



北京理工大学

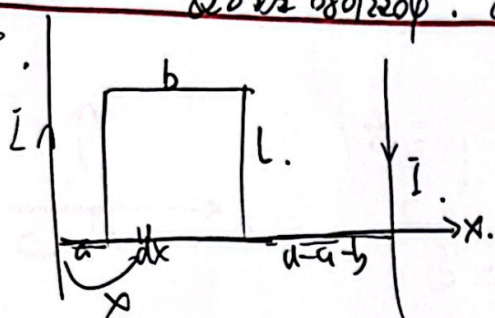
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大物

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第四章



$$B = \frac{\mu_0 I}{2\pi x} + \frac{\mu_0 I}{2\pi(a-x)}$$

$$\phi = \int_a^{a+b} B L dx = \frac{\mu_0 I L}{2\pi} \ln \frac{a+b}{a} + \frac{\mu_0 I L}{2\pi} \ln \frac{a}{a+b}$$

$$\mathcal{E} = -\frac{d\phi}{dt} = -\frac{\mu_0 I L \omega}{2\pi} \cos \omega t \left(\ln \frac{a+b}{a} + \ln \frac{a}{a+b} \right)$$

2. $\psi = N\phi = NBS \cos \theta$

$$\mathcal{E} = -\frac{d\psi}{dt} = NBS\omega \sin \theta$$

$\sin \theta = 1$ 当 $\theta = \frac{\pi}{2}$ 时 $\mathcal{E} = NBS\omega$

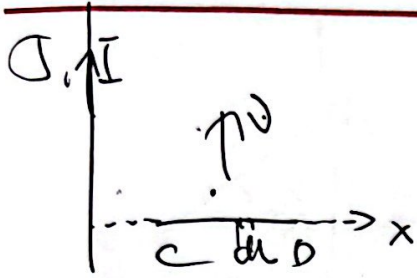
4. $B = \mu_0 n I = \mu_0 \frac{N}{L} I$

$$\phi = BS = \pi r^2 \mu_0 \frac{N}{L} I$$

$$\mathcal{E} = -\frac{d\phi}{dt} = -\frac{25\pi r^2 \mu_0 N}{L} \omega \cos \omega t$$

$$I = \frac{\mathcal{E}}{R} = -\frac{25\pi r^2 \mu_0 N}{LR} \omega \cos \omega t$$

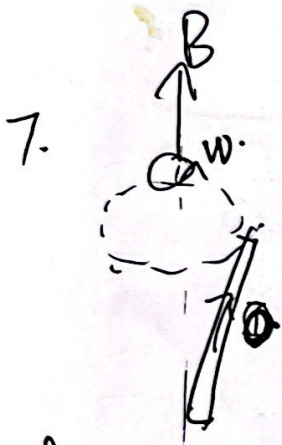
$$I_{\max} = \frac{25\pi r^2 \mu_0 N}{LR} = 29.7 \text{ A}$$



$$\mathcal{E} = \int \vec{v} \times \vec{B} \cdot d\vec{l}$$

$$B = \frac{\mu_0 I}{2\pi x}$$

$$\mathcal{E} = - \int_{a-r}^{a+r} \frac{\mu_0 I}{2\pi x} v dx = - \frac{\mu_0 I v}{2\pi} \ln \frac{a+r}{a-r}$$

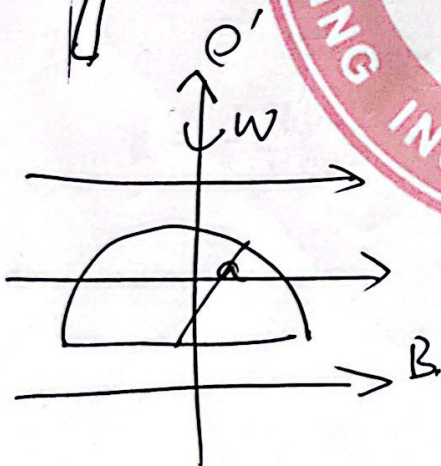


$$\mathcal{E} = \frac{\mu_0 I v}{2\pi} \ln \frac{a+r}{a-r}$$

$$\mathcal{E} = \int_0^{r \sin \theta} l \omega B dl = \frac{1}{2} \omega B l^2 \sin^2 \theta$$

D -> A -> B.

8.



(1) AODCA

(2) $\Phi = B \sin \omega t$

$$\mathcal{E} = B \omega \sin \omega t$$

$$= \frac{1}{2} B \pi a^2 \omega$$

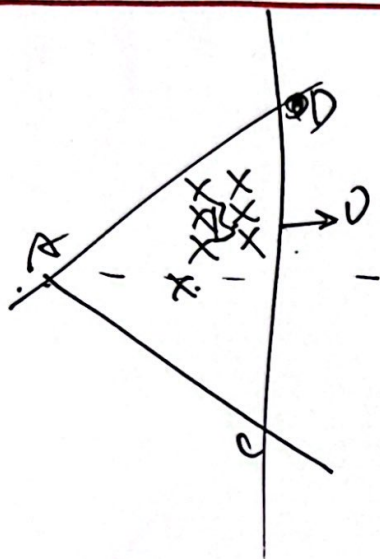


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9.



$$17. \mathcal{E} = \vec{v} \times \vec{B} \cdot \vec{CD} = vB \cos \theta = \frac{2\sqrt{3}}{3} v B_0 t$$

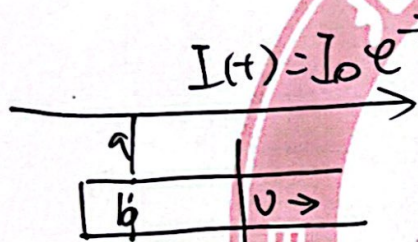
逆时针

$$\mathcal{E}_1 = \frac{2\sqrt{3}}{3} v B_0 t^2$$

$$\mathcal{E}_2 = \oint_C \vec{E} \cdot d\vec{l} = - \int_S \frac{\partial B}{\partial t} d\vec{S} = - \frac{1}{3} v^2 B_0 t^2$$

$$\mathcal{E} = \mathcal{E}_1 + \mathcal{E}_2 = \sqrt{3} v^2 B_0 t^2$$

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$$\phi(t) = \int_S B dS = \int_a^b \frac{\mu_0 I(t)}{2\pi y} \lambda t dy$$

$$= \frac{\mu_0 I(t) \lambda t}{2\pi} \ln \frac{a+b}{a}$$

$$\mathcal{E} = - \frac{d\phi}{dt} = \frac{\mu_0 I_0 v}{2\pi} e^{-\lambda t} (\lambda t - 1) \ln \frac{a+b}{a}$$