Given: $k \approx 9\times10^9\ \mathrm{N\,m^2/C^2}$.

A charge of 162 C $\pm$ 18 C is at a distance of 9 m $\pm$ 3 m from the origin. What is the uncertainty ΔE in the magnitude of the electric field $E = k\,\dfrac{q}{r^2} = (9\times10^9\ \mathrm{N\,m^2/C^2})\,\dfrac{(162\ \mathrm{C})}{(9\ \mathrm{m})^2} = 18\times10^9\ \mathrm{N/C}$, at the origin?

A) $\Delta E = 9\times10^9$ N/C
B) $\Delta E = 12\times10^9$ N/C
C) $\Delta E = 14\times10^9$ N/C
D) $\Delta E = 16\times10^9$ N/C
E) $\Delta E = 24\times10^9$ N/C

A first-order approximation is

$$\begin{aligned}
\Delta E &= \left|\frac{\partial E}{\partial q}\right|\Delta q + \left|\frac{\partial E}{\partial r}\right|\Delta r \\
&= k_e\,\frac{1}{r^2}\,\Delta q + 2\,k_e\,\frac{q}{r^3}\,\Delta r \\
&= (9\times10^9\ \mathrm{N\,m^2/C^2})\,\frac{1}{(9\ \mathrm{m})^2}\,(18\ \mathrm{C}) \\
&\quad + 2\,(9\times10^9\ \mathrm{N\,m^2/C^2})\,\frac{(162\,\mathrm{C})}{(9\ \mathrm{m})^3}\,(3\ \mathrm{m}) \\
&= (2\times10^9\ \mathrm{N/C^2}) + (12\times10^9\ \mathrm{N/C^2}) \\
&= 14\times10^9\ \mathrm{N/C^2}\,,
\end{aligned}$$

since

$$\begin{aligned}
\frac{\partial E}{\partial q} &= \frac{\partial}{\partial q}\left(k_e\,\frac{q}{r^2}\right) = +k_e\,\frac{1}{r^2}\,, \quad \text{and} \\
\frac{\partial E}{\partial r} &= \frac{\partial}{\partial r}\left(k_e\,\frac{q}{r^2}\right) = -k_e\,2\,\frac{q}{r^3}\,.
\end{aligned}$$

Answer bf C.