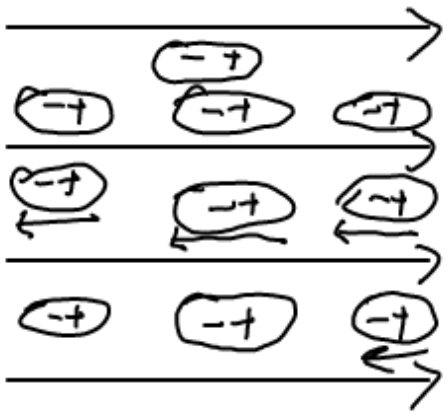
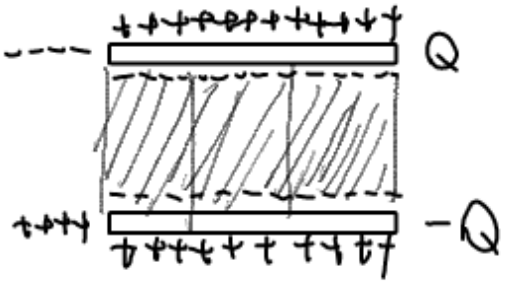
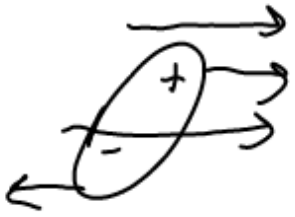
Capacitance
Energy
Summation
Boundary Conditions

Dielectric Material



$$E = E_0 + E_{ind}$$





$$\frac{\rho_s}{K\epsilon_0} = E = \frac{\rho_s}{\epsilon_0} + \frac{\rho_{ind}}{\epsilon_0}$$

$$-\frac{\rho_s}{K\epsilon_0} + \frac{\rho_s}{\epsilon_0} = \frac{\rho_{ind}}{\epsilon_0} = \frac{(k-1)}{k}\rho_s$$

$$C = \frac{K\epsilon_0 A}{d}$$ ← dielectric constant = relative permittivity

$$V = \frac{Q_1 + Q_2}{C_{eq}}$$

Energy stored in C:

work = Force × distance

$\frac{work}{q}$ = potential

$dq\frac{work}{q}$ = potential × dq

$du = V \times dq$

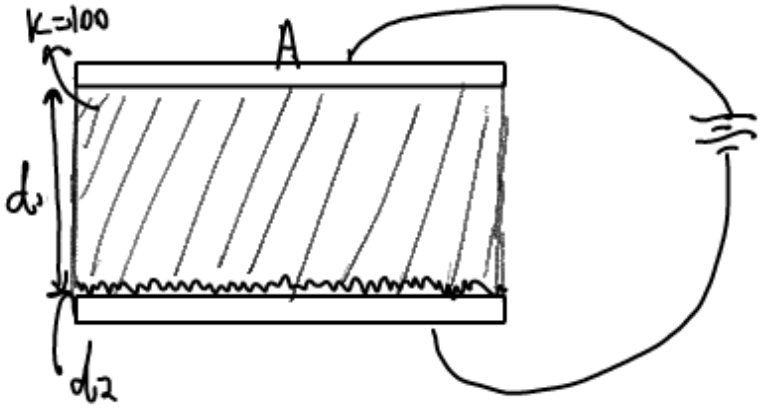
$$u = \int_0^Q \frac{q}{C} dq$$

$$= \frac{q^2}{2C}$$

$Q = CV$

$$= \frac{Q^2}{2C} = \frac{CV^2}{2C} = \frac{CV^2}{2}$$

$$\boxed{u = \frac{1}{2}CV^2}$$



$$C_0 = \frac{\epsilon_0 k A}{d} = \frac{\epsilon_0 k A}{d_1}$$

$$d_2 = 2d_1$$

$$\frac{1}{C_{eq}} = \frac{1}{C_1} + \frac{1}{C_2}$$

$$\frac{1}{C_{eq}} = \frac{d_1}{\epsilon_0 k A} + \frac{2d_1}{\epsilon_0 A}$$

$$= \frac{d_1}{\epsilon}$$