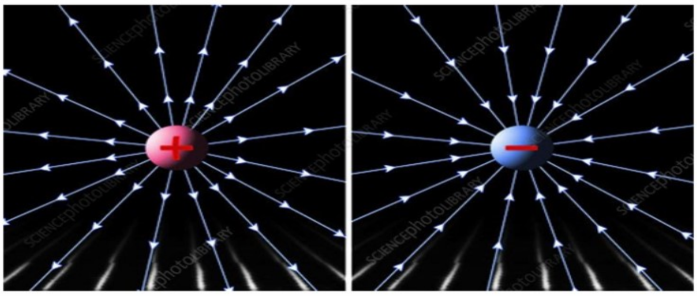
كلية الجبيل الصناعية
JUBAIL INDUSTRIAL COLLEGE

المجال الكهربى

Electric fields

CH22

الهيئة الملكية للجبيل وينبع
Royal Commission for Jubail & Yanbu



Chapter:22

Contents

Introduction

- In Physics, the space surrounding an electric charge has a property called an electric field
- The electric field exerts a force on other electrically charged objects
- The concept of electric field was introduced by Michael Faraday

Michael Faraday
(1791–1867)

* الفراغ المحيط بالشحنة الكهربية
اسمه المجال الكهربى

* المجال الكهربى الموجود حول الشحنة يؤثر عليها بقوة .

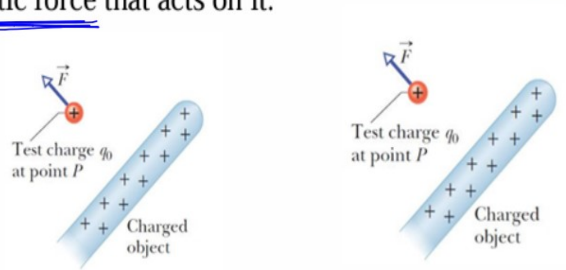
* الى التشف ده فاراداى .

Electric field

- The electric field E at a point due to a charged object is defined as $\vec{E} = \frac{\vec{F}}{q_0}$

* note

where q_0 is a positive test charge at that point and F is the electrostatic force that acts on it.



- Force on a charge sitting in an electric field $\vec{F} = \vec{E} q_0$

- The SI unit of electric field is Newton per Coulomb (N/C).

* المجال الكهربي عند نقطة مشحونة
يكون مؤثر عليها بقوة F

$\vec{E} = \frac{\vec{F}}{q_0}$; $\vec{F} \rightarrow N$; $q_0 \rightarrow$ scaler $\rightarrow C$

N/C

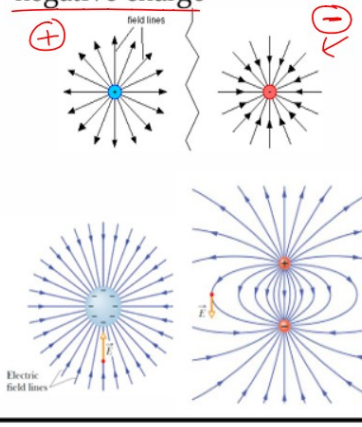
$\vec{F} = \vec{E} q_0 = N$

Electric field lines

- The space around a charged body can be visualized as filled with lines of force is the electric field lines.
- The relation between the field lines and the electric field vectors is:

1. The direction of E at any point is given by the direction of a straight field line or the direction of the tangent to a curved field line at that point.
2. The field lines density is proportional to the magnitude of E.

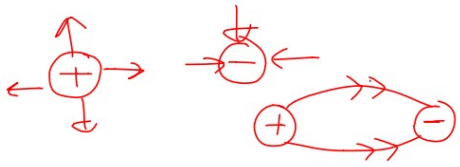
- The electric field lines are radially outward direction in positive charge
- The electric field lines are radially inward direction in negative charge



*1 قيه خطوط وهميه حول جسم مشحون اسمها خطوط المجال الكهربي يُؤثر عليها بقوه مقدارها F

*2 العلاقه بين خطوط المجال والمجال الكهربي طا تجاه

*3 كثافه خطوط المجال تتناسب طرديا مع E.



Electric field lines rules

Field lines ***start*** on **positive** charges.

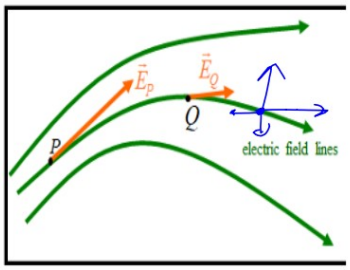
Field lines ***stop*** on **negative** charges.

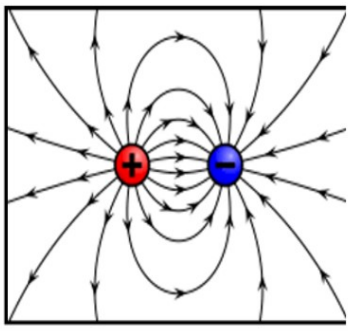
More charge ⇒ more field lines.

Field lines never cross.

Field line spacing indicates field strength

Direction of E is tangent to the field line.





* قواعد خطوط المجال

① خط المجال لازم يبدأ من الشحنة الموجبة

② // // ينتهي عند الشحنة السالبة

③ كلما $E \propto \frac{q}{A}$

④ خطوط المجال مستحيل تتقاطع

⑤ خطوط المجال المتقاربة قوية

// // المتباعدة ضعيفة