

Stacked Dielectrics



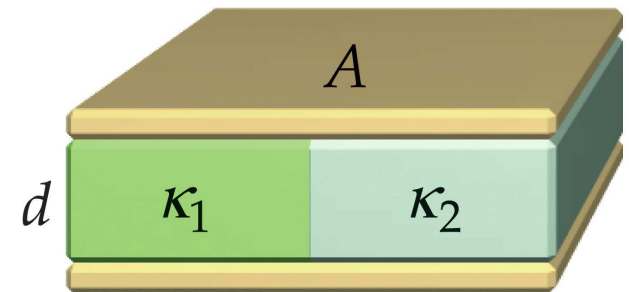
Consider a parallel-plate capacitor with area A of each plate and spacing d .

- Capacitance without dielectric: $C_0 = \frac{\epsilon_0 A}{d}$.

- Dielectrics stacked in parallel: $C = C_1 + C_2$

with $C_1 = \kappa_1 \epsilon_0 \frac{A/2}{d}$, $C_2 = \kappa_2 \epsilon_0 \frac{A/2}{d}$.

$\Rightarrow C = \frac{1}{2}(\kappa_1 + \kappa_2)C_0$.



- Dielectrics stacked in series: $\frac{1}{C} = \frac{1}{C_1} + \frac{1}{C_2}$

with $C_1 = \kappa_1 \epsilon_0 \frac{A}{d/2}$, $C_2 = \kappa_2 \epsilon_0 \frac{A}{d/2}$

$\Rightarrow C = \frac{2\kappa_1\kappa_2}{\kappa_1 + \kappa_2} C_0$.

