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INTEGRATION OF PHYSICS LESSONS IN HIGHER EDUCATION INSTITUTIONS IN CONSTRUCTION

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ABSTRACT

The article discusses the methodological features of the teaching process of physics in higher education institutions in the field of construction. It discusses the fact that physics is the main fundamental science in the training of civil engineers and its integration with other special general engineering disciplines. Specific recommendations are given on what to pay more attention to in the organization of the teaching process. instructions have been studied.

KEYWORDS: ***higher education, construction, civil engineer, vibration, construction, physics, practical work, laboratory work.***

Physics is one of the most important fundamental sciences in the successful acquisition of the specialties of civil engineers in the field of civil engineering. [1] 2]. For example, it is difficult to master building mechanics, materials resistance, electrical engineering and electronics, hydraulics, construction physics, and other sciences without a good knowledge of physics. In addition, he will be able to apply his knowledge of physics in his future work. In particular, residential or industrial buildings should be beautiful, tidy, able to withstand sunny hot summer days and cold winter days, as well as snow and rain, and each room in the building should be warm in winter and cool in summer, evenly lit, clearly audible sounds and unnecessary voices should be eliminated as much as possible, and so on. Solving these problems requires knowledge of the basic laws and laws of physics and their application in practice. Therefore, a successful systematic structure of physics teaching in construction universities allows students to form an understanding of the role of physics in the system of scientific knowledge, as well as the importance of the student in his chosen specialty [3]. In the future, it prepares students for the successful acquisition of scientific knowledge in special subjects.

Taking into account the basic requirements for the organization and conduct of physics lessons for students of construction universities, we have identified the following main methodological aspects in the implementation of the practical direction of teaching physics to overcome the difficulties [4]:

a) The presentation of the course in the organization of lectures should be carried out in the context of modern applied physics, that is, to demonstrate the main directions of the application of physical knowledge in future professional activities and to provide a sufficient number of examples of their practical application. Practical examples should be clear to students. In the process of presenting the

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theoretical material, more attention should be paid to the practical application of some of the concepts studied. For example, "Forced oscillations. Resonance Phenomena "is mainly about the vibrations of construction and other engineering structures. A detailed presentation of this report can be organized in the following order.

The basic concepts of the subject are defined — vibrations, forced vibrations, resonance. A differential model of vibrational systems is considered, and mathematical expressions for resonant frequency and amplitude are found. The beneficial and harmful effects of vibration and resonance on construction can be mentioned. However, we will discuss in more detail the use of vibrations in construction technologies. Vibrating piles are used to strengthen the foundations of buildings. It is known that piles are usually placed on the ground with a heavy load, but now it is possible to do this with the help of vibrations. At the top of the pile is a vibrator, which creates vibrations in the pile. As a result, the frictional force of the ground and the pile is sharply reduced and is absorbed into the ground by gravity. The sinking speed is 3-4 meters per minute. It is also possible to remove the piles from the ground using this vibratory method. Based on the same details, we need to consider the harmful effects of vibrations on construction structures and ways to combat them. Here are three main causes of harmful vibrations:

1. Periodic oscillations. These include vibrations caused by the operation of engines inside buildings.

2. Auto-vibrations (inextinguishable vibrations that occur in a system without external influences). It is known that these oscillations occur under the influence of any constant energy source, which can lead to the destruction of structures. This can happen on power lines, television towers or suspension bridges due to constant wind.

3. Vibrations caused by the action of one or more forces, such as explosions or earthquakes.

Particular attention should be paid to ways to combat these vibrations in the lectures. There are two ways to do this:

1. By tuning from resonance. It is used to create any structures that have or may have harmful vibrations.

2. Vibration suppression method. This method is widely used, where the structure and operation of a vibration damper are considered. For example, the world's first building, Taipei 101, which is more than half a kilometer long, used a pendulum with a total weight of 660 tons to withstand typhoons and earthquakes (Figure 1). The pendulum is located on floors 87-91 of the building, which allows the building to remain in balance even when the wind speed reaches 216 km / h. During vibration, the fluid is released through 8 hydraulic shock absorbers attached to the balloon and extinguishes the vibration energy [5].

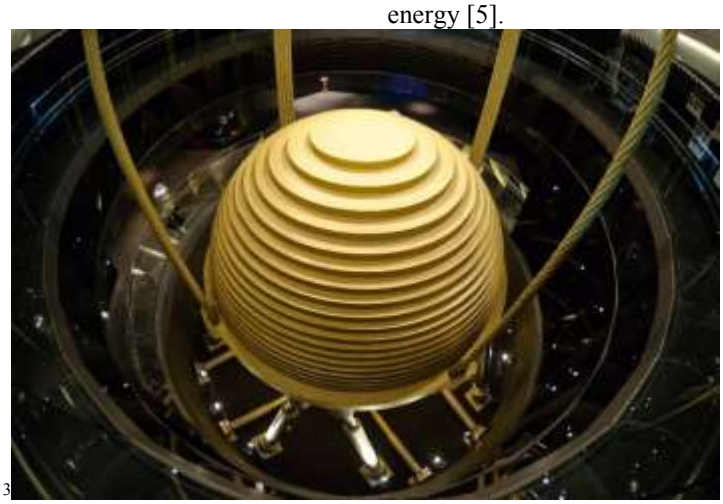

Figure 1.

b) Practical training should use a specially designed and selected set of professionally oriented tasks [6]. This type of problem is the main practical direction of teaching physics. The following is a problem directly related to the field of construction from physics [7].

Find the maximum stress acting on a brick column with a height of 2.5 m and a cross section of 50x65 cm^2 under a force of 300 kN. The column is made of bricks with a density of 1600 kg / m^3 (Figure 2)

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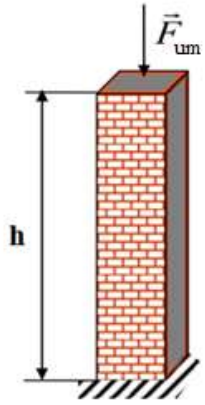

Figure 2

We know that based on the expression for the determination of mechanical stress,

$$\sigma = \frac{F_{um}}{S}$$

determined.

Total force: $F_{um} = F + P$, where $P = mg$ is the height of the brick column. Column mass: $m = \rho \cdot V = \rho \cdot S \cdot h = \rho \cdot a \cdot b \cdot h$.

So, for mechanical stress,

$$\sigma = \frac{F + \rho \cdot a \cdot b \cdot h \cdot g}{S}$$

expression follows.

Substituting the known values into the above expression, we determine the maximum stress that can occur in the brick column,

$$\sigma = \frac{300000 + 1600 \cdot 0{,}5 \cdot 0{,}65 \cdot 2{,}5 \cdot 10}{0{,}5 \cdot 0{,}65} = 963 \cdot 10^3 \frac{N}{m^2}$$

The strength limit for bricks is in the range of $10 \div 20$ MPa. Therefore, taking into account that the result obtained is several times smaller than the limit of strength, we conclude that the brick can withstand the preferred load.

c) It is known that laboratory classes are an integral and important part of effective teaching of physics. For example, laboratory classes at the Tashkent Institute of Architecture and Construction focus on directing students to the field of construction. For example, in the laboratory work "Determination of the Yung modulus by the method of bending" concepts such as deformation, Guk's law, Yung's modulus, relative and absolute elongations, strength limits ensure the integration of future engineers in future scientific and labor activities. Alternatively, virtual labs can also be used effectively. When using virtual laboratories, all the professional skills of future civil engineers are formed and developed at the same time. [8] It is known that the Carnot cycle is a classic example of understanding the irreversible processes that occur in many heat pumps and refrigeration machines. As a rule, a detailed study of all stages of this cycle and the calculation of all relevant parameters occurs most effectively in the process of laboratory work on this topic in physics. In our opinion, We can analyze the dedicated and proposed laboratory work for future civil engineering students [10]. The theoretical material of this work is very important for future civil engineers, as it directly deals with all the theoretical foundations of heat transfer processes through construction barriers. Also, the specificity of a particular line of construction is practiced in the laboratory.

d) The organization of independent work of students should be organized, if possible, with the use of information technology (IT), as well as theoretical, practical, test and control materials, professionally oriented didactic materials using guidelines for solving professional problems [11]. This approach to organizing students 'independent work not only helps to improve the quality of students' fundamental knowledge, but also builds their ability to apply the knowledge they have acquired in their later education and future careers. In carrying out this work, it is desirable to carry out close cooperation between professors of physics and professors of special subjects. It should be noted that in order to optimize

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independent work and, accordingly, to maximize savings in the classroom, students are invited to perform tasks that theoretically complement the course of lectures in the laboratory.

Thus, taking into account the specifics of their specialization in the field of construction in the vocational guidance of students, there are suggestions and recommendations for the effective organization of lectures, practical, laboratory classes, independent work. In addition, a special feature of the professional training of students majoring in construction is not only the acquisition of new knowledge in physics, but also the increase in the need to use the acquired physical knowledge in their future careers through the proper organization.

REFERENCES

1. *Mirzabekova OV, Soboleva VV, Agafonova A. Formation of design activities in teaching physics to students of engineering and construction specialties // Man and education. –2013. –№ 1 (34). – P. 113–116.*
2. *VV Soboleva. Conceptual foundations of the organization of the educational process in physics based on the technology of end-to-end design of objects of professional activity of civil engineers. materialy VIII mezinárodní vědecko-praktická conference "Dny vědy" .- Díl 34. Pedogogika: Praha. PublishingHouse "EducationandScience" s.r.o.-2012- P. 59-63.*
3. *T.A. Polyakova. Materials of the interuniversity scientific methodological conference (Omsk, Russia, 2011), Omsk: OmSTU, 2011. P. 93-96.*
4. *Yu.R. Mukhina. Innovative projects and programs in education, 2010.4, P. 16-18*
5. *Nortojiev A. "The role of integrative education teaching physics" –O'zMU RIAK-2020, P 371.*
6. *6.M.D. Dammer, N.V. Zubova. Methods of teaching physics at a technical university based on complex case technology, Bulletin of SUSU. Series "Education. Pedagogical Sciences ". Chelyabinsk. 2015. No. 2. P 9-15.*
7. *V.V. Sobolev. Dis. Cand. ped. Sci., ASU, Astrakhan 2019. P 41.*
8. *D.I. Fakhertdinov. Dis. Cand. ped. Sci., KNRTU, Kazan, 2011.P 169 .*
9. *D.I. Fakhertdinova, Study of the Carnot Cycle of an Ideal Heat Engine, Kazan State University of Architecture and Civil Engineering, Kazan, 2014, P 11.*
10. *D.I. Fakhertdinov. Diffusion in gases, KGASU, Kazan, 2014.P 10.*
11. *T.A. Polyakova, Materials of the interuniversity scientific and methodological conference (Omsk, Russia, 2011), Omsk: OmSTU, 2011. P 93-96.*