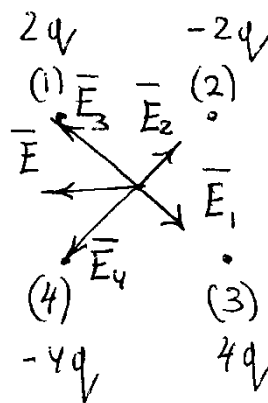


Question:

Four particles carrying charges $+2q, -2q, +4q$ and $-4q$ (with $q=1.0$ nC) are kept at the vertices of a square of side 6.0 cm. Determine the net electric field due to these charged particles at the centre of square. What is the electrostatic force on a particle carrying positive charge of 1.0 nC placed at the centre of square? Please explain in detail.

Solution:



As far as for an electric field $\vec{E} = \sum_i \vec{E}_i$, then in accordance with the figure above

$$E = \sqrt{2} \frac{k2q\sqrt{2}}{a^2} = \frac{4\sqrt{2} \cdot 9 \cdot 2}{36 \cdot 10^{-4}} = 28.3 \text{ (kV/m).}$$

Respectively the force

$$f = Eq = 28.3 \cdot 10^3 \cdot 10^{-9} = 28.3 \text{ (mN).}$$

The answer:

The net electric field $E = 28.3$ kV/m;

the electrostatic force $f = 28.3$ mN.