Physics 106b-2011 Class 10 Wednesday 2-9-11 Summary

26-3 Energy density of $\vec{E}$

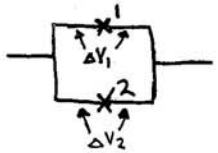
A different way to think of this same U:
Think of it as being "stored" in the $\vec{E}$:

$$U = \int_{\text{all space}} u_E \, dV$$

where $u_E = \frac{\text{energy}}{\text{vol}} = \frac{1}{2}\varepsilon_0 E^2$

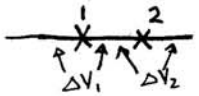
26-6 Connecting capacitors

Parallel



$\Delta V_1 = \Delta V_2$

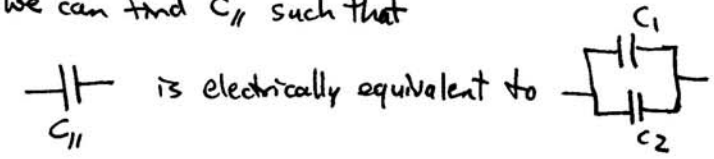
Series



$\Delta V_1 \neq \Delta V_2$
"need not equal"

equivalent capacitance:

we can find $C_{\parallel}$ such that

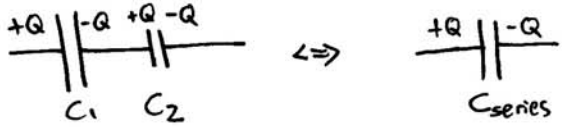


is electrically equivalent to

$$C_{\parallel} = C_1 + C_2$$

Capacitors in Series

$E = 0$ inside conductor in equilibrium
→ capacitors in series have the same charge,

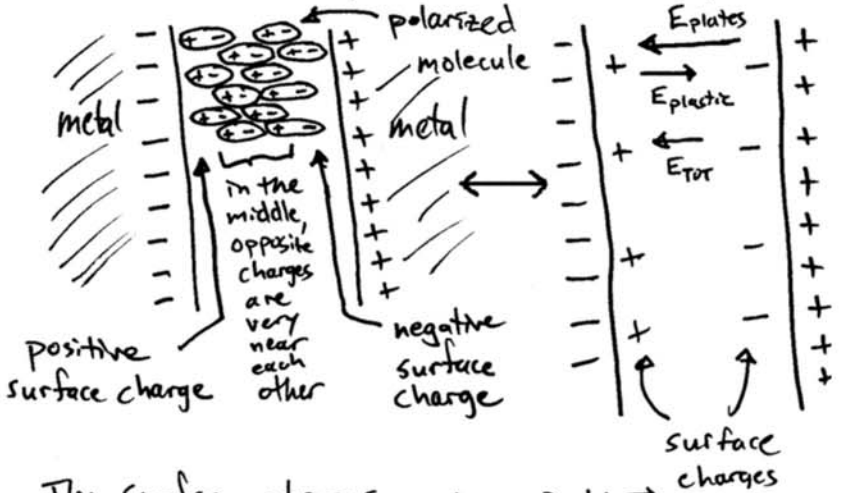


$$\frac{1}{C_{\text{series}}} = \frac{1}{C_1} + \frac{1}{C_2}$$

26-7 Capacitors & Dielectrics

Filling the space between capacitor plates with an insulator ("dielectric") gives 3 advantages:

1) Easy to make d (plate separation) small
2) Larger dielectric breakdown field than air
3) Increased capacitance because of polarization:



The surface charges create a field $\vec{E}_{\text{plastic}}$ that partly cancels $\vec{E}_{\text{plates}}$