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STUDYING THE SUBJECT "ELECTRIC FIELD" OF THE DEPARTMENT OF ELECTROMAGNETISM IN AN UNTRADITIONAL WAY

Nabiyeva Firuza Odilovna
PhD Student of the Department of "Physics and Astronomy"
Navoi State Pedagogical Institute

Abstract

Nowadays, the interest and attention to the use of interactive methods, innovative technologies, pedagogical and information technologies in the educational process is growing day by day. One of the main reasons for this is that, until now, in traditional education, students were taught to acquire only ready-made knowledge, while in modern education, they have to search for the knowledge they acquire, independently study and analyze it, even they are also making their own conclusions. In traditional classes, in most cases, the teacher speaks. This reduces the activity of students to a certain extent. If the teacher searches more and uses non-traditional teaching methods, it will give a positive result. Non-traditional classroom conditions allow students to actively work in the classroom, think freely and communicate with each other. As a result, it serves to keep such information in memory for a long time. Therefore, we will consider some conclusions that draw attention to the study of the topic "Electric field" of the department of electromagnetism in an unconventional way.

The British physicist-experimenter Maykl Faradey, who made a great contribution to the field of electromagnetism, conducted thousands of experiments during his life. Even great scientists named him "the king of experiments". He explained that the effect of charged bodies on other bodies around them occurs through the electric field.

It means that electric charges interact without directly touching each other, and an electric field is created around them. The electric field of the first charge affects the second charge, and the field of the second affects the first charge. The electric field gets weaker as it moves away from the charge.

The field of a stationary charge or a charged body is called an electrostatic field.

We can know the existence of an electric field based on the interaction of charged bodies. The concept of lines of force is used to graphically describe the electric field. Electric lines of force are assumed to start at a positive charge and end at a negative charge, or go to infinity. (Figure 1)

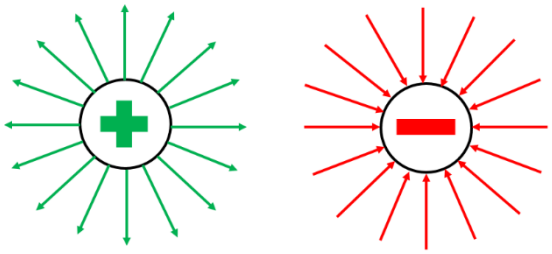

Figure 1

In order to quantitatively assess the effect of the electric field on the electric charge introduced into it, a physical quantity called the electric field strength is introduced and it is denoted by the letter E. Let's introduce a positive point charge q_0 to point A of the electric field created by a sphere with a positive charge q (Fig. 2). The area of the sphere affects the point charge with a certain force F.

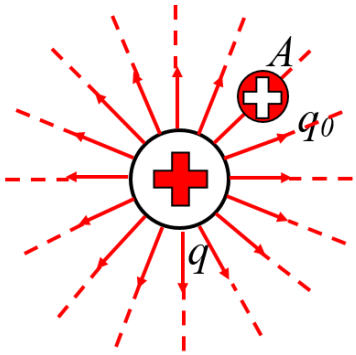

Figure 2

The strength of the electric field created by the charge q at point A is expressed as follows: $\vec{E} = \frac{\vec{F}}{q_0}$

Electric field strength is equal to the ratio of the force exerted on a point charge by the field to this charge.

The direction of the electric field strength (E) is the same as the direction of the force F acting on the positive charge at point A (Fig. 3). Electric field strength is a vector quantity. The unit of field strength is expressed in $\frac{N}{Cl}$.

Let's look at the intensity of the electric field created by a point charge at a distance. According to Coulomb's law, we write the expression of field $\vec{E} = \frac{\vec{F}}{q_0}$ as follows:

$$E = \frac{k\frac{|q_0| \cdot |q|}{r^2}}{q_0} = k\frac{|q|}{r^2}$$

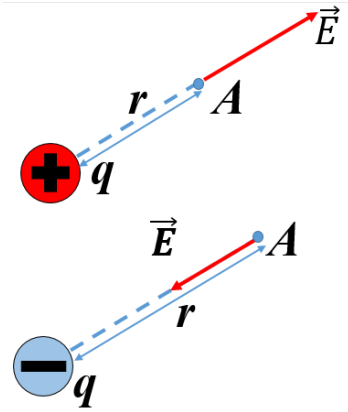

Figure 3

So, the electric field intensity at a distance r from an arbitrary point charge can be found by the following formula: $E = k\frac{|q|}{r^2}$

The strength of the electric field created around a point charge depends on the properties of the medium in which the charge is located. If the field strength created by a point charge q in a vacuum is E_0, then the field strength will decrease when its surroundings are filled with a dielectric. Because the dielectric weakens the electric field. If the modulus of the field strength in a vacuum E_0 is divided by the modulus E of the electric field strength created in a homogeneous dielectric, that is, the ratio $\frac{E_0}{E}$ shows how many times the field strength in a given dielectric is smaller than the field strength in a vacuum. This ratio is

called the dielectric constant of the dielectric and is denoted by the letter ε (epsilon). By definition: $\varepsilon = \frac{E_0}{E}$

In that case, the field intensity at a point located at a distance r from a point charge q placed inside the dielectric is calculated as follows: $E = k\frac{|q|}{\varepsilon r^2}$

The dielectric constant of the medium is a quantity that indicates how many times the electric field strength of the charge in the medium is smaller than the electric field strength in a vacuum.

Educational technology - **"Can you think?"** we use the interactive method. The purpose of using this method is to check how much the teacher remembers the subject after the student has passed a new topic, and thus to arouse the interest of the student in the science of physics, and at the same time is to strengthen the student's ability to think independently and strive for innovation. This method reinforces their knowledge by repeating the basic concepts of the same topic after the completion of the new topic.

"Can you think?" method consists of 2 steps:

1. A series of boxes with the letters of the main concepts of the topic are given. In this case, the student concentrates his thoughts and finds the given word by putting the letters in the boxes in their place.
2. At this stage, physical quantities are given. Students use these quantities to write formulas related to the topic.

Example:

Topic: Electric field.

Step 1: replace the letters in such a way that the result is a term related to the topic.

a	y	d	f	e	a	r

e	c	l	i	t	e	c	f	l	i	e	r	d

l	o	f	i	f	c	o	n	e	s	r	e

f	s	g	e	t	h	i	t	n	r	l	e	d

e	c	l	d	t	e	i	c	r	i

Step 2: Write at least 3 formulas related to the topic from the ones given below.

$\vec{E}, \vec{F}, q, r, q_0, k, \varepsilon, E_0, E$

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