

Answer on Question #50848-Physics-Electromagnetism

Let the charges Q and $-Q$ be placed alternatively along the x -axis at positions $x = 1$ m, $x = 3$ m, $x = 6$ m and $x = 9$ m. What is the electric field at $x = 0$ due to these charges?

Solution

According to the principle of superposition the electric field at $x = 0$ due to these charges is

$$E = k \sum \frac{q_i}{r^2} = k \left(\frac{Q}{(1-0)^2} - \frac{Q}{(3-0)^2} + \frac{Q}{(6-0)^2} - \frac{Q}{(9-0)^2} \right) = kQ \left(1 - \frac{1}{9} + \frac{1}{36} - \frac{1}{81} \right) = \frac{293}{324} kQ.$$

The electric field at $x = 0$ has directed negatively.

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