ФИЗИКО-МАТЕМАТИЧЕСКОЕ ОБРАЗОВАНИЕ: ЦЕЛИ, ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ

PHYSICAL AND MATHEMATICAL EDUCATION: GOALS, ACHIEVEMENTS AND PROSPECTS

Материалы Международной научно-практической конференции

г. Минск, 10–13 мая 2017 г.

Materials of the International Scientific and Practical Conference

Minsk, May 10–13, 2017

Министерство образования
Республики Беларусь

Учреждение образования
«Белорусский государственный
педагогический университет
имени Максима Танка»

Ministry of Education
of the Republic of Belarus

Belarusian State
Pedagogical University
named after Maxim Tank

ФИЗИКО-МАТЕМАТИЧЕСКОЕ ОБРАЗОВАНИЕ: ЦЕЛИ, ДОСТИЖЕНИЯ И ПЕРСПЕКТИВЫ

Материалы Международной научно-практической конференции

г. Минск, 10–13 мая 2017 г.

PHYSICAL AND MATHEMATICAL EDUCATION: GOALS, ACHIEVEMENTS AND PROSPECTS

Materials of the International Scientific and Practical Conference

Minsk, May 10–13, 2017

Минск
БГПУ
2017

Minsk
BSPU
2017

$$\left(\vec{T}_1+\vec{T}\right)r+\vec{M}=I\frac{\vec{a}}{r}\quad\left(\vec{T}_2+\vec{T}\right)r+\vec{M}=I\frac{\vec{a}}{r}$$

$$h=\frac{1}{2}at^2\quad I=\frac{1}{2}mr^2$$

The solution of the system of equations allows to express the acceleration of gravity g, the moment of the frictional force M, the radii of the blocks r, their mass m and the moments of inertia I, and the tension forces of the filaments T_1, T_2 and T. It is possible to use the data of several independent electronic measurements of the passage time t of cargo of height h with the subsequent application of the listed working formulas. Also, based on electronic measurements, it is advisable to plot the dependence of the angular acceleration on the resultant moment.

$$(m_1-m_2)g-2I\frac{a}{r^2}-2M\frac{1}{r}=(m_1+m_2)a;$$

$$a=\frac{(m_1-m_2)g-2M\frac{1}{r}}{m_1+m_2+2I\frac{1}{r^2}};\quad g=\frac{m_1+m_2+2I\frac{1}{r^2}}{m_1-m_2}a+\frac{2M\frac{1}{r}}{m_1-m_2};$$

$$M=\frac{(m_1-m_2)}{2}g-\frac{1}{2}\left(2I\frac{1}{r^2}+m_1+m_2\right)a.$$

Thus, the electronic experiment on the laboratory machine "Atvud machine" allows to simulate the motion with and without friction and tu restore the parameters of the circuit with collective discussion of the features of the process.

UDC: 537.312.62;541.123.3:548

V. Sobol, Ch. Fedorcov, B. Korzun, I. Perepechko
BSPU, Minsk, Belarus
T. Bizhigitov, S. Tomaev, B.Nushnimbaeva, S. Egemberdieva, N. Korganbaev
TSPU, Taraz, Kazakhstan

NON-EQUILIBRIUM HEATING WITH LOCAL REDISTRIBUTION OF THERMAL FIELD BY THE MECHANISMS OF INTERFERENCE

The problem of heating large industrial premises with high ceilings can be rationally solved by using so-called nonequilibrium systems, which usually use directed infrared rays, instead of raising the temperature directly of air throughout the volume. In order to create comfortable conditions for the working personnel in large rooms there is no sense to heat the interior area in a traditional way, since warm air as known rising to a higher altitude will not heat volume at once. It lead to an excessive expenditure of energy carriers when heating will be similar to heating for residential premises, where fuel elements are

located at the height of the window. Heat waves similar infrared rays can remotely and locally affect the temperature of absorbing finite area if they are properly concentrated either by mirror systems, or by lenses, or by other means.

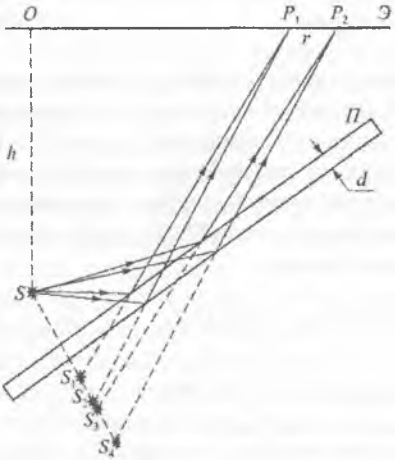

Figure 1- П – plate of mica, d is the thickness of the plate, S is the radiation source S_1, S_2, S_3, S_4 imaginary sources, e – screen, P_1, P_2 – the interference fringes (rings), the center of the concentric rings, h – the distance from the center of the rings to the source.

The report presents the results of modeling the process of concentration of electromagnetic thermal waves through interference mechanisms. It is known that the emitted electromagnetic flux can not be amplified by an external passive action, but this flux can be concentrated, that is, partially redistributed due to, for example, interference. Formally, two coherent sources of the same intensity at the minimum point give zero flux intensity, whereas at the maximum point they increase the sum intensity fourfold. The width of the interference band, as known, is determined by the radiation wavelength, by the distance between the coherent imaginary sources and by the distance to the screen. For the experimental modeling of such process of re-distribution of the energy flux, the radiation of mercury lamp was chosen, because this radiation is easy to visualize during the experiment instead of infrared beams. Schematic diagram of the experimental setup is shown in figure 1. With its help, the resulting redistribution of thermal energy that is confirmed by the presence of an interference pattern in the form of concentric rings with their centers on the perpendicular to the screen passing through the source, which was used mercury lamp DRSH-250.

As a tool for the formation of a coherent light field of small coherence length a crystalline plate of mica is chosen. This plate of mica in a so-called high-aperture arrangement, forms a system of interference strips on a remote screen (see. Fig. 2), which can be observed with the naked eye. On the base of experiment the estimations of parameters of discussed system for formation of interference heat field are

calculated. The radiation is chosen as having wave length of the order from some tens to some hundreds microns at required width band of 0.3–0.4 m.

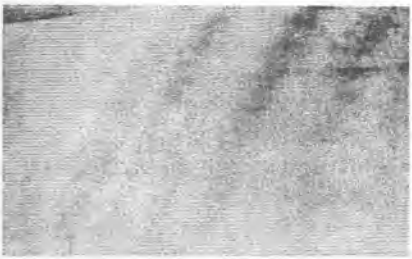

Figure 2 – The interference fringes of the real distance r between which is 8.6 mm, with the distance h from the source to the screen, equal to 53 cm.

So the heating in regime of non-equilibrium functionning of high energetic infrared sources may be benefit at the action of additional mechanisms of interference.

➢ **BIBLIOGRAPHY**

1. Mansurov, V. A. Fundamentals of energy conservation, training and method. a manual / V. A. Mansurov. – Minsk: Belarusian state medical University, 2010. – 68 p.

2. Pospelova, T. G. Fundamentals of energy conservation / T. G. Pospelova. – Minsk: Tekhnoprint, 2000. – P. 353.

3. Energy efficient lighting / Energy Saving. – 1999. – No. 8. – P. 22–23.

4. Kundas, S. P. Renewable energy sources / S. P. Kundas, S. S. Pazniak, L. V. Shenets. – Minsk: mgeu them. A. D. Sakharov, 2009. – 315 p.

УДК 519.674.001.57

В. Р. Соболь, О. Н. Белая, В. С. Самуленков, Е. А. Сливец
БГПУ, Минск, Беларусь

НЕПАРАМЕТРИЧЕСКИЕ ПОДХОДЫ В ПРЕДСТАВЛЕНИИ ДАННЫХ ВЕРИФИКАЦИИ ДИДАКТИЧЕСКИХ НОВАЦИЙ

Статистические исследования в областях психологии, медицины педагогики, и т. д. предполагают, в том числе, и сопоставление данных обследования какого либо признака, например, сопротивляемости к компьютерной игромании, устойчивости организма к инфекциям либо уровня усвоения материала учебной программы через разнесенные во времени промежутки тестирования пациентов. То есть, до начала воздействия коррекционных методов, до начала вакцинации, до применения более совершенных подходов дидактики и после конечного этапа использования новшеств с воздействием на психику, здоровье, уровень усвоения учебного материала. Проблемой, с которой сталкиваются специалисты, является необходимость сопоставления результатов обследования какого-либо признака при неодинаковых условиях экспе-