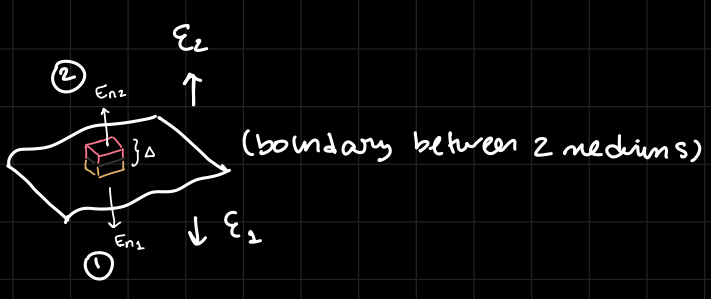
remember $\nabla \cdot (\underbrace{\varepsilon \bar{E}}_{\bar{D}}) = \rho_{free}$ } gauss's law for diff materials



- in medium 1
- in medium 2

when $\nabla \to 0$, area and thereafter, flux $\to 0$

note: $D_{n1} = E_{n1} \varepsilon_1$
$D_{n2} = E_{n2} \varepsilon_2$

$\underbrace{\oint \bar{D} d\bar{s}}_{flux} = \rho_{enclosed}$ } Gauss's Law

$\Rightarrow \quad D_{n2}A - D_{n1}A = \sigma A$
↳ surface charge

$D_{n2} - D_{n1} = \sigma$

$$\boxed{\varepsilon_2 E_{n2} - \varepsilon_1 E_{n1} = \sigma}$$

if $\sigma = 0$, $E_{n2}\varepsilon_2 = E_{n1}\varepsilon_1$

or $\frac{E_{n2}}{E_{n1}} = \frac{\varepsilon_1}{\varepsilon_2}$

if $\sigma \neq 0$, D_{n1} and D_{n2} are discontinuous
else they are continuous
but do note that potential is always continuous

NOITYN GNUTNM

$\oint E \cdot d\ell = 0$

$E_{t2}\ell - E_{t2}\ell = 0$

$$\boxed{E_{t1} = E_{t2}}$$

PEC ≡ perfectly electric conductor
↓ infinite conductivity
elec field inside PEC = 0

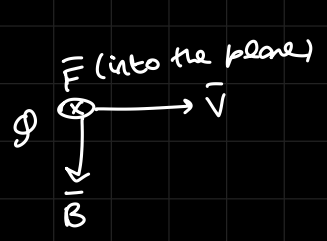
and any electric field tangential to the PEC's surface is zero

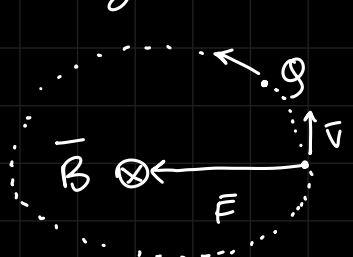
* Lorentz Force Law { magnetostatics }

$F_{mag} = \rho \cdot (\bar{v} \times \bar{B})$

$F_{total} = \rho \bar{E} + \rho(\bar{v} \times B)$

$F_{total} = \rho(\bar{E} + \bar{v} \times \bar{B})$





$\frac{mv^2}{r} = \rho v B$

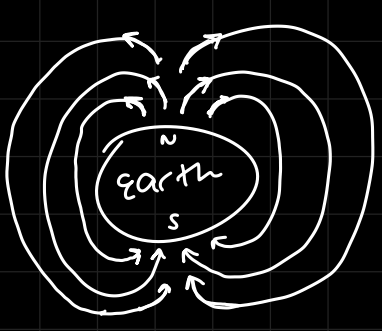
$r = \frac{mv}{\rho B}$

motion of the charge
≡ cyclotron motion
↳ used in mass spectrometer

magnetic field is not affected by the presence of a conductor unlike electric field

magnetic field is static in nature

magnetic bottle
↳ magnetic field is converging at the pole



collision with O_2 partides,
pink aurora

green with N_2

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