

Facts about electric potential

Consider an electric field generated by a positive point charge. The direction of the electric field is such that it is radially outwards. When a positive test charge is brought closer to the point charge, it will experience repulsion due to electrostatic or Coulomb force. Energy is needed to overcome the repulsive force and move the test charge closer to the point charge, which is a source charge. This energy is known as electric potential energy.

The electric potential energy is a scalar quantity. It is not a vector, although the electric field responsible for it is a vector. The magnitude depends upon two factors:

Suppose q_1 and q_2 are the magnitudes of the two charges and r is the separation distance between them. Then, the electric potential energy U is given by

The above equation gives the electric potential at a distance r from the source charge Q . If this charge is negative, the electric potential is negative and given by

Suppose a unit charge is moved from point A to B such that B is closer to the source charge than A. Let r_A and r_B represent the distances of A and B from Q. Then, $r_A > r_B$. The potential difference between two points, A and B, can be written as

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Web: <https://www.hollanddutchtours.nl/contact-us/>

Email: energystorage2000@gmail.com



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WhatsApp: 8613816583346

