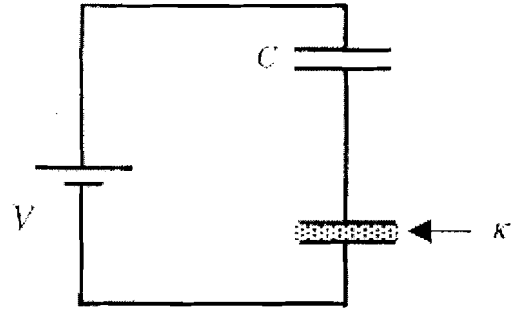


Two identical parallel plate capacitors, each with capacitance C , are connected in series, across a fixed total potential V . Then a slab of dielectric, with dielectric constant $\kappa > 1$, is inserted into one of the capacitors. Calculate



- (a) the difference in total energy stored in the two capacitors between the initial situation (i.e. no dielectric is in either of the two capacitors) and the final situation (i.e. a dielectric slab is completely inserted into one of the capacitors, as shown in the figure).
- (b) the energy supplied by the battery for the insertion process. The battery supplies a constant voltage throughout the insertion process.
- (c) the work done by the electrostatic force on the slab as it is inserted.
- (d) Is the dielectric being pulled into the capacitor by the electrostatic force or does it have to be pushed in by an external force that works against an opposing electrostatic force? Briefly justify your answer.