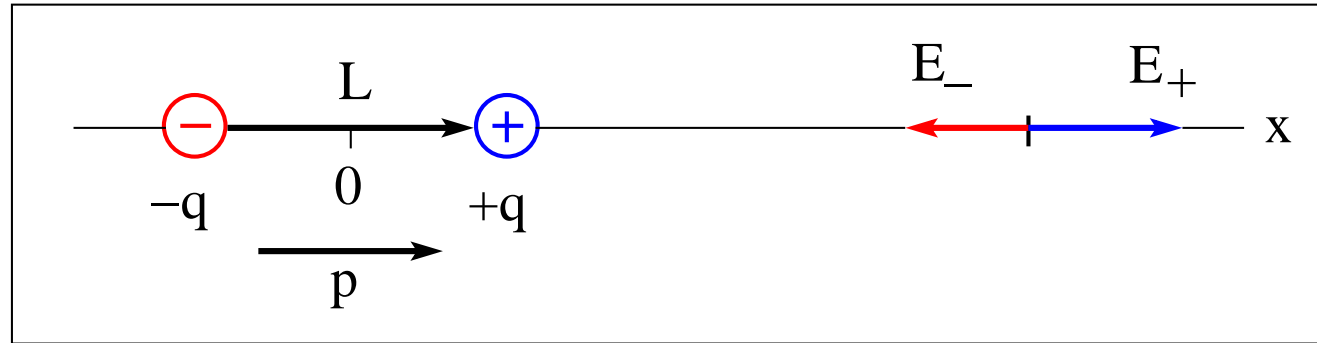


# Electric Dipole Field



$$E = \frac{kq}{(x - L/2)^2} - \frac{kq}{(x + L/2)^2} = kq \left[ \frac{(x + L/2)^2 - (x - L/2)^2}{(x - L/2)^2(x + L/2)^2} \right] = \frac{2kqLx}{(x^2 - L^2/4)^2}$$
$$\simeq \frac{2kqL}{x^3} = \frac{2kp}{x^3} \quad (\text{for } x \gg L)$$

Electric dipole moment:  $\vec{p} = q\vec{L}$

- Note the more rapid decay of the electric field with distance from an electric dipole ( $\sim r^{-3}$ ) than from an electric point charge ( $\sim r^{-2}$ ).
- The dipolar field is not radial.