where *p* is density, kg/m³; $h = \int_{T'}^{T} p(T)dT$ is volume enthalpy J/(m³·K); $\Delta = \left(\frac{\partial}{\partial x}, \frac{\partial}{\partial y}, \frac{\partial}{\partial z}\right)$ is the Hamiltonian operator; $\hat{\imath}$ is thermal conductivity, W/(mK); T is temperature, K; $i = \overrightarrow{1,M}$ is index of the biological tissue element; $q_{vb}(T) = c_{pb}\rho_b w_b(T_b - T)$ is the density of the internal source of heat associated with perfusion, W/m; E (T) is the volume density of the radiation heat flux of the "gray" radiation, absorbing and dispersing medium (W/m³), which is determined by the intensity of the radiation from the solution of the transport equation $dI\frac{dI(s,\Omega)}{ds} + +\beta I(s,\Omega) = KI_b(T) + \frac{\sigma_s}{4\pi}\int_{4\pi} I(s,\Omega')d\Omega'$; *s* is the length of the path measured along the direction of radiation propagation Ω, m; *I* is intensity of radiation along s in the cortical corner Ω, W/(m².sr); $I_b = \frac{n^2\sigma T^4}{\pi}$ is intensity of radiation of an absolutely black body, W/(m2.sr); σ is the constant of Stefan-Boltzmann, W/(m².K⁴); *n* is index of refraction of the medium; $\beta = K + \sigma_s$ is the relaxation factor of the medium, m^{-1}; *K* is absorption coefficient of medium, m^{-1}; σ_s is the scattering factor of the medium, m^{-1}. For numerical solution of problems, the method of discrete ordinates (MDO) is used, namely the method of finite volumes (MSO), which is widely used for the problems of convective heat transfer.

Conclusions. In the course of this work, a theoretical analysis was made of the vital importance of laser radiation application in surgery, cosmetology, and dentistry. Analyzing the theoretical material, we can say that the application of laser technology is very commonly used in modern medicine. Especially lasers gain popularity in surgery. Laser technology is used widely in oncology. Depending on the wavelength of radiation, its dose and methods of exposure, tumor growth may be accelerated or inhibited. Laser technology is used successfully to treat many benign neoplasms.

The application of neurosurgical laser technology can increase the radicality and reduce the traumatic operation of tumors located in the "critical" areas of the brain affecting vital and functionally significant departments.

Since laser biotechnology deals with living objects, in addition to the physical and chemical manifestations of light radiation, it is necessary to take into account the influence of light on the functioning of living matter, which is determined by the degree of homeostasis of a living object. Laser radiation affects the biological tissue by the following physical factors: temperature, weak electric current, pressure, and so on. A distinctive feature of its influence is localization. The physical and mathematical model can reliably describe the nonstationary distribution of temperature in the sample during laser radiation exposure.

MATHEMATICAL ANALYSIS OF THE DYNAMICS OF POPULATIONS GROWTH IN EUROPEAN STATES

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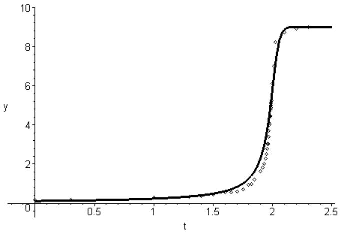
Introduction. Trend in the number the population of countries is a very important factor of its existence. Therefore, there are groups that are made the analysis of the existing situation and outlook for the future in all countries and international organizations.

Aim. Determine population trends in Europe and the Commonwealth of Independent States over the years and now.

Materials and methods. Mathematical models are developed for this purpose. The different differential equations are using for this purpose. For example the statistical data on population of Earth for the time from the beginning of our era until the year 2030 is showing in fig.1. This process is described by the differential equation



$$\frac{dN}{dt} = (a - bN)N^2, \qquad N(0) = N_0 . (1)$$

Line is the solution of this equation.

Fig. 1

Fig. 2 shows the changing of the population of Ukraine from year 1700 before year 2003. The equation (1) cannot describe decrease of the population in 2000. This is requires another mathematical model. A growing portion of the schedule, you can describe a simpler equation

$$\frac{dN}{dt} = aN^2, \qquad N(0) = N_0$$

The factor *a* determines the rate of population growth.

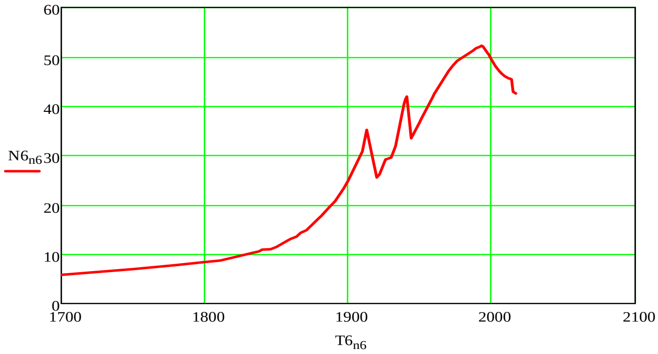


Fig. 2

Results and discussion. There was analyzed the evolution of the population in several countries of Europe and are made some conclusions about development trends in these processes.

MARKOV MODEL IN THE PHARMACOECONOMIC ANALYSIS.

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Introduction. In the 20th century, the modeling method has been used in various fields, plays a key role in the economic evaluation of health programs, since it allows the integration of clinical research data with economic indicators used in medical decision-making.As you know, modeling is an analytical methodology that consists of the development of events for a certain time in a population (population) and is based on data derived from primary and secondary sources, the main objective of which is to assess the effectiveness of pharmacotherapy for health and appropriate costs. The simulation methodology includes the following steps:

1. Development of the algorithm of the disease;
2. Determination of the probability of individual trends (phenomena, events, etc.);
3. Addition of each direction by economic data.

Aim. Models should be presented as decision-making tools, not as confirmation of a scientific fact. In accordance with the "Principles of Good Practice in Modeling Health Decision-Making Estimates" approved by the ITFED (ISROF), mathematical models for assessing drugs are used to synthesise data from different sources and provide cost and drug cost information for decision-making purpose for financing health care.

Materials and methods. The Pharmacoeconomic Analysis uses the Markov model. From the point of view of this analysis, all events are a transition from one state to another, taking into account that all people are healthy (full health - 1), and at the moment of the disease they pass into another state. Some