

Vector Field and Electric Field Lines



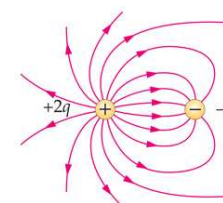
- The electric field is a vector field:

$$\vec{E}(\vec{r}) = \vec{E}(x, y, z) = E_x(x, y, z)\hat{i} + E_y(x, y, z)\hat{j} + E_z(x, y, z)\hat{k}$$

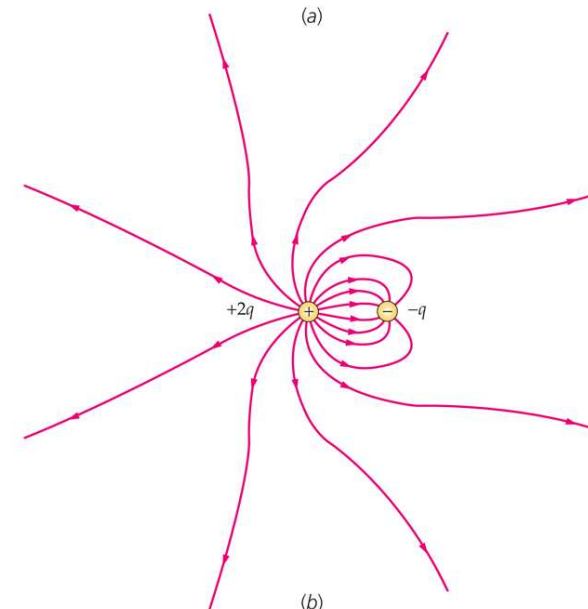
- Electric field lines: graphical representation of vector field.

- Properties of electric field lines (electrostatics):

- Electric field lines begin at positive charges or at infinity.
- Electric field lines end at negative charges or at infinity.
- The direction of \vec{E} is tangential to the field line going through the field point.
- Electric field lines bunched together indicate a strong field.
- Electric field lines far apart indicate a weak field.
- Field lines do not intersect.



(a)



(b)