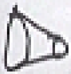
3P2

$\vec{J} = \sigma \vec{E}$ $\quad [\frac{A}{m^2}] = [\sigma][\frac{N}{C}] \cdot m^2$

$[\sigma] = \frac{A}{m^2} \cdot \frac{C}{N} = \frac{C^2}{m^2 N}$

$A = C \frac{Nm^2}{C}$

$N = \text{mass} \cdot \frac{m}{s^2}$

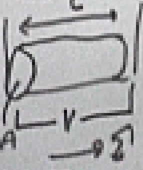


$\sigma \rightarrow R$

$\vec{J} = \sigma(\vec{E} + \vec{v} \times \vec{B})$ $\quad i$

$R = \frac{1}{\sigma}\frac{L}{V}$

ρ



$\sigma \quad \vec{E} = \frac{Q}{\epsilon} \hat{E}$

$\vec{J} = \sigma E \quad \oint \vec{J} \cdot d\vec{A} = I$

$E = \frac{V}{L} \quad I = AA(\sigma \frac{V}{L}) \rightarrow RI = V$

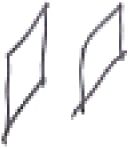
$$\vec{E} = \frac{\lambda}{2\pi s \epsilon_0} \hat{s}$$

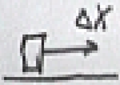
$$\vec{J} = \sigma \vec{E}$$

$$I = \oiint \vec{J} \cdot d\vec{a}$$

$$V = \int \vec{E} \cdot d\vec{s} \Rightarrow \frac{1}{2\pi \sigma L} \ln\left(\frac{b}{a}\right)$$

$$RI = V$$





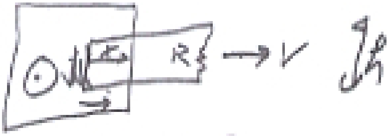
$f = \mu . mg$

$W = \mu m g \Delta x$

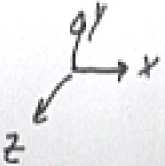
$\vec{f} = \vec{f}_s + \vec{E}$

$\vec{f}_s = -\vec{E}$

$V = -\int \vec{E} \cdot d\vec{l} = \oint_a^b \vec{f}_s \cdot d\vec{l} = EMF$



$\vec{F} = q\vec{v}\times\vec{B}$



$\hat{x}\times\hat{z}$

$x\times y = z$

$y\times z = x$

$z\times x = y$ $\quad x\times z = -y$

$F = qvB \Rightarrow E = \frac{F}{q} \Rightarrow \underline{E = vB}$

$\Phi_m = \oint \vec{B}\cdot d\vec{A} = Bh(x)$ $\quad \int E\cdot dl = Eh$

$\frac{d\Phi_m}{dt} = -\underline{Bhv}$

$$\mathcal{E} = -\frac{d\Phi_N}{dt}$$

$$\text{emf} = \oint \vec{E}\cdot d\vec{l} = -\iint \frac{d\vec{B}}{dt}\cdot d\vec{A}$$

$$\iint (\vec{\nabla}\times\vec{E})\cdot d\vec{A} = -\iint \frac{d\vec{B}}{dt}\cdot d\vec{A}$$

$$\vec{\nabla}\times\vec{E} = -\frac{\partial \vec{B}}{\partial t}$$

$$\vec{F} = q\,\vec{u} \times \vec{B}$$

$$V = \omega R$$

$$\vec{u} = \vec{\omega} \times \vec{s}$$

$$\vec{u} = \begin{vmatrix} \hat{x} & \hat{y} & \hat{z} \\ 0 & 0 & \omega \\ s\cos & s\sin & 0 \end{vmatrix}$$

$$= \hat{x}(-\omega s \sin(\omega t))$$
$$-\hat{y}(-\omega s \cos(\omega t)) = \omega s \hat{\phi}$$

$$\vec{F} = q\vec{u} \times \vec{B}$$

$$= -\omega s B \begin{vmatrix} \hat{x} & \hat{y} & \hat{z} \\ \sin & -\cos\omega t & 0 \\ 0 & 0 & \end{vmatrix}$$

$$= -\omega s B \left\{ \hat{x}(-\cos\omega t) - \hat{y}(\sin(\omega t)) \right\}$$

$$= \omega s B \left[\hat{x}\cos(\omega t) + \hat{y}\sin(\omega t) \right]$$

$$= q\omega B s \hat{s}$$

$-\hat{y}\,(\sin(\omega t))$

$= \omega s B\left[\hat{x}\cos(\omega t) + \hat{y}\sin(\omega t)\right]$

$= q\omega B s\,\hat{s}$

$$\mathcal{E}mf = \int_{s=0}^{s=a} \vec{E}\cdot d\vec{s} = \omega B\int_0^a s\,ds$$

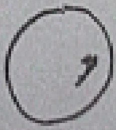
ϕ

$\vec{E}$

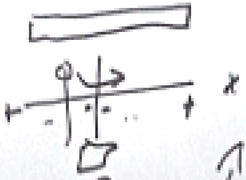
$$\mathcal{E}mf = \omega B\frac{a^2}{2}$$

$\oint \vec{E}\cdot d\vec{s}$

$$\mathcal{E}mf = IR \Rightarrow I = \frac{\omega B a^2}{2R}$$



05



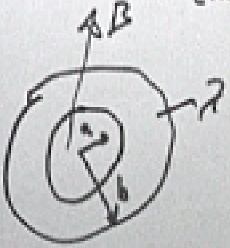
$$\vec{u} = \omega s \hat{\phi}$$

$$\vec{F} = q \cdot \vec{u} \times \vec{B}$$

$$\oint \vec{E}\cdot d\vec{l} = -\frac{\partial \phi_M}{\partial t}$$

$$\phi_M = \iint \vec{B}\cdot d\vec{A} = B(\pi a^2)$$

$$\text{Emf} = -\pi a^2 \frac{dB}{dt}$$



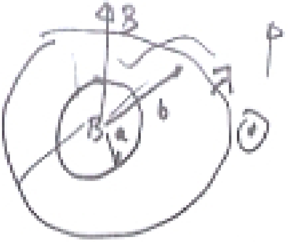
$$\oint \vec{E}\cdot d\vec{l} = -\frac{\partial \phi_M}{\partial t}$$

$$\phi_M = \iint \vec{B}\cdot d\vec{A} = B\,(\pi a^2)$$

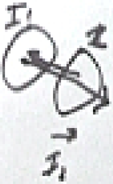
$$\mathcal{E}mf = -\pi a^2 \frac{dB}{dt}$$

$$\oint \vec{E}\cdot d\vec{l} = -\pi a^2 \frac{dB}{dt}$$

$$N = b\lambda \oint E\, dl = -b\lambda \pi a^2 \frac{dB}{dt}$$

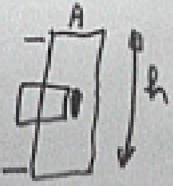


$$L = \frac{\Phi_M}{I}$$



M_{21}

$$\vec{B} = \frac{\mu_0 I}{4\pi} \oint \frac{d\vec{l} \times \hat{r}_{ip}}{r_{ip}^2}$$



N

$n = \frac{N}{h}$

$$\oint \vec{B} \cdot d\vec{s} = \mu_0 I_c$$

$$Bw = \mu_0 n I w$$

$$B = \mu_0 n I$$

$$\phi_{m,1} = BA$$

$$\Phi_M = NBA = \mu_0 (\overset{N}{nh}) \mu_0 n I A$$

$$= \mu_0 n^2 I A h$$

$$L = \frac{\Phi_M}{I} = \mu_0 n^2 A h$$

$$\varepsilon = -\frac{d\Phi_M}{dt}$$

$$\text{Power} = -I\varepsilon = \frac{dU_M}{dt}$$

$$\varepsilon = -\frac{d\Phi_M}{dt}$$

$$\Phi_M = I L$$

$$\frac{d\Phi_M}{dt} = L \frac{dI}{dt}$$

$\frac{\phi}{I} = \mu_0 n^2 A h$

$$\varepsilon = -\frac{d\phi_m}{dt}$$

$$\text{Power} = -I\varepsilon = \frac{dU_m}{dt}$$

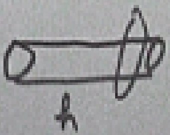
$$\varepsilon = -\frac{d\phi_m}{dt} \qquad \phi_m = I L$$

$$\frac{d\phi_m}{dt} = L\frac{dI}{dt}$$

$$P = -I\varepsilon = +I\frac{dI}{dt}L = \frac{dU_m}{dt}$$

$$\int_0^{U_m} dU_m = \int_0^{I} L I \, dI$$

$$U_m = \frac{1}{2} L I^2$$



$\rightarrow I$

start wed

$, \ \phi = \int \vec{B} \cdot d\vec{A}$

$$L = \frac{\phi}{I}$$