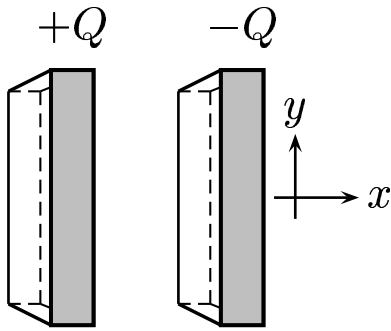


Consider an electrostatic situation. A parallel plate system has a plate charge $+Q$ on the left-hand plate and a plate charge $-Q$ on the right-hand plate. Each plate has an area A .



Determine the the force F the right-hand plate exerts on the left-hand plate.

A) $\vec{F}_{left} = \frac{Q^2}{\epsilon_0 A}$, to the right.

C) $\vec{F}_{left} = \frac{Q^2}{2\epsilon_0 A}$, to the right.

B) $\vec{F}_{left} = \frac{Q^2}{\epsilon_0 A}$, to the left.

D) $\vec{F}_{left} = \frac{Q^2}{2\epsilon_0 A}$, to the left.

The areal charge density is $\sigma = \frac{Q}{A}$, therefore

$$E_{gap} = \frac{\sigma}{\epsilon_0} = \frac{Q}{\epsilon_0 A}.$$

The electric field due to the right-hand plate alone contributes to one-half of the total field in the gap; *i.e.*,

$$E_{left} = \frac{\sigma}{2\epsilon_0} = \frac{Q}{2\epsilon_0 A} \Rightarrow \vec{F}_{left} = \frac{Q^2}{2\epsilon_0 A}, \quad \text{to the right.}$$

Answer **C**.