 I \left(\frac{r^2}{a^2}\right)}{2\pi r} \Rightarrow \frac{\mu_0 I r}{2\pi a^2} \hat{\theta} = \vec{B}$$

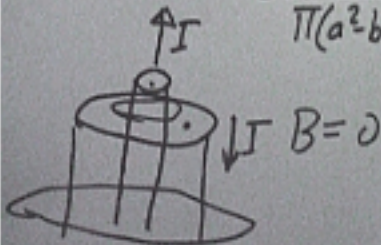
DC : uniform  $J$

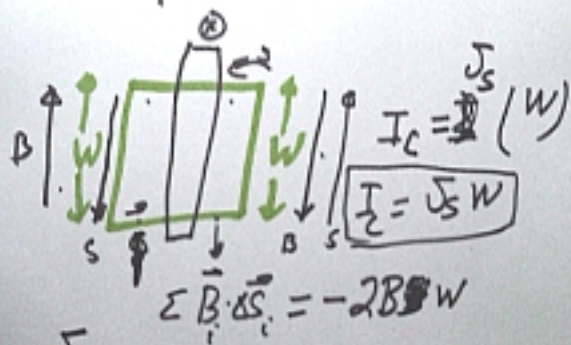
AC :   $R = \rho \frac{L}{A}$

$R \propto \text{freq} \propto \phi$



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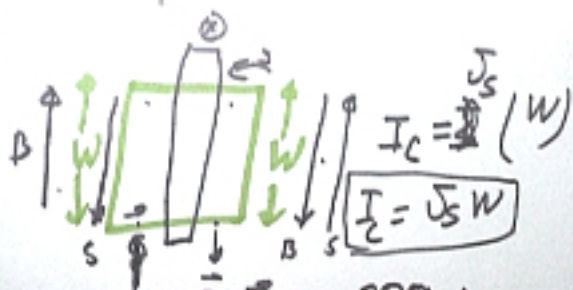




$$\oint \vec{B}_i \cdot d\vec{s}_i = -2Bw$$

$$J_s = \frac{\text{current}}{\text{length}} = \frac{I}{\text{length}}$$

dB



$$\oint \vec{B} \cdot d\vec{S}_i = -2Bw$$

$$J_s = \frac{\text{Current}}{\text{Length}} = \frac{I}{\text{Length}}$$

Diagram showing a vertical wire with current  $J_s$  flowing in the negative  $y$ -direction. A coordinate system is shown with  $x$  pointing right and  $y$  pointing up.

$$-2Bw = \mu_0 J_s w$$

$$B = -\frac{\mu_0 J_s}{2} \hat{y} \quad (x > 0)$$

$$B = \frac{\mu_0 J_s}{0} \hat{y} \quad (x < 0)$$



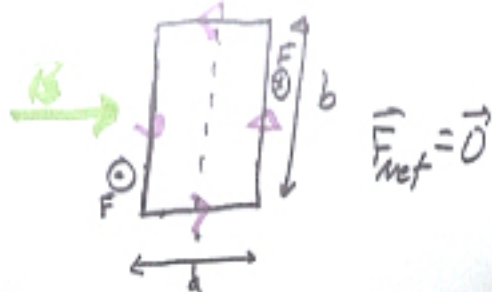
$$\vec{F} = I \vec{L} \times \vec{B}$$

$$F = ILB$$

$$\vec{\tau} = \vec{R} \times \vec{F}$$

$$\tau = ILB \left( \frac{a}{2} \right) + Ib \left( \frac{a}{2} \right)$$

$$b = I(ab)B$$



$$\vec{F} = I \vec{L} \times \vec{B}$$

$$F = ILB$$



$$\vec{\tau} = \vec{R} \times \vec{F}$$

$$\tau = ILB \left(\frac{a}{2}\right) + Ib \left(\frac{a}{2}\right)$$

$$= I(ab) B$$

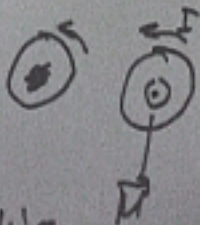
Area

$$\tau = I(\text{Area}) B$$

$$\vec{\mu} = I \vec{A}$$

$$\mu_0 = 4\pi \times 10^{-7}$$

$$\vec{\tau} = \vec{\mu} \times \vec{B}$$





$$\vec{F} = I \vec{L} \times \vec{B}$$

$$F = ILB$$



$$\vec{\tau} = \vec{R} \times \vec{F}$$

$$\tau = I L B \left(\frac{a}{2}\right) + I b \left(\frac{a}{2}\right)$$

$$b = I (\underbrace{ab}_{\text{Area}}) B$$

$$\tau = I (\text{Area}) B$$

$$\vec{\mu} = I \vec{\text{Area}}$$



$$\mu_0 = 4\pi \times 10^{-7}$$

$$\vec{\tau} = \vec{\mu} \times \vec{B}$$