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ANALYSIS OF THE CALCULATION OF THE ELECTROSTATIC FIELD BY DIFFERENTIATING AND INTEGRATING METHODS

Abdullayev J. M.
Navoi State Pedagogical Institute

Abstract

Teaching this subject has been set as a priority by the president of the Republic of Uzbekistan in the program of comprehensive measures to improve the quality of education in physics and ensure the effectiveness of scientific research in 2021. In ensuring the implementation of this decision, the formation of fundamental knowledge in the field of physics in schoolchildren of general secondary education is established. As you know, we face electrical phenomena in our daily activities. This means that any young generation of electricity should have such elementary concepts as proper use, energy saving. Accordingly, from the school physics course, elementary concepts and knowledge of electrical phenomena are given.

This is developed by new laws based on experiences and their results in higher education institutions. And in the course of Theoretical Physics in pedagogical higher educational institutions, the results determined in the experiment are summarized and studied as fundamental laws. Theoretical physics is taught in fundamental sections such as classical mechanics, electrodynamics quantum mechanics, and Statistical Physics. In order for students to have knowledge and skills in this subject, they must have sufficient knowledge, skills and qualifications in such subjects as mechanics, Molecular Physics, Electrical and magnetism, optics, atomic and nuclear, and mathematical analysis. In the process of teaching students a course in theoretical physics, they are:

- inability to make full-blooded use of his mathematical knowledge;
- problems such as the lack of systematization of knowledge in the general physics course lead to difficulties in mastering the course. For example, in order to delve deeper into the electrostatic field in the Electrodynamics section, it is necessary to summarize the laws in the electromagnetism section through mathematical knowledge from a general physics course. Therefore, in the study of the electric field in electrodynamics, it is necessary to use the equations of the theory of the electromagnetic field created by Maxwell. Due to the fact that the electrostatic field is generated by non-ferrous charges, boundary conditions are imposed on it by calculating the private state of the electromagnetic field.

Electrostatic field theory is mainly focused on solving three issues:

1) to define eletrocytatic field vectors as a function of coordinates with knowledge of the charge distribution (a proper matter of electrostatics

2) determining the distribution of charges based on the given values of the field vectors (inverse matter of electrostatics)

3) determination of forces acting on charges in the electrostatic field

If the field vector coordinates are known as functions, the second issue can be solved directly by calculating the volumetric and surface densities of the charge based on the distance. Therefore, in electrositatics, mainly first and Second issues are seen.

If the charge distribution is known,$rot\vec{E} = 0$ va $\varepsilon div E = \rho$ By solving Maxwell's equations, the electrostatic field Vector can be defined as a coordinate function. But the result obtained cannot be directly compared with the experiment due to the fact that the voltage at a given point of the field cannot be determined in the experiment. The difference in potentials at the two points of the field can be

determined in the experiment. Therefore, the concept of the field potential is introduced and the field is between the voltage vector and the potential $\vec{E} = -grad\varphi$ bonds are important in the experimental investigation of the results obtained when calculating the electrostatic field.

While computing the field using the integral formula of Maxwell's equations, the integral form of the Ostrogradsky-Gauss theorem is $\varepsilon \oint \vec{E} d\vec{S} = \int \rho dV = q$ based on E is determined. In this case, the number of lines of force passing through the unit of face perpendicular to the lines of force N is considered equal to the numerical value of the Vector E. of the field where that face is.

$\vec{E}$ based on the vector, the difference in potentials between the two points of the field is calculated. With the measurement of the difference in potentials in the experiment $\vec{E}$ it is possible to verify the correctness of the calculation result found for.

Teaching electromagnetism and electrodynamics on the basis of an integrative approach in correlation through electrostatic field study methods serves to highly formulate the Universal competence of future physics teachers through an interdisciplinary link between physics and mathematics.

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