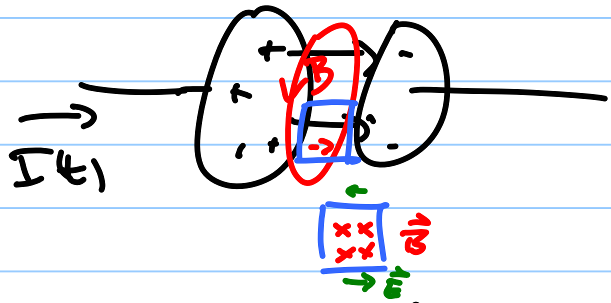
Note Title 4/16/2008

changing E generates a B



$$\vec{\nabla}\times\vec{B} = \mu_0 \vec{J}$$

changes move

$\epsilon_0 \frac{d\vec{E}}{dt}$

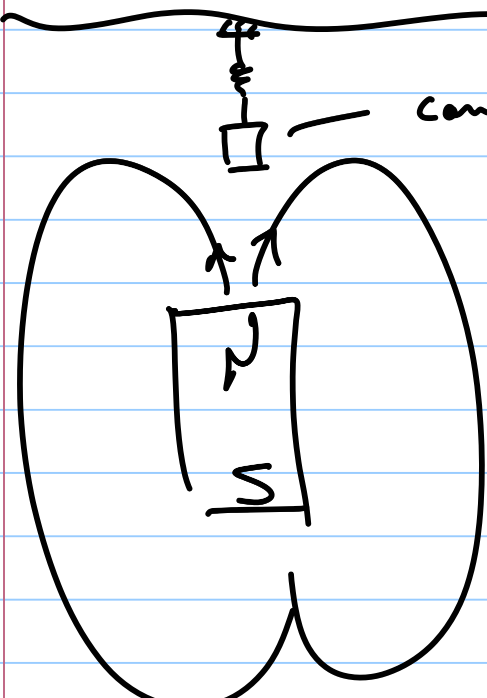
displacement current

Faraday's law ⇒ changing B generates an E

$$\mathcal{E}mf = \int \vec{E}\cdot d\vec{\ell} = -\frac{d\Phi_m}{dt}$$

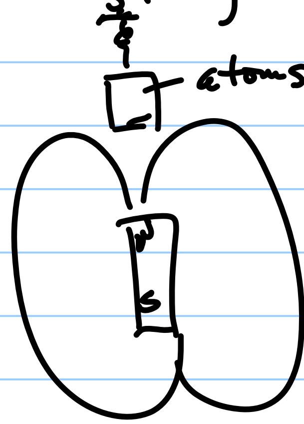
from change B

$$E = E_0 + E_1 + E_2 + \cdots$$



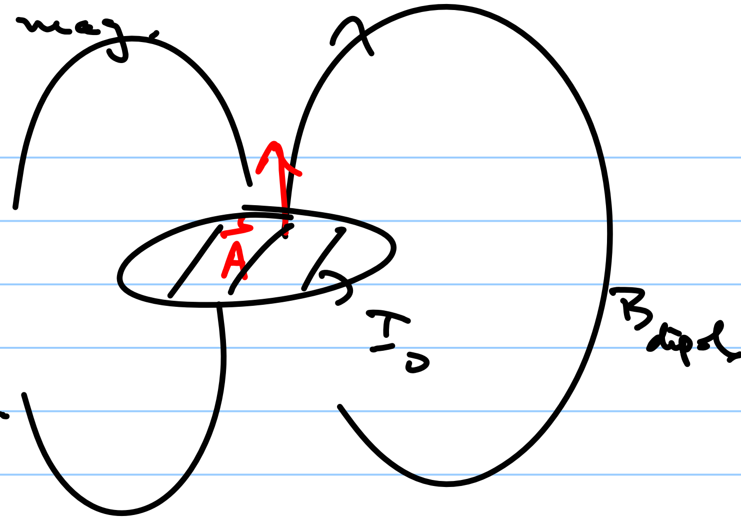
can of material

- weakly attracted
- " repelled
- strong attracted



Quantitatively deal with mag.

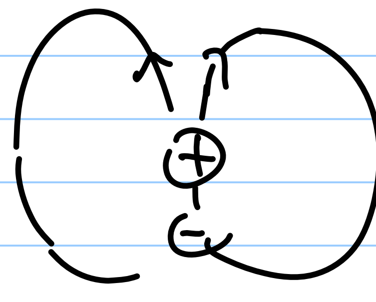
mag dipole mom.



$$\vec m = \int I_0 \, d\vec a \quad \text{dipole mom}$$

$$= I_0 \vec A$$

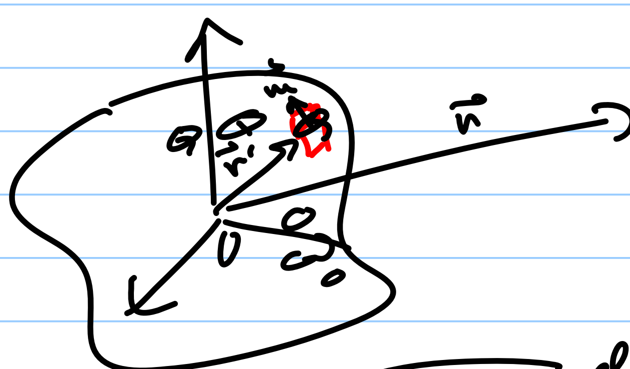
$$\| \quad |\vec A| \hat z$$



$\Rightarrow$ dipole E_{dipole}

$$\vec A_{dipole} = \frac{\mu_0}{4\pi} \frac{\vec m \times \hat r}{r^2}$$ vector pot for 1 dipole

$$\vec B_{dipole} = \vec \nabla \times \vec A_{dipole}$$



dipole $\quad$ dipole mom / vol

$$\underline{d\vec m} = \vec M \, d\tau$$

$$\vec A = \frac{\mu_0}{4\pi} \int \frac{d\vec m \times \hat r}{r^2}$$

$$\vec A = \underline{\frac{\mu_0}{4\pi} \int \frac{1}{r} (\vec \nabla \times \vec M) \, d\tau} + \frac{\mu_0}{4\pi} \oint \frac{1}{r} \underbrace{(\vec M \times d\vec a)}_{K_b}$$

$$\vec{A} = \frac{\mu_0}{4\pi}\int \frac{\vec{J}\, d\tau}{r}$$

$\vec{J}$ $\vec{A}$ $\vec{B}$

$$\nabla \times \vec{M} = \vec{J}_b$$