A parallel plate system has a plate charge $Q$.

Within the gap $E_{\text{gap}} = \frac{\sigma_{\text{plate}}}{\epsilon_0} = \frac{Q}{\epsilon_0 A}$.

Determine electric force $F$ with which the bottom plate pulls the top plate.

A) $F = Q E_{\text{gap}}$

B) $F = \frac{1}{2} Q E_{\text{gap}}$
The electric field due to the bottom plate as shown is

\[ E_1 = \frac{Q_{encl}}{2 \varepsilon_0 A} = \frac{E_{gap}}{2}. \] This leads to \( F = Q E_1 = \frac{Q E_{gap}}{2} \)

Answer B.

26.02-06 Attraction between Plates 2004-3-24