HIGH METHODOLOGY OF TEACHING THE TOPIC "MOVEMENT OF A BODY WITH VARIABLE MASS" IN EDUCATION

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Abstract. *The article discusses the possibility of using different methods in the study of the movement of bodies with variable mass in higher education, for which a teacher with pedagogical knowledge and skills must first have an idea about the methodological foundations of the science of pedagogy, the laws and factors of personal development, goals and tasks. When we say a body with variable mass, it obeys the laws of classical mechanics and its mass changes during its movement, that is, its mass can decrease or increase. For example, when cars sprinkle water on the street in summer , the mass decreases as a result of fuel burning in rockets and jet planes. As a result of the fall of various meteorites on the earth, the mass of the earth increases and so on . Therefore, in explaining the topic in higher education, the Russian scientist K.E. Tsiolkovsky's contribution to the field of cosmonautics is explained from a physical point of view and expressed using equations.*

The main task of education and training is to give knowledge to young people, teach them professions, make them mature specialists and bring them to adulthood. Education is not about teaching young people to repeat the same sentences , but about creating a basis for their deep thinking. It does not rely only on the knowledge obtained before studying physics, but also on the knowledge obtained from concrete and natural sciences. Control of students' knowledge in a programmed way It is more effective in checking knowledge through oral question-answer. The programmed method is an active form of repetition and reinforcement in knowing that students have mastered the material. The continuous learning process and its implementation require extensive practical skills. And the practical skill expands due to the views and observations based on modernity . The article shows an example of programmed methods. The use of these methods ensures mutual continuity and coherence of school and higher education. This method can be used by school teachers as a methodical guide.

Keywords: *body, rocket, mass, cosmonautics, skill, universe, movement, fuel, method, style, education.*

INTRODUCTION

By the 21st century, a number of innovations have appeared in our scientific views that represent the physical landscape of the universe. Therefore, since serious changes have occurred in all departments and directions of physics, the content of education should also change in accordance with these achievements. Therefore, in higher education, different methods can be used to teach the subject of the movement of bodies with variable mass. abilities and skills must be formed. Pedagogical abilities and skills are not easily formed in a teacher. In order to achieve his goal, a person who chooses this profession must continuously study, learn and search, work creatively, quickly understand what is happening in our independent country, and be able to deeply feel how necessary his work is for the country. It is the demand of the times to acquire modern

knowledge and experiences in accordance with the high requirements, to work creatively. Therefore, they should strive to continuously improve their skills and master modern knowledge and experiences in accordance with the high requirements of the present day.

LITERATURE ANALYSIS AND METHODOLOGY

When we say a body with variable mass, it obeys the laws of classical mechanics and its mass changes during its movement, that is, its mass can decrease or increase. For example, when cars spray water on the street in the summer, the mass decreases as a result of the burning of fuel in rockets and jet planes . As a result of the fall of various meteorites on the earth, the mass of the earth increases and so on . Glazunov A. _ T. _ of « Middle _ The contribution of K. E. Tsiolkovsky to cosmonautics is widely covered in the " school physics course, technique " manual for teachers. In his other works, the important principles of cosmonautics are defined:

1. Use of solar and nuclear energy from liquid fuels for spacecraft engines;

2. Using multi-stage rockets.

Young people were invited by K.E. By introducing the scientific heritage of Tsiolkovsky, it is necessary to introduce the latest achievements of mechanical engineering, electronics and automation in explaining the motion of a body of variable mass . The knowledge given by the teacher is an important factor in the development of the country's economy. In the "General Physics Course" of A.G. Rasulmuhamedov, J. Kamalov, the mass change during the movement of the body is widely covered. But with the increase in speed, the mass does not change. For these cases, if we express Newton's formula in the following form,

$$\vec{F} = \frac{d\vec{p}}{dt} = \frac{d(m\vec{\vartheta})}{dt} = \vec{v}\frac{dm}{dt} + m\frac{d\vec{v}}{dt} = \vec{v}\frac{dm}{dt} + m\vec{a}$$

will be It can be seen from the formula that with the change of mass, the magnitude of the speed also changes, in general, it does not coincide with the direction of the force, and the correct proportionality of the acceleration to the force is not maintained. If the direction of the force is in the same direction as the direction of the velocity or the force is directed perpendicular to the velocity, the force with the acceleration is in the same direction.

We used Newton's second law above to express the force acting on a body of varying mass. Now let's look at the motion of a body of varying mass using the change in momentum. To do this, let's get acquainted with the motion of a rocket whose mass changes over time. The center of mass of the rocket does not change during the movement.

Resulting from the fuel burned in the rocket interacts with it only at the time of exit (separation) from the rocket. Since the gas is constantly escaping, the mass of the rocket is also continuously decreasing . The external force F acting on the rocket is equal to the sum of the rocket's weight gi P and the resistance of the environment F_q.

m be the mass of the rocket at time *t* and its speed at that time $\vec{\vartheta}$. At this point, the rocket $\overrightarrow{p_1} = m\vec{v}$ will have momentum. At time *dt,* the mass of gas $\vec{\vartheta}_1$is released from the rocket with a velocity. $t + dt$momentum of the system (rocket+gas) during movement at time $\vec{p}_2 = [m - (-dm)] * \left(\vec{\vartheta} + d\vec{\vartheta}\right) + (-dm)\vec{\vartheta}_1$will be equal to

As a result of the change of momentum, the system is affected by the momentum of external forces (gravity and the resistance of the environment), that is, after $\Delta\vec{p} = \vec{p}_2 - \vec{p}_1 = [(m + dm)]\left(\vec{\vartheta} + d\vec{\vartheta}\right) - \overrightarrow{\vartheta^1}dm - m\vec{\vartheta} = \vec{F}\,dt$ .opening the Bracket, $d\vec{\vartheta}\,dm$, as it is too small, and dividing the resulting expression by *dt* yields the following equation:

$$m\frac{d\vec{\vartheta}}{dt} - \overrightarrow{\vartheta_1}\frac{dm}{dt} + \vec{\vartheta}\frac{dm}{dt} = \vec{F}$$

Or

$$m\frac{d\vec{\vartheta}}{dt} - \left(\vec{\vartheta}_1 - \vec{\vartheta}\right)\frac{dm}{dt} = \vec{F}$$

from this

$$m\frac{d\vec{v}}{dt} = m\vec{a} = \overrightarrow{F +}\left(\vec{\vartheta}_1 - \vec{\vartheta}\right)\frac{dm}{dt} = \vec{F} + \vec{u}\frac{dm}{dt}$$

This variable mass represents the equation of motion of the point. This is called the Meshersky equation.

1. $\overrightarrow{\vartheta_1} - \vec{\vartheta} = \vec{u}$ –is the speed of the outgoing gas relative to the frame of reference moving with the rocket, it is called the relative speed.
2. $\frac{dm}{dt} = 0$then this equality turns into the expression of Newton's second law for a body of constant mass.
3. The second additive on the right side of the equation $\vec{u}\frac{dm}{dt} = \overrightarrow{F_p}$is the force exerted by the mass of the released gas *dm on the mass m* .

Taking it into account, the above formula takes the following form:

$$m\frac{d\vec{\vartheta}}{dt} = \vec{F} + \overrightarrow{F_p}$$

Solving this equation in general is more complicated because it is difficult to calculate the reactive power. Therefore, if the Mesherisky equation is used to study the motion of a body in an airless environment, that is, in the absence of external forces, the external force (F) will take the following form:

$$\mathrm{m}\frac{\mathrm{d}\vec{\vartheta}}{\mathrm{dt}} = -\vec{\mathrm{u}}\frac{\mathrm{dm}}{\mathrm{dt}} \quad yoki \quad \mathrm{d}\vec{\vartheta} = -\vec{\mathrm{u}}\frac{dm}{m}$$

The sign (-) indicates that the movements are in the opposite direction, and if we say $u = |\overrightarrow{u}|$, it will look like this.

$$d\vartheta = -u\frac{dm}{dt}$$

Integrating this expression,

$$\vartheta = -ulnm + C$$

Determining the constant of integration Let m=m₀ and $\vartheta = 0 m=m_0$ at *t=0* . Then C= ulnm will be 0 .

$$\vartheta = -ulnm + ulnm_0 = uln\frac{m_0}{m}$$

Or

$$\frac{m_0}{m} = -e^{\frac{v}{u}}$$

This relationship is called the Tsiolkovsky formula. The Tsiolkovsky formula allows you to calculate the amount of fuel needed to give the rocket a certain speed. **When learning** " body movement with variable mass ", it is necessary to use the programmed method for the mastery of young people. In this case, one of the programming methods, Alternative method, is used as an example.

Alternative style science in mastering how use can

Her one to the question from group A and B right the answer show need

A answers	V group responses
Two stage rocket speed.....	$\frac{m_0}{m} = -e^{\frac{v}{u}}$
$m\frac{d\vec{v}}{dt} = \vec{F} + \vec{u}\frac{dm}{dt}$	Tsiolkovsky's formula
The equation of motion of a rocket...	Maximum speed...
The minimum mass of the rocket structure per unit of fuel mass	$\vec{v}$ = 17.25 km/h
Me Shchersky equation	Single stage rocket speed.....
$\vec{v}$ = 5.75 km/h	There are no correct answers
With acceleration, the force is in the same direction	When the force is perpendicular to the velocity.....
In order for the rocket to have a high speed...	The formula for calculating the fuel supply in a rocket
To the law of conservation of energy	It is necessary to reduce the mass of unburned fuel with the rocket
Reactive action is based on	To the law of conservation of momentum
If the rocket is acted upon by external forces, the equation of motion of the rocket is.....	$m\frac{d\vec{v}}{dt} = \vec{u}\frac{dm}{dt}$

The methods shown as examples also have an effect on the mental development of young people. Along with organizing the process of teaching physics, it is necessary to take into account the specific mental characteristics of teaching physics. Because education is a tool that changes the human mind. Its methods are diverse, and its possibilities are endless. The social and spiritual opportunities of the people who have used the educational opportunities in a wide scope will increase more and more. To educate the young generation growing up in our country in an all-round way, to care for and support young people with talents and talents, to help them achieve the peaks of creativity and knowledge, to create conditions at the level of scientific, material and spiritual possibilities for the realization of their talent and intellectual potential. consists of

CONCLUSIONS AND SUGGESTIONS

Thus, taking into account the comprehensive nature of coherence and consistency as a didactic principle, in the field of education, it is necessary to take into account not only the content aspect of physics education, but also the methodological aspect developed with new technologies that represent the implementation of this content in life. One of the main requirements for the consistency and integrity of the content of physics education is that the physics taught in new educational institutions in the territory of Uzbekistan should be in accordance with the current trend of the development of physics, should not be separated from the advanced ideas and scientific achievements recognized by the world, advanced techniques and technologies that are used in practice. On the contrary, the achievements of science at the international level should be reflected in the content of education. Over time, physics as a science is enriched with achievements, its fields of application in technology are updated, and the content of physics education changes under the influence of life requirements.

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