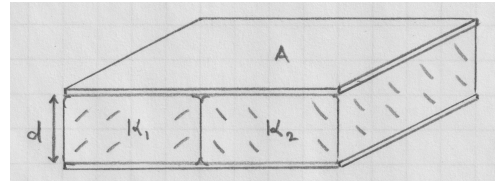


### [lex45] Capacitor with stacked dielectrics II

Consider a parallel-plate capacitor. Its capacitance without dielectric is  $C_0 = \epsilon_0 A/d$ . However, the space between the plates is filled with two slabs of different dielectric materials, specified by dielectric constants  $\kappa_1$  and  $\kappa_2$ . Each slab has area  $A/2$  and width  $d$  as shown.

- Find the electric fields  $E_1$  and  $E_2$  (magnitude only) inside the two dielectric materials and relate them to the voltage  $V$  between the plates.
- Find the displacement fields  $D_1$  and  $D_2$  inside the two dielectric materials and relate them to the charge  $Q$  (magnitude only) on the plates.
- Calculate the capacitance of this capacitor with stacked dielectrics from the definition  $C \doteq Q/V$  and express it in the form  $C = C_0 f(\kappa_1, \kappa_2)$ .



**Solution:**