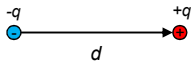
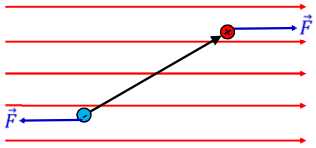
Electric Dipole



$$\vec{p} = q\vec{d}$$

Electric Dipole

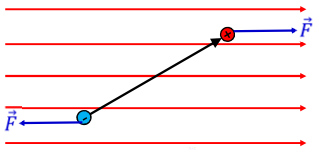
Force and torque in a uniform electric field.



$$\vec{F}_T = 0$$

Electric Dipole

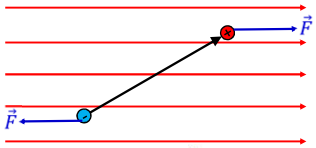
Force and torque in a uniform electric field.



$$\vec{\tau} = \vec{r} \times \vec{F}$$

Electric Dipole

Force and torque in a uniform electric field.

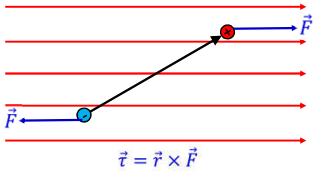


$$\vec{\tau} = \vec{r} \times \vec{F}$$

$$\vec{\tau}_T = 2\left(\frac{\vec{d}}{2} \times q\vec{E}\right)$$

Electric Dipole

Force and torque in a uniform electric field.



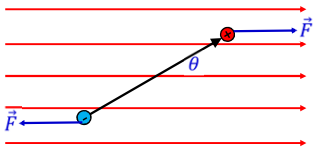
$$\vec{\tau} = \vec{r} \times \vec{F}$$

$$\vec{\tau}_T = 2\left(\frac{\vec{d}}{2} \times q\vec{E}\right)$$

$$\vec{\tau}_T = \vec{p} \times \vec{E}$$

Electric Dipole

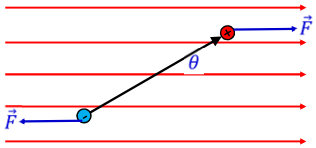
Force and torque in a uniform electric field.



$$-\Delta U = W = \int \vec{F} \cdot d\vec{s}$$

Electric Dipole

Force and torque in a uniform electric field.

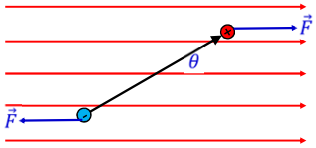


$$-\Delta U = W = \int \vec{F} \cdot d\vec{s}$$

$$-\Delta U = 2\left[qE \cdot \left(\frac{d}{2}\cos\theta_f - \frac{d}{2}\cos\theta_i\right)\right] = \Delta(\vec{p} \cdot \vec{E})$$

Electric Dipole

Force and torque in a uniform electric field.

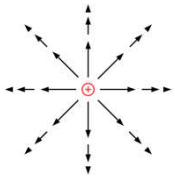


$$U = -\vec{p} \cdot \vec{E}$$

(If $U = 0$ when $\theta = \frac{\pi}{2}$)

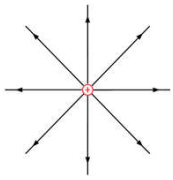
Electric Field Vectors

Arrows show direction and magnitude of field.



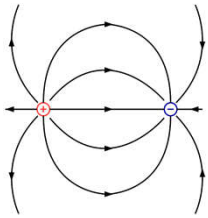
Electric Field Lines

Arrows show direction and magnitude of field.
Density of lines show magnitude of field.



Electric Field Lines

Arrows show direction and magnitude of field.
Density of lines show magnitude of field.



Electric Field Lines

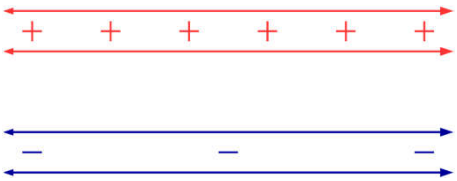
- Lines originate at positive charges.
- Lines terminate at negative charges.
- Lines may originate or terminate at infinity.
- Lines do not cross.
- Number of lines is proportional to amount of charge.
- Near charges, ignore other charges.
- Far from charges, consider total charge.
- Smoothly join near and far.

Example: Pair of point charges

Example: Pair of point charges

Example: Three point charges

Example: Large charged plates



Example: Large charged plates

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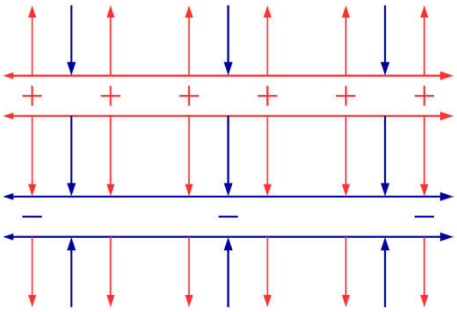

Example: Large charged plates