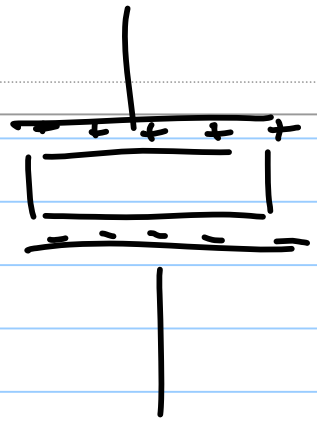
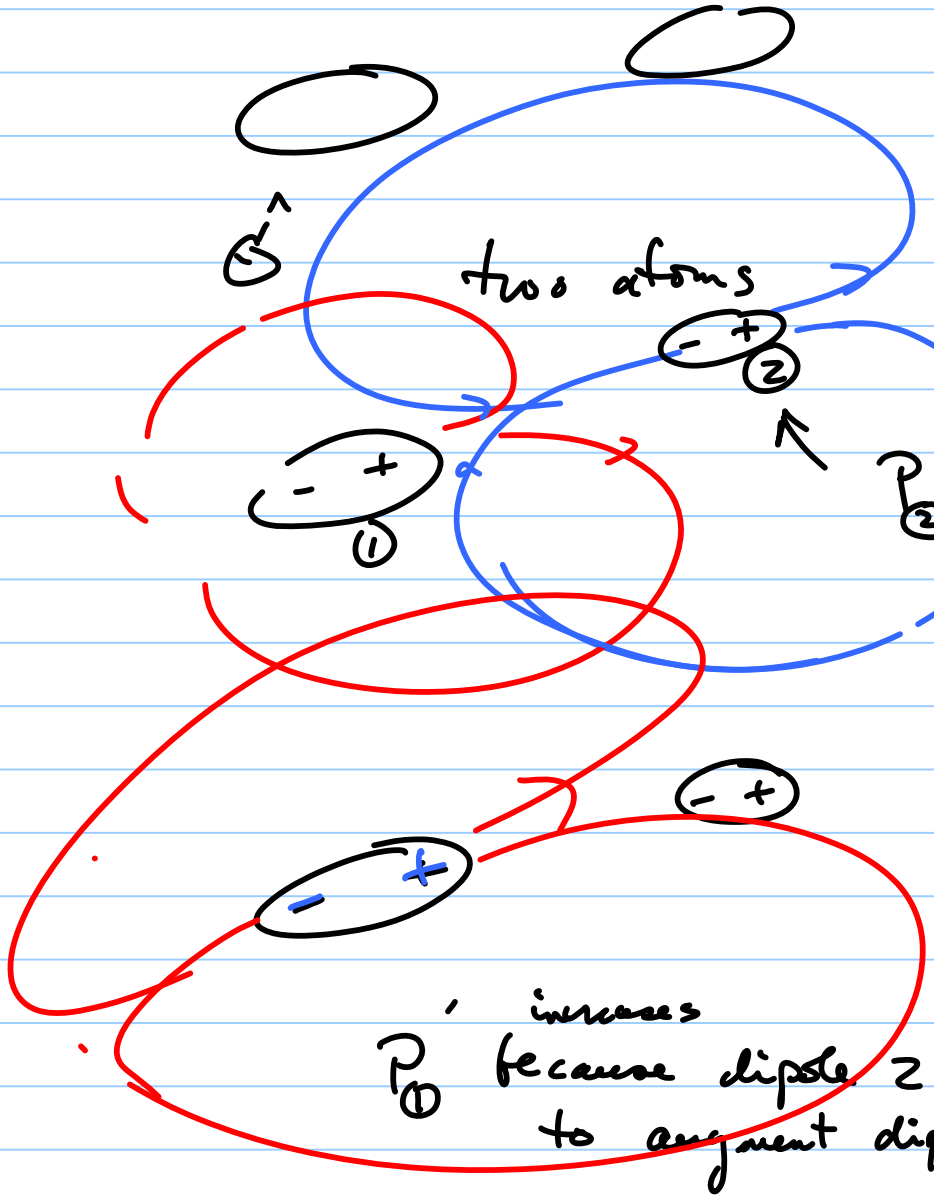
Note Title 3/7/2008



$$\vec{P} = \epsilon_0 \chi_e \vec{E}$$

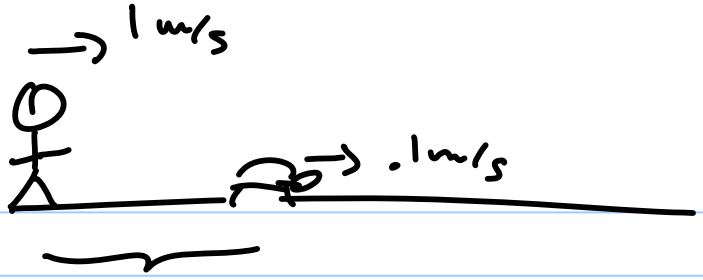
↑ tot E from both free & bnd charges

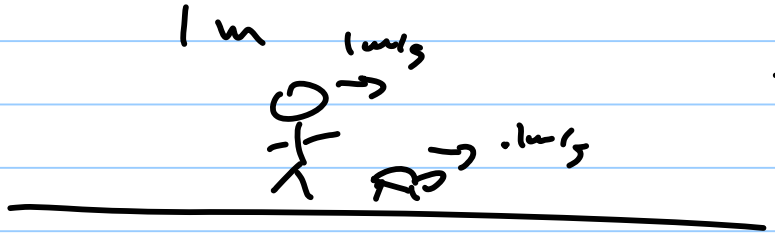


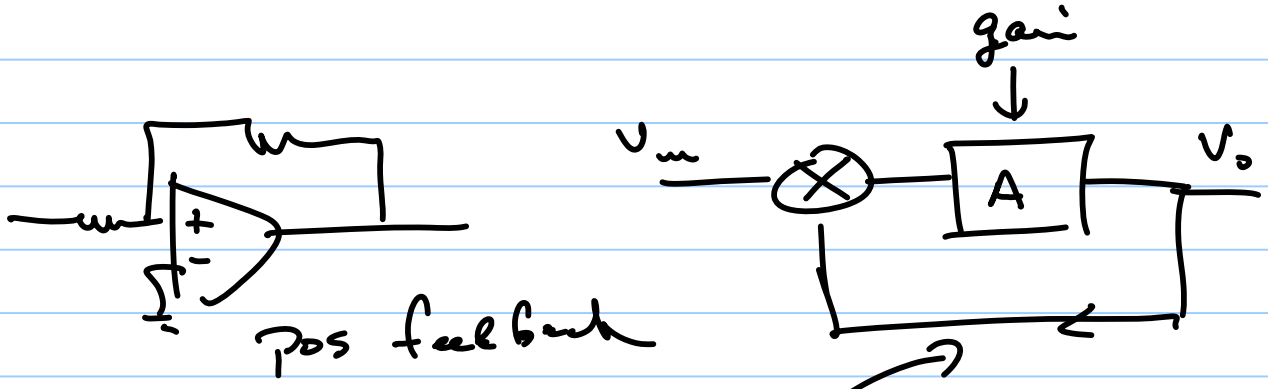
P_1 increases because dipole 2 generates a field to augment dipole moment in 1

field from 1 gets larger & that causes dipole 2 to get larger

Zeno



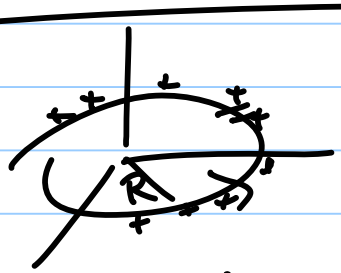




$$V_o = V_{in} A \pm V_o A$$

$$\frac{V_o}{V_{in}} = \frac{A}{1 \mp A} \quad \text{pos} \quad \frac{A}{1-A}$$

for $A < 1$ $\propto \frac{1}{1-\delta} \simeq 1 + \delta + \delta^2 + \delta^3 + \cdots$

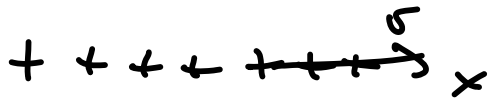


$$\vec{F} = q\vec{v} \times \vec{B}$$

given, find F

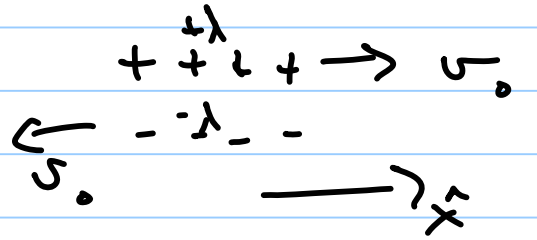
$$d\vec{F} = dq\vec{v} \times \vec{B} \qquad dq = \lambda |d\vec{\ell}| = \lambda R d\varphi$$

linear



$$\frac{dq}{dt} = \lambda \frac{dx}{dt} = \lambda v$$

current $I = \frac{dq}{dt} = \lambda \vec{v} = \vec{I}$

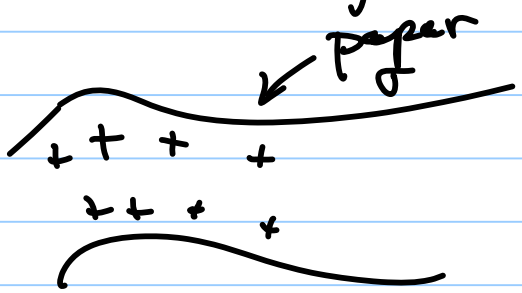


$$\vec{I} = \lambda v_0 \hat{x} - \lambda v_0 (-\hat{x})$$

$$= 2\lambda v_0 \hat{x}$$

$$d\vec{F} = dq\, \vec{v} \times \vec{B} = \lambda\, d\ell\, \vec{v} \times \vec{B} = I\, d\vec{\ell} \times \vec{B} = \vec{I} \times \vec{B}\, d\ell$$

Surface current density

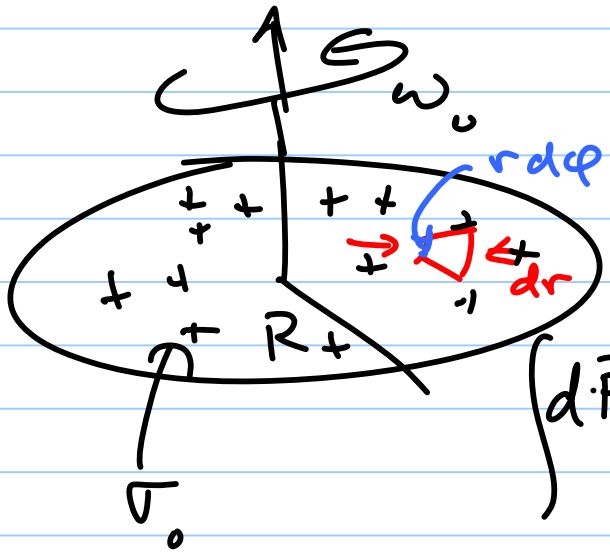


$$dq = \sigma\, da$$

$$d\vec{F} = \sigma\, da\, \vec{v} \times \vec{B}$$

$$\vec{K}$$

$$d\vec{F} = \vec{K} \times \vec{B}\, da$$



$$da = r\, d\ell\, dr$$

find $\vec{K} = \sigma \vec{v}$

$$= \sigma_0\, \omega_0 r\, \hat{\ell}$$

$$\int d\vec{F} = \int_0^R \int_0^{2\pi} \sigma\, \omega_0 r\, \hat{\ell} \times \vec{B}(x,y,z)\, r\, d\ell\, dr$$

$\hat{\ell}$ into $\hat{x}$ $\hat{y}$ $\hat{z}$

$$d\vec{F} = dq\,\vec{v}\times\vec{B} \qquad dq = \rho\, d\tau$$

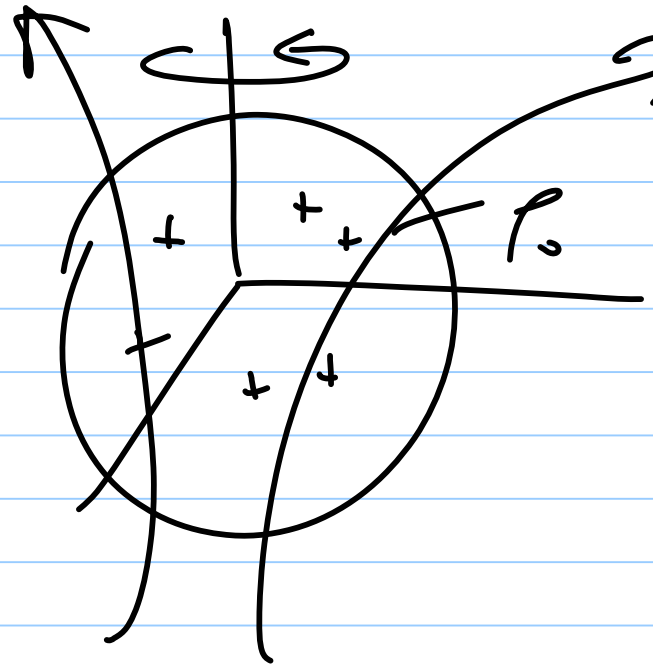
$$d\vec{F} = \rho\, d\tau\, \vec{v}\times\vec{B} \qquad \vec{J} = \rho\,\vec{v} \qquad \frac{\text{Coul}}{m^3}\cdot\frac{m}{s}$$

$$\vec{J}$$

$$\frac{\text{Coul}}{s\cdot m^2}$$

$$d\vec{F} = \vec{J}\times\vec{B}\, d\tau \qquad \int \vec{J}\cdot d\vec{a} = I$$

$$\frac{\text{Amps}}{m^2}\cdot m^2$$



find Force