Answer on Question #59520-Physics – Electromagnetism

Find electric intensity midway between the charges +1.36x10-9 coul and -1.36x10-9 coul separated by a distance of 80 cm.

Solution

The objects have equal absolute charges but with different signs. Find electric intensity of the point charge is

$$\vec{E} = \frac{kq}{r^2}\overrightarrow{e_r}.$$

For the positive charge:

$$\overrightarrow{E_p} = \frac{kq}{r^2}\overrightarrow{e_r}.$$

For the negative charge:

$$\overrightarrow{E_n} = \frac{k(-q)}{r^2}(-\overrightarrow{e_r}) = \frac{kq}{r^2}\overrightarrow{e_r} = \overrightarrow{E_p}.$$

By the superposition principle:

$$\vec{E} = \overrightarrow{E_p} + \overrightarrow{E_n} = 2\overrightarrow{E_p}.$$

$$E = 2\frac{8.99 \cdot 10^9 \cdot 1.36 \cdot 10^{-9}}{0.4^2} = 153\frac{N}{C}.$$