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Environmental Engineering Science

USING THE PRINCIPLES OF «GREEN LOGISTICS» FOR ENVIRONMENTAL PROTECTION

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SUMMARY

The article analyzes the results of studies by Russian and foreign authors on the negative impact of black carbon on the environment. The principles of «green logistics» are proposed to be used to reduce the negative impact of the results of a person's economic activity on the Earth's climate.
Key words: ecology, logistics, black carbon, climate, transport.

INTRODUCTION

One of the problems of our time is the negative anthropogenic impact on living nature. Protection of the environment is a significant problem not only for the state, the public, but also for entrepreneurs, since the complex ecological situation is a direct result of their activities, including the result of the activities of the facilities of the material base between the sections of the logistics chain.
In particular, 60% of the pollution of the atmosphere is in vehicles. Therefore, in addition to the main, traditional questions: «what to buy», «how much to buy», «from whom to buy», «on what conditions to buy», modern conditions put before logistics other, no less significant problems, including such as environment protection. As a consequence of the above-mentioned problem in logistics, the direction of activity, called environmental logistics – «green logistics» has been outlined [5].
The purpose of the study is to explore the possibility of using the principles of «green logistics» to protect the environment from the effects of black carbon.
To achieve this goal, it is necessary to solve a number of tasks:
review current research on the effects of black carbon on the environment;
develop proposals aimed at reducing the negative impact of black carbon on the Earth's climate.

METHODOLOGY

The study of the theory of the negative impact of industrial and other activities on the Earth's climate was carried out using the methodology of the system approach and the principles of ecological – «green logistics». General scientific methods were used, for example, analysis and synthesis. The method of analysis made it possible to identify the problem and to identify the main components in it, and the synthesis to determine the main directions for resolving current problems.
The methods of empirical knowledge include description, comparison, measurement. Based on the analysis of available literature sources, a complex ecological situation was described in the context of anthropogenic impact on nature.

RESULTS AND DISCUSSION

A BRIEF OVERVIEW OF MODERN RESEARCH ON EFFECTS ON THE NATURAL SYSTEM OF BLACK CARBON

In 2011 – 2012 a number of survey studies on the effect on the climate system of short-lived «climatic factors», which include the release of substances into the atmosphere that are stored in it from several days to several years, rather than dozens of years, such as CO_2. Such emissions include «black carbon» (BC), which is a new substance from the point of view of its study.
Let's define the BC, consider its impact on public health, the environment and climate [1].
BC is a product of incomplete combustion of coal, diesel fuel, biofuel, biomass and is the strongest light-absorbing component of suspended particles. Its solid particles consist mainly of pure carbon, which absorbs solar radiation at all wavelengths. The BC is released directly into the atmosphere in the form of soot, consisting of small particles smaller than 2,5 microns [2].
BC is unique and important in the Earth's climate system, as it absorbs solar radiation, affects the formation of clouds, melting snow and ice cover. Most atmospheric concentrations of black carbon are due to anthropogenic activity.

BC is a separate type of carbon material, which is formed only in the flame during the combustion of carbon fuels. It differs from other forms of carbon and carbon compounds contained in the atmosphere, since it has a unique combination of the following physical properties:
absorbs visible light with a mass absorption of at least 5 $m^2 g^{-1}$ at a wavelength of 550 nm;
has refractory properties, that is, it retains its base form at very high temperatures, and its evaporation temperature is about 4000 K;
not soluble in water, in organic solvents, including methanol and acetone, as well as in other components of atmospheric aerosol.
A clear absorption of visible light in all visible waves with the help of BC is a distinctive feature that has caused interest in studies devoted to the radioactive radiation of the atmosphere. In the atmosphere in significant quantities there are no other substances having such a strong energy absorption per mass unit. BC has very low chemical reactivity in the atmosphere; its main process of removal is wet or dry precipitation. BC, as a rule, is in atmospheric aerosols containing a number of other materials, many of which are ejected together with BC from various sources.
It is possible to distinguish natural and anthropogenic sources of BC. On a global scale, the largest natural sources of black carbon are forest and steppe fires, some of which can be indirectly attributed to anthropogenic impact (fires caused by people). Anthropogenic sources include emissions associated with human economic activity. In Africa, Latin America, East, South and South-East Asia, open burning of grasses and forests is the most significant source of black carbon emissions.
In Europe and North America, the main source of BC are diesel engines of road transport (for example, diesel trucks and cars); diesel engines of other modes of transport (for example, trains, ships) and non-transport diesel engines (agricultural and construction equipment, generators). Diesel car engines in the volume of emissions of BC are in the first place, followed by diesel engines of other modes of transport.
According to the World Bank, in 2000 the automobile and marine sector produced about 4.8 million tonnes of BC, which is about 20% of global emissions. Emissions from the full cycle of air transport operations, including flight, landing and take-off, also constitute a significant share. However, in comparison with industrial activity, which is a significant source of mass emissions of BC on a global scale, emissions in aviation and shipping are insignificant. After entering the atmosphere, the BC moves on a regional and intercontinental scale and is removed from the atmosphere through wet and dry deposition on the Earth's surface (i.e., precipitated), resulting in an average lifetime of BC in the atmosphere of about a week [3].
Black carbon has a negative impact on human health and the state of ecosystems, on the conditions of illumination, visibility in the navigation of passenger and freight transport. Short-term and long-term effects are associated with diseases of the respiratory system and the cardiovascular system of man, as well as premature death. In addition, the increased content of BC in the atmosphere leads to a reduction in crop yields, damage to materials and buildings. BC particles can penetrate the human body through the lungs with inhalation, through the gastrointestinal tract, in contact with water and food, as well as through the skin and mucous membranes.
BC affects the climate in three ways: direct effect, the effect of reflectivity of snow (albedo) and interaction with clouds [4].
First, BC contributes to the warming of the atmosphere by absorbing solar radiation (direct action). The strongest climatic effect of BC is its direct atmospheric effect - successive changes in the atmospheric balance of the Earth due to increased absorption of sunlight in the atmosphere. When the BC is located above a reflective surface, such as clouds or snow, it also absorbs solar radiation reflected from this surface. Heating inside the atmosphere and reducing the sunlight reaching the surface can change the hydrological cycle by changing the latent heating, as well as by changing the convection.
Secondly, BC also interacts with clouds, which affects cloud stability, deposition and reflectivity. The particularly complex role of BC and other aerosols in the climate is associated with changes in the formation and radiation properties of liquid and ice clouds. BC particles can increase the reflectivity and lifetime of warm (liquid) clouds, causing cooling, or they can reduce cloudiness, which leads to warming. Aerosol particles can affect the formation of rain, snow clouds or mixed clouds (snow-rain).
Thirdly, BC is deposited on snow and ice, reduces their reflectivity and thereby increases their absorption of sunlight and their subsequent melting.
BC, precipitating on ice or snow, also causes warming because it reduces the reflectivity of these surfaces, causing the absorption of solar radiation. Direct absorption of sunlight causes warming, which affects snow and ice, which leads to additional climate changes and, ultimately, to the earlier melting of snow.
The increase in the solar heating of snow covered with BC particles affects the aging of snow, which leads to a rapid increase in the size of the snow particles.
Coarse-grained snow has a lower reflectivity than fine-grained snow. BC accumulates on the surface. Climate change, caused by a decrease in the reflectivity of snow and ice, can affect the pathways of atmospheric transport of water vapor [3].

BASIC PROPOSALS ON THE APPLICATION OF THE PRINCIPLES OF «GREEN LOGISTICS» TO REDUCE THE NEGATIVE IMPACT OF BLACK CARBON ON CLIMATE

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For the rational management of transport, it is necessary to develop the theory of transport systems and incorporate the elements of logistics into it based on the application of the system approach, which indirectly will influence the reduction of black carbon emissions through the rational use of vehicles. Reducing emissions of BC is a potential strategy to reduce the anthropogenic impact on the natural environment.

The BC is discharged together with other suspended particles and gases and has a mixed effect on the climate. Therefore, when evaluating the possibilities for reducing BC emissions, it is necessary to take into account the side effects of other particulate and gas emissions. For example, the BC is about 75% of the emissions of suspended particles from mobile diesel engines, while in the combustion of biomass, mainly organic carbon is released. To reduce BC, it is necessary to use the basic principles of «green logistics» – environmental logistics.

«Green Logistics» is a system of planning, design and management using advanced logistics technologies and methods of ecological design in the field of pollution reduction and resource consumption [5, 7]. «Green logistics» is a new scientific direction, involving the use of advanced logistics technologies and modern equipment in order to minimize pollution and increase the efficiency of the use of logistics resources.

From the point of view of business, the methods of «green logistics» mainly include: management of the transportation system (combined transport, 3PL-logistics), packaging management (to reduce the environmental impact of packaging materials), organization of «green» communications and production, management warehousing and waste management [6, 7, 8].

The basic principles of «green logistics» include: rational use of natural resources; rational use of enterprise resources; maximum use of industrial waste, packaging and packaging, as recyclable materials or their environmentally safe disposal; the introduction of innovations and technologies to reduce the environmental burden on the environment; enhancement of environmental education and staff responsibility; environmentally sound safety of transportation and storage of material resources; minimum use of raw materials and packaging not recyclable or safety of disposal.

Using the above-listed principles of «green logistics» will allow to control direct emissions of suspended particles in the atmosphere and to help reduce emissions of BC. Recommendations for reducing emissions include improving energy efficiency to reduce the need for diesel generators; increasing efficiency of diesel engines; tightening standards for new engines or fuel standards to reduce emissions from mobile sources; as well as the replacement or modernization of industrial boilers and diesel generators.

The duration of stay of BC in the atmosphere is low, and the climate will quickly react to emission reductions. In addition, a reduction in black carbon emissions generally results in a reduction in the emissions of suspended particles PM2.5 (solid microparticles and minute droplets of liquids from 10 nm to 2,5 microns in size), providing significant medical, environmental and economic benefits. It is estimated that by 2030, the benefits of reducing PM2.5 suspended particulate emissions in the US range from $ 290,000 to $ 1.2 million per tonne of PM2.5 suspended solids; the estimated costs to achieve such a reduction in emissions is much less [3].

Emissions of BC will be reduced in the coming years, as new technologies of vehicles and environmentally friendly fuel with low sulfur content are developed and introduced. However, in developing countries, it is expected that emissions will increase as transport activity increases and outdated technologies are used. In addition, diesel fuel standards that allow the use of fuels with a higher sulfur content can negate the benefits of some emission control technologies. This phenomenon can demonstrate the example of the US and China. While each of these countries has a similar level of transport activity, China's transport through 2050 will be a source of more than 50% of global carbon dioxide emissions, and US transport is less than 5% [4].

CONCLUSION

Thus, the above brief analysis of the negative impact of black carbon on the environment allows us to conclude that the implementation of the environmental aspect in the management of material flows is necessary for the successful protection of the environment. Constantly increasing anthropogenic impact on the environment requires an intellectual approach and intervention of narrow specialists in the formation of transport systems and the configuration of the ratio of species and varieties of transport. The use of the principles of «green logistics» is a modern activity in a number of economic and technical disciplines.

REFERENCES

1. World Wild life Fund [Electronic resource]. URL: https://new.wwf.ru/upload/iblock/2fd/03_uglerod_vliyanie_na_klimat_i_mejdunarodnaya_koalitsiya.pdf
2. Bond, T. C., Doherty, S. J., Fahey, D. W., Forster, P. M., Berntsen, T., DeAngelo, B. J., et al. (2013). Bounding the role of black carbon in the climate system: A scientific assessment. Journal of Geophysical Research: Atmospheres, n/a-n/a. URL: http://onlinelibrary.wiley.com/doi/10.1002/jgrd.50171/full
3. Suzanne Greene, Smart Freight Center Advise. Black Carbon Methodology for the logistics sector. Global Green Freight Project, 2017. 62 p.

4. World Wildlife Fund [Electronic resource]. URL: https://new.wwf.ru/upload/iblock/1b0/02_black_carbon_emissions_twopager_final_12march2013_eng_2.pdf
5. Grigoriev M.N. Logistics. Basic course. Textbook for undergraduate / M.N. Grigoryev, S.A. Uvarov. Moscow: Yurayt 2012. 826 p.
6. Rostov School of Logistics [Electronic resource]. URL: http://rostov-logist.ru/teoriya-logistiki/zelenaya-logistika/
7. Levkin G.G. Use of logistics to protect the environment / G.G. Levkin // In the collection: The Eurasian Economic Space: Problems and Trends of Development Materials of the XII All-Russian Forum of Young Scientists and Students. 2009. pp. 59-60.
8. Levkin G.G. Environmental aspects of supply chain management / G.G. Levkin // Logistics. 2009. № 2 (47). Pp. 24-25.

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Electrical engineering, Radio Engineering, Telecommunications, and Electronics

GAS LEAKAGE CONTROL SYSTEM FOR MULTILEVEL INTEGRATED MONITORING OF THE MAIN PIPELINES

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ABSTRACT

A structured and algorithmic model of the control system, which allows multi-level complex monitoring on the basis of measuring channels controlled by variable range for remote detection of leakage sites in the main pipelines, has been developed.
The air-gas composition change in the leak site of the pipeline leads to changes in the absorption and radiation intensity due to its impact on the radiation obtained from that site. The used liquid crystal filters have a wider range of bandwidth control and is polarized-independent providing to obtain the results of a two-color measurement.
The values of measurement results obtained from the infrared range in the monitoring system represent the current leakage state and obtaining the appropriate data in the visible range allow the confirmation of the obtained data in the infrared range and thereby increase the reliability of the received information about the leakage. Decoding infrared data in the visible range makes it possible to visualize the obtained infrared data.
MCM being used in each channel solves the problems of local control of the channel and the necessary data processing including the calculation of the channel error, taking it into account in the data obtained from the facility, reducing the amount of data transmitted by the CMC. Therefore, it allows an increase in system speed and efficiency in obtaining data on the investigated area.
Keywords: ecological monitoring, leakage, multi-level measuring, infrared and visible range, reliability, modified architecture, decoding, main pipeline.

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XÜLASƏ

Magistral boru kəmərlərində sızma yerlərinin məsafədən aşkarlanması üçün dəyişən diapazonlu idarə olunan ölçmə kanalları əsasında çoxsəviyyəli kompleks monitorinqə imkan verən nəzarət sistemin struktur və alqoritmik modeli işlənmişdir. Sızma yerində hava-qaz tərkibinin dəyişməsi bu sahədə radiasiyaya təsir etdiyindən monitorinq sistemində infraqırmızı diapazonda əldə edilən ölçmə nəticələrinin qiymətləri baş verən sızmaya uyğun vəziyyəti əks etdirir. İsifadə edilən mayekristallik süzgəclər buraxma zolağının idarə olunması üçün daha geniş diapazona və asılı olmayan polyarlığa malikdir və bir kanalda iki rəngə uyğun ölçmə nəticəsi əldə etməyə imkan verir. Nəticədə tədqiq olunan sahədən üç əsas rəngdə uyğun informasiyanın əldə olunması, infraqlrmızı diapazonda əldə edilən verilənləri təsdiqləyir və bununla da sızma haqqında əldə edilən informasiyanı dəqiqətəuyğunluğunu artırmağa imkan verir. İnfraqırmızı diapazonun verilənlərinin verilən diapazonda deşifrasiyası yerinə yetirilir ki, bu da həmin verilənlərin vizuallaşdırılmasına imkan verir. Hər kanalda MKM-in istifadə olunması kanalın lokal idarə olunmasını, verilənlərin emal olunması (o cümlədən, kanalın xətasını hesablanması, alınan nəticənin obyekt haqqında əldə edilən verilənlərdə nəzərə alınması, mərkəzi MK-ya ötürülən verilənlərin həcminin azaldılması.) və. s kimi məsələləri həll edir. Bu həmçinin sistemin cəldişləməsinin artırılmasına və tədqiq olunan sahə haqqında verilənlərin alınmasının operativliyinə imkan verir.
Açar sözləri: ekoloji monitorinq, sızmalar, çoxsəviyyəli ölçmələr, infraqırmızı və görünən diapazon, həqiqətəuyğunluq, modifikasiya olunmuş arxitektura, deşifrasiya, magistral boru kəməri

РЕЗЮМЕ

Разработана структурная и алгоритмическая модель системы контроля, позволяющей проводить многоуревневый комплексный мониторинг на основе управляемых измерительных каналов с переменными диапазонами измерения для определения места утечки газа на магистральных трубопроводах.
Изменение состава воздух-газ около места утечки оказывает влияние на радиацию в районе этого участка поэтому в системе мониторинга результаты измерений в инфракрасном диапазоне позволяют определить место утечки. Используемые жидкокристаллические фильтры имеют более широкий диапазон управления полосой пропускания, являются поляризационно – независимым и позволяют получить в одном канале результаты двухцветного измерения. В результате обеспечивается получение информации об исследуемой местности в трех основных цветах, которые служат для подтверждения данные, полученных в инфракрасном диапазоне. Это

увеличивает достоверность информации об утечке. Предусматривается дешифрация данных инфракрасного диапазона в видимом диапазоне, которая дает возможность визуализации данных, полученных в инфракрасном диапазоне.
МКМ используемые в каждом канале, решают задачи местного управления каналом и обработки данных, в том числе: вычисление погрешности канала, ее учет в полученных данных от объекта, уменьшение объема данных, передаваемых ЦМК. Это позволяет увеличить быстродействие системы и оперативность получения данных об исследуемой местности.
Ключевые слова: экологический мониторинг, утечка, многоуровневые измерения, инфракрасный и видимый диапазон, достоверность, модифицированная архитектура, дешифрация, магистральный трубопровод..

A structured and algorithmic model of the control system, which allows multi-level complex monitoring on the basis of measuring channels controlled by variable range for remote detection of leakage sites in the main pipelines, has been developed. The values of measurement results obtained from the infrared range in the monitoring system represent the current leakage state and obtaining the appropriate data in the visible range allow the confirmation of the obtained data in the infrared range and thereby increase the reliability of the received information about the leakage. Decoding infrared data in the visible range makes it possible to visualize the obtained infrared data.
Keywords: ecological monitoring, leakage, multi-level measuring, infrared and visible range, reliability, modified architecture, decoding.

INTRODUCTION

Problem statement. As other industrial facilities the oil and gas industry is one of the environmental pollution sources. Controling the pollutants that pollute the environment in areas involving extraction, initial processing, disposal, storage, processing and transportation of this industrial property are among the ongoing global ecological issues [1]. Therefore, in order to prevent dangerous situations, development of methods and means for controlling the composition and concentration of a pollutant is an urgent task.

The analysis of recent researches and publications. Basically, these types of researches are carried out by the methods and means of contact measurement and control. The problem of determining the leakage site with the help of various stationary or portable means, including sensors and devices used to measure gas parameters: composition, pressure, temperature, consumption, concentration, differential pressure, etc., is considered. [2].

The acoustic and ultrasonic methods used to determine the leakage are one of the methods of contact measurement. Despite the fact that these types of means are the operational information source in facilities covering large areas (including main pipelines), their use does not allow to achieve expected high results [3].

Typically, this type of control is carried out by ground-based, contact measurement methods in some local areas in the pipeline.

At the same time, taking into account the large size of the covered area of pipelines is more efficient to use remote monitoring and control of their state. Remote measuring is carried out in different ranges of the electromagnetic spectrum. In this case, it is required to choose informative results from the obtained data using hyper and multi-channel means, which leads to

the need to use additional processing methods and increases time costs [4].

Purpose of the article

Development of methods to improve the reliability of data in the system of multi-level integrated monitoring of main pipelines with controlled measuring channels to identify leakage sites and make operational decisions to prevent dangerous consequences.

Exposition of basic material

Unlike multi and hyper measurement channel methods and means operating on the base of remote measurement method in the detection of leak sites of pipelines, the structure and algorithmic model of the measurement method allowing the control on the base of variable-range (flexible) controlled channels providing multilevel complex monitoring is presented.

The air-gas composition change in the leak site of the pipeline leads to changes in the absorption and radiation intensity due to its impact on the radiation obtained from that site. Therefore, the values of the measurement results obtained from the infrared range in the monitoring system represent the current leakage state.

The measuring system in the visible range, simultaneously measuring in the infrared ranges provide the confirmation of the obtained data in the infrared range and thereby increase the reliability of the obtained information on leakage (see Fig. 1).

The implementation of multi-level measurements on two channels from the visible and infrared range makes it possible to determine the leak site and its state.

As it is seen from the figure, the system consists of an optical receiver unit (ORU), a liquid crystal modulator (LCD module), a visible range channels unit (VRCU), an infrared channel unit (ICU), a control unit of liquid crystal modulators

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(CULCM), a power supply unit (PSU), central microcontroller module (CMCU), coordinate-connecting unit (CCU), storage unit (SU), receive and transmit unit (RTU) and indication unit (IU). The visible range channels unit (VRCU) consists of liquid crystal units of optical filters (LCOF), a converter unit (CU), and microcontroller modules of the visible range (MCMVR) of the corresponding channels.
The infrared channel unit (ICU) consists of the corresponding liquid crystal optical filter units ($LCOF_1$ and $LCOF_2$), the unit of the supporting radiator and converter (SRCU) as well as the microcontroller modules of the infrared range ($MCMU_1$, $MCMU_2$).

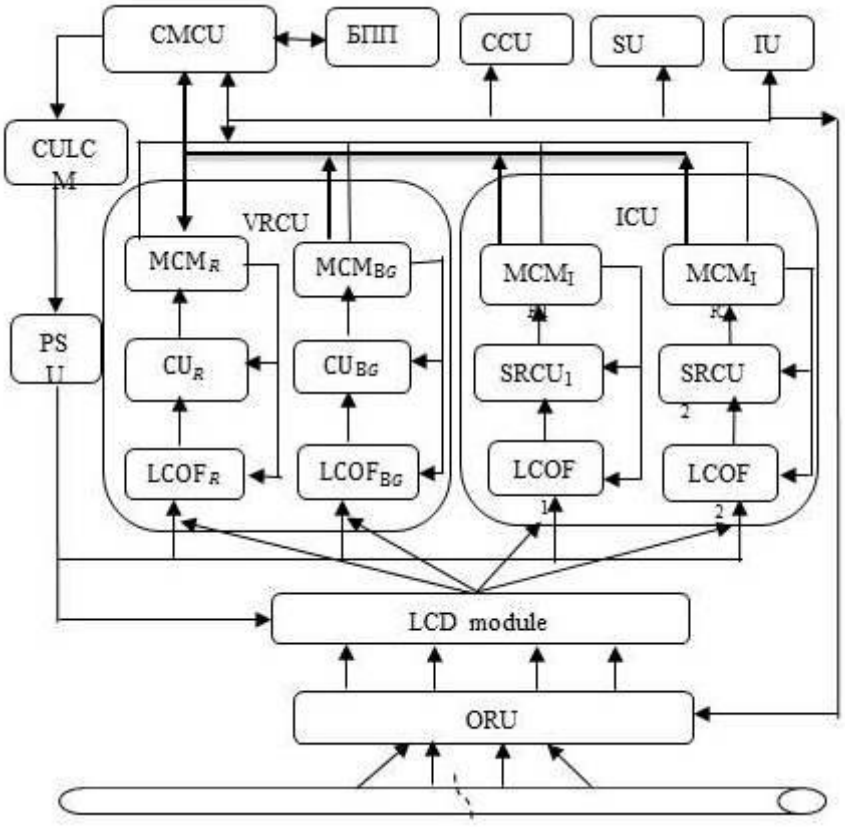

Fig.1. Structural diagram of the controlling-measuring system

According to CMCV, OCU allows the system to select the operating mode and direct the signal received from the research area to the appropriate measurement channels.
The used liquid crystal filters have a wider range of bandwidth control and is polarized-independent. They are simple to be prepared and can be used for both visible and infrared spectral regions.
In one of the channels of the visible range, a liquid crystal filter is used which is controlled on the base of dual-frequency signals from the CU using CMC providing to obtain the results of a two-color measurement (I_B and I_G). As a result, it provides to obtain the information about the research area in three primary colors like red, green, and blue (R, G, B) in the visible range (IR, IB, and IG). LCD used in the channels of the infrared range is tuned to transmit the received radiation at two wavelengths.
In the converting units being used in the measuring channels of the visible range, the signals are converted in the required form for transmission to the corresponding MCM.
According to the block diagram of the supporting radiator and transducer, the signals received from the facility and the supporting radiator are converted into signals representing the level of radiation intensity, incoming from the gas accumulation around the leak site.
MCM being used in each channel solves the problems of local control of the channel and the necessary data processing including the calculation of the channel error, taking it into account in the data obtained from the facility, reducing the

amount of data transmitted by the CMC and thereby allowing an increase in system speed and efficiency in obtaining data on the investigated area.
The central microcontroller (CMC) controls the liquid crystal filter through the control unit (CU) by means of the power supply unit (PSU), and enables them to be tuned to pass at the required wavelength in the corresponding sub-bands.
During the experiment, the CMC transmits the obtained data to the ROM (read-only memory), and, if necessary, to the ground-based research center where the ground diagnostics data of local pipeline sections are processed, as well as estimates the values of remote measurement results error in the absence of ground-based measurements.
The progress of the measurement process and the necessary data is represented on the display.
The CMC also performs the decoding of infrared data in the visible data, which provides visualization of the received infrared data.

CONCLUSIONS

As a result, the opportunity is provided to determine the coordinates and the leakage area position, its intensity, the state of the leakage site, data visualizations obtaining the visibility of the required information.
Measurement and control using the proposed system provides an opportunity to obtain effective information on the leakage site and parameters of the gas cloud emissions during the leak, and thereby prevent serious consequences.

REFERENCES

1. Gorshkov M.V. Environmental monitoring/ Training aid.Vladivostok:Publishing House, 2010.313 p.
2. Kondranin T.V, Kozoderov V.V. Technology for estimating the state of objects of the natural-technogenic sphere according to aerospace monitoring data//Modern problems of remote sensing of the Earth from space: Physical principles, methods and technology of environmental monitoring, potentially dangerous objects and phenomena. Collection of scientific articles. M: 2000, 2008. p.512-522
3. A.A. Shirin-Zade, Bakirova L.R. Issues of the authenticity of the continuous remote control of delivery mains for hydrocarbon gas transfer Russian Journal of Nondestructive Testing Volume 50, Issue 5, pp 283-287 published in Defektoskopiya, Moskov, 2014, Vol. 50, No. 5, pp. 41–46.
4.Wang B., Wang X., Chen Z. Spatial entropy based mutual information in hyperspectral band selection for supervised // International Journal of Numerical Analysis and Modeling, 2012, Vol. 9, No. 2, pp. 181-192

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Chemical Technology, Chemistry Sciences

MATHEMATICAL-CHEMICAL AND QUANTUM-CHEMICAL STUDY OF SOME SUGARS CONTAINING NITROZO (N = O) GROUPS

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ABSTRACT

Nitroso (N = O) group-containing derivatives of N-glycosylamines were synthesized. With the purpose of theoretical substantiation of the direction of the reactions of synthesis of some derivatives of sugars containing nitroso (N = O) groups, quantum-chemical calculations were carried out using the semi-empirical AM1 method. The calculations were performed using CS MOPAC (Chem 3D Ultra-version 8.03).
Before each calculation using the AM1 (Austin Model 1) method, the compound was optimized - energy minimization, using both the molecular mechanics (MM) method and the quantum chemical method. It is established that the reactions proceed with the formation of 1,2-trans-glycosides. In the framework of the quasi-ANS-matrices method, a mathematical and chemical study of the synthesized compounds was carried out. It turned out that the correlation is satisfactory.
Keywords: 1,2-trans-glycoside, semi-empirical AM1 method, quantum-chemical calculations, mathematical and chemical research, quasi-ANS matrix, correlation.

აბსტრაქტი

სინთეზირებული იქნა N- გლიკოზილამინების ნიტროზო (N = O) ჯგუფის შემცველი შაქრების წარმოებულები. Nitroso (N = O) ჯგუფების შემცველი შაქრის ზოგიერთი წარმოებულების სინთეზის რეაქციის მიმართულების თეორიული დასაბუთების მიზნით ჩატარებულ იქნა ნახევრად ემპირიული AM1 მეთოდით კვანტური ქიმიური გათვლები. გათვლები შესრულდა CS MOPAC (Chem 3D Ultra- ვერსია 8.03) გამოყენებით.
AM1 (Austin Model 1) მეთოდის გამოყენებით თითოეული გათვლების წინ ტარდებოდა ნაერთის ოპტიმიზაცია - ენერგიის მინიმიზაციით, როგორც მოლეკულური მექანიკის (MM) მეთოდის, ასევე კვანტური ქიმიური მეთოდის გამოყენებით. დადგინდა, რომ რეაქციები მიმდინარეობს 1,2-ტრანს- გლუკოზიდების წარმოქმნით. კვაზი-ANS-მატრიცების მეთოდის ფარგლებში ჩატარდა სინთეზირებული ნაერთების მათემატიკური და ქიმიური კვლევა. აღმოჩნდა, რომ კორელაცია დამაკმაყოფილებელია.
საკვანძო სიტყვები: 1,2-ტრანს-გლიკოზიდები, ნახევრად ემპირიული AM1 მეთოდი, კვანტურ- ქიმიური გათვლები, მათემატიკური და ქიმიური კვლევა, კვაზი- ANS მატრიცა, კორელაცია.

INTRODUCTION

In a series of carbohydrate derivatives, a significant amount of substances have been found that are used in medicine as medicines for various purposes. Chemical modification of known drugs based on carbohydrates is one of the promising areas in the search for new biologically active substances [1]. Modified derivatives of saccharides are currently widely used in medicine, for example, as effective antiviral and anticancer drugs [2].

Biologically active substances (BAS) - chemicals that have high physiological activity at low concentrations in relation to certain groups of living organisms (first of all - in relation to humans, as well as in relation to plants, animals, fungi, etc.) or individual groups of their cells, the physiological activity of substances can be considered both from the point of view of the possibility of their medical use, and from the point of view of maintaining the normal functioning of the human body or given I specific properties (such as, for example, increased resistance to disease).

RESULTS AND DISCUSSION

Over the past decade and a half, events have occurred in biology that cannot be considered as truly fundamental changes in the way the most diverse biological systems function. We are talking about the discovery that such a low-molecular

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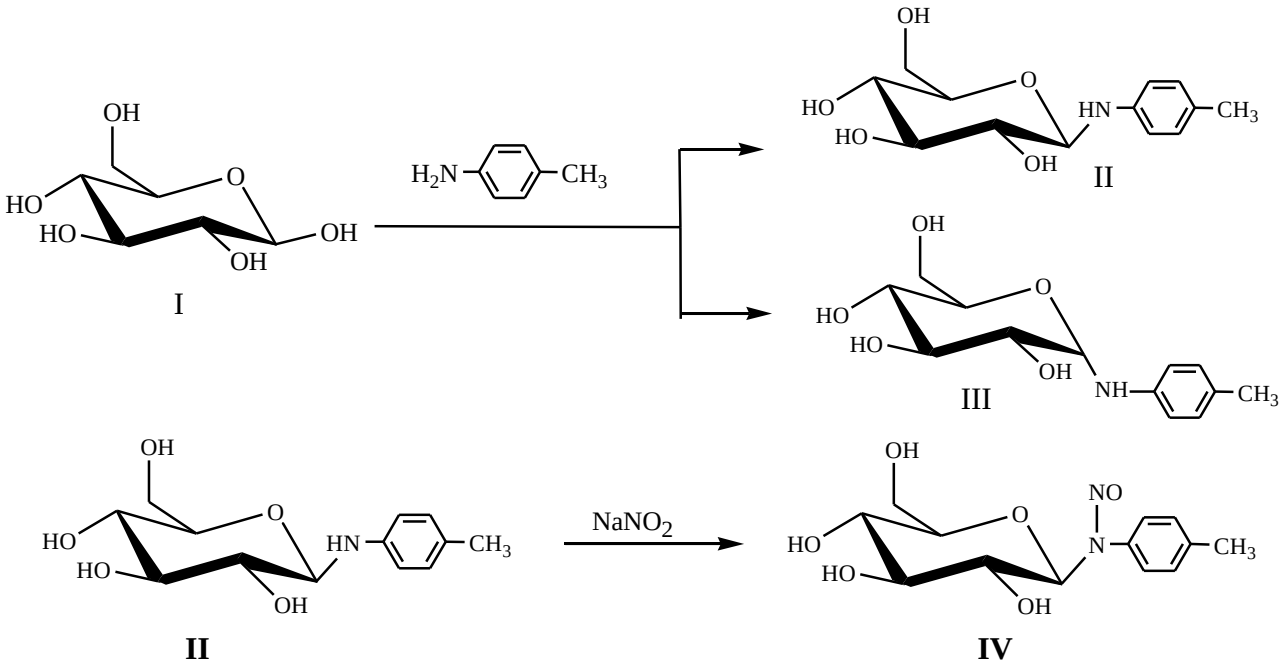
compound, such as nitric oxide - NO, is one of the universal and necessary regulators of the function of cellular metabolism. Nitric oxide is involved in the regulation of blood vessels, inhibits platelet aggregation and their aggression on the walls of blood vessels, functions in the central and autonomic nervous system, regulating the activity of the respiratory system, gastrointestinal tract and urinary system. The breadth of the biological activity of NO weight is great [3]. Particular attention is paid to drugs that are generators of nitric oxide.

In this regard, the task of synthesizing new types of N-glycosides seems to be highly relevant, since glycosylation increases solubility, reduces toxicity, and in some cases changes the nature of the action [4].

Condensation of gluco-, galacto- and mannopyranoside with p-toluidine synthesized intermediate products of the reaction - β-N-p-tolyl-D-glucopyranosylamine, β-N-p-tolyl-D-galactopyranosyl-amine and β-N-p-tolyl-D -mannopyranosylamine. By nitrosation of the above compounds with sodium nitrite, the following were obtained: β-N-nitroso-N-p-tolyl-D-glucopyrannosylamine, β-N-nitroso-N-p-tolyl-D-galactopyranosylamine and β-N-nitroso-N-p-tolyl-D-mannopyranosylamine. The structure of the synthesized compounds is confirmed by physico-chemical methods of analysis. For a theoretical substantiation of the formation of intermediate and target products of the above reactions of the condensation of D-gluco (galacto, manno) pyranoside with p-toluidine, we carried out quantum chemical calculations.

The calculations were performed using CS MOPAC (Chem 3D Ultra-version 8.03). Before each calculation using the AM1 (Austin Model 1) method, the compound was optimized — energy minimization, using both the molecular mechanics (MM) method and the quantum chemical method [5]. As a model, we selected the reaction for the synthesis of N-β-p-tolyl-nitroso-D-glucopyranosylamine (IV) according to the scheme:



During the condensation of D-glucopyranosy (I) with p-toluidine, two possible ways of the reaction are considered: with the formation of 1,2-*trans*-glucoside (product II) and with the formation of 1,2-*cis*-glucoside (product III).

In order to determine the global minimum of the heat of formation of compounds (II and III), the dependence of the change in the heat of formation ($\Delta H_{f.}$) On the length of ≡C-N = bonds in the R_{C-N} =1.35-1.60 Á interval was studied. With an increase in the R_{C-N} bond of more than 1.60 Á, the aglycone was detached. The distance was varied in increments of 0.05Å. The dependence of the change in the heat of formation ($\Delta H_{f.}$) Of compounds (II and III) on the length of the R_{C-N} bond is shown in Figure 1. [6,7,8]

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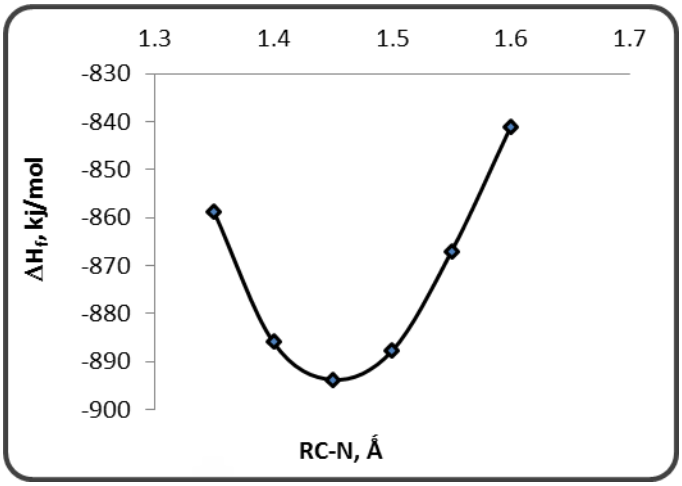
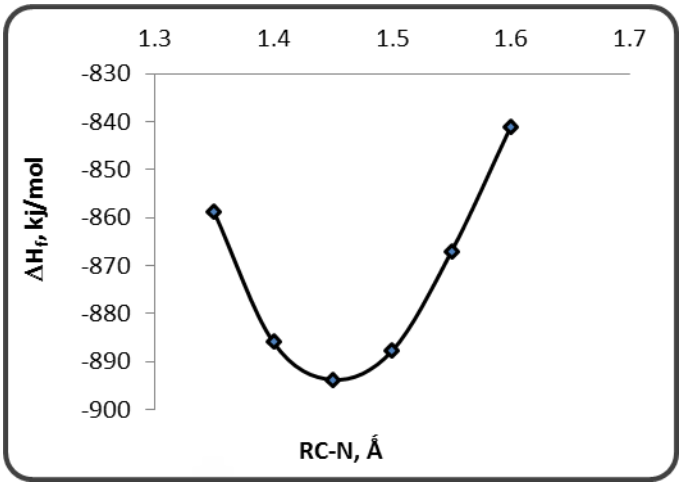


$\Delta H_{образ}$ кдж/моль	R_{C-N} Å
-861.11	1.35
-887.05	1.40
-894.94	**1.45**
-888.06	1.50
-869.24	1.55
-840.95	1.60



$\Delta H_{образ}$ кдж/моль	R_{C-N} Å
-858.70	1.35
-885.95	1.40
-893.80	**1.45**
-887.78	1.50
-867.04	1.55
-840.95	1.60

Fig. 1. The dependence of the change in the heats of formation ($\Delta H_{f.}$) the compounds II and III of the length R_{C-N} communication

Calculation of the heat of formation of the reaction products showed that the thermodynamically favorable structure is the product of structure II with ΔH_f. = -894.94 kJ/mol, and $\Delta H_{reac.}$ = -9.27), which confirms the probability of the formation of 1,2-*trans*-glucoside. The structure of the product II is confirmed by spectroscopic data.

To describe the nitrosation process, calculations were carried out using the semi-empirical quantum-chemical technique AM1. The heat of formation (ΔH_f), the final product of the reaction (IV) containing the nitroso (N = O) group, was calculated. The thermal effect of the reaction ($\Delta\Delta H$) and the activation energy ($\Delta\Delta H^{\#}$) with variations in the N–N chemical bond length (R_{N-N}).

The estimated distance between nitrogen atoms was predetermined 1.0 Å longer than the bond distance in the final product. The variation of the R_{N-N} distances was carried out with an interval of 0.05 Å. The dependence of the system energy changes (ΔH) on the R_{N-N} distances is given in Figure 2.

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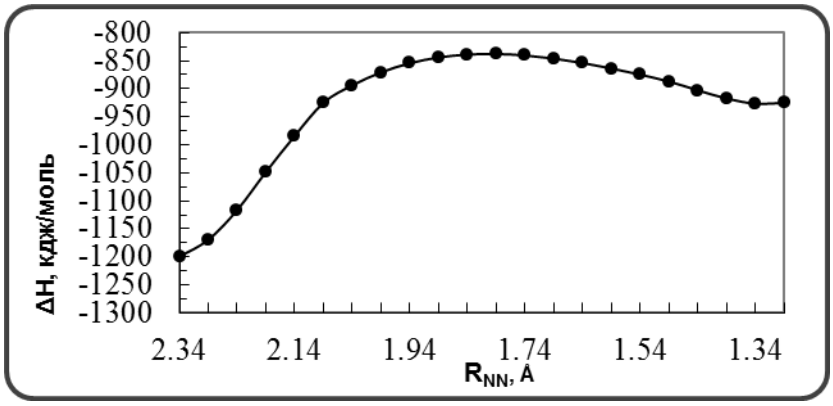
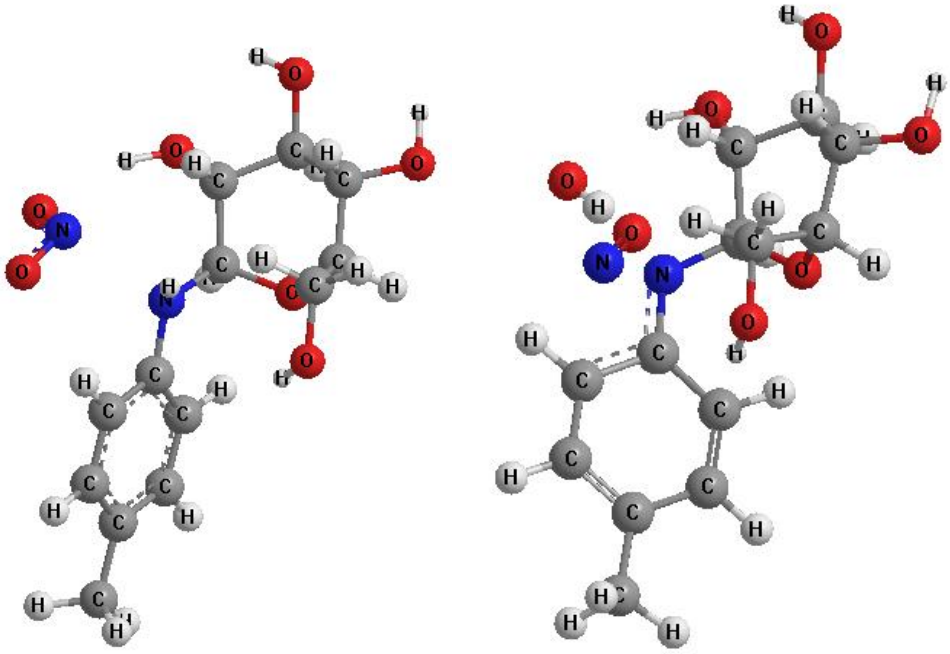


Fig. 2. Dependence of the change in the heats of formation ($\Delta H_{f.}$) Of compounds IV from the length of the connection R N_{12}-N_{39}
$\Delta\Delta H^{\#}$ = 361.23 kj/mol (Energy activation)
ΔΔH = 274,05 kJ/mol (thermal effect of the reaction)



The initial state of the system. The final state of the system.

In the framework of the quasi-ANS-matrix $(\tilde{A}HC-)$ method [9,10], a mathematical-chemical study of the derivative target synthesized compound was carried out:

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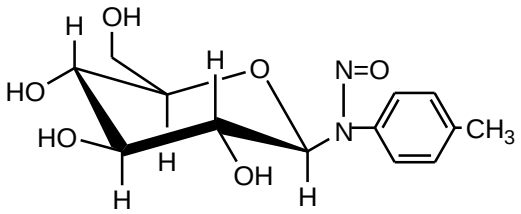
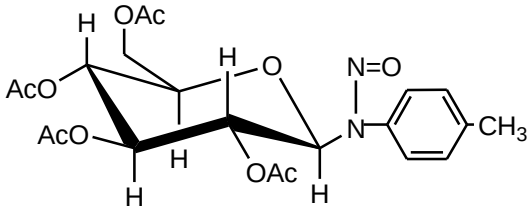
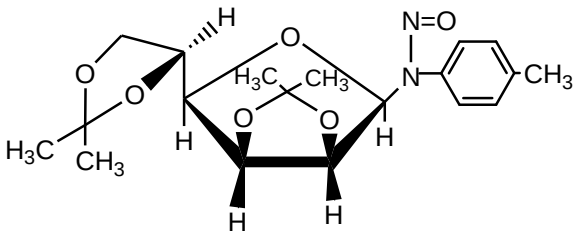


IV

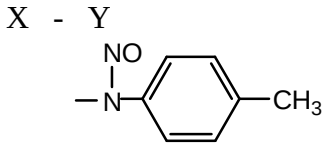


V



(VI)

The diagonal elements of the quasi-ANS matrices are the sums of the ordinal numbers of the chemical elements whose atoms belong to the structural fragments of molecules, the non-diagonal elements are the multiplicities of the chemical bonds between the structural fragments. In this way, $(\tilde{A}NB)$ - The matrix is built on the basis of the Molecule Model, which is an innovative approach in mathematical chemistry. $\lg(\Delta_{\tilde{A}HC})$ - is an effective topological index for constructing correlation equations of the “structure-property” type [11]. For the above structures, the simplest model has been developed:



Where: Y - denotes a structural fragment.
X - the rest of the molecule

Corresponding $(\tilde{A}NB)$ - the matrix has the form:

$$\begin{Vmatrix} Z_X & 1 \\ 1 & Z_Y \end{Vmatrix}$$

The table shows the values $\lg(\Delta_{\tilde{A}HC})$ and melting point for these compound.

N	Compound	$\lg(\Delta_{\widetilde{AHC}})$	melting p.^{0}C
1.	$C_{13}H_{18}N_2O_6$	3.93	97
2.	$C_{19}H_{26}N_2O_6$	3.97	124
3.	$C_{21}H_{26}N_2O_{10}$	4.13	134

On a computer using the least squares method, a correlation equation was constructed:

$$\text{melting p.} = 185 \lg(\Delta_{\widetilde{AHC}}) - 630$$

Correlation coefficient is equal to: 0.981. Thus, according to Jaff's criterion, the correlation is satisfactory.

REFERENCES

1. M.D.Mashkovskii. Lekarstvennie sredstva, 15-e izdanie. M: RIA “Novaia volna”, 2007, s. 1206.
2. I.V.Kulakov, O.A.Nurkenov, A.I.Ilin, M.E.Kulmanov. N-aminoglikozidi: metodi cinteza, stroenie I biologicheskaia aktivnost. Izd.”Ulassir”: Karaganda, 2010, s. 156.
3. V.G.Granik, N.B.Grigirev. Oksid azota, novii puts k poisky lekarstv. Vuzovskaia kniga. Moskva, 2004, s.108-115.
4. N.N.Sidamonidze, R.0.Vardiashvili, M.O. Nutsubidze. Journal Pharmaceutical Chemistry. 2007, 41, 3, p.131-136.
5. M.J.S.Dewar, E.G. Zoebisch, E.F.Healy and J.J.P.Stewat. J.Am.Chem.Soc., 1985, 107, 3902.
6. N.N.Sidamonidze, R.A.Gakhokidze, R.0.Vardiashvili, Mathematical- and Quantum-Chemical investigation of some Lactamocontaining Derivatives β-D-Glucopyranose. Moscow. Engineering physics. 2016, N11, p.74-80.
7. Lali Tabatadze, Neli Sidamonidze, Zurab Phachulia, Natia. Shengelia. SINTHESIS AND QUANTUM-CHEMICAL MODELING OF 2-O-(β-D-GLUCOPYRANOSYL)-α,D-MANNOPY-RANOSE. BLACK SEA SCIENTIFIC JOURNAL OF ACADEMIC RESEARCH. 2018, VOLUME 40, ISSUE 02, P.40-52;
8. Mukbaniani O., Tatrishvili T.N., Sidamonidze N.N., Jalagonia Quantum chemical investigation of model hydrosilylation reaction of methyldimethoxysilane with allyl cyanide. Moskow. Applied Physics and Mathematics. 2015, N 3. p. 3-7.
9. N.N.Sidamonidze, M.I.Gverdtsiteli. Graphs:”Symmetric Star, “Pseudoymmetric Star”, “Asimmetric Star” and Thrie Application in Mathematic Chemistry. Moscow. Engineering physics. 2016, N16, p.94-98.
10. Gverdtsiteli M., Gamziani G., Gverdtsiteli M. The Contiguity Matrices of Molecular Graphs and their Modifications. Tbilisi,Tbilisi University Press. 1996.
11. Gamziani G., Kobakhidze N., Gverdtsiteli M. Topologic Indeces. Tbilisi, TUP, 1995.

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Pedagogy Science

WHEN IS MCNAMARA CRITERIA ON POSSIBLE TO BE USED IN PEDAGOGICAL RESEARCH

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ABSTRACT

Non-parametric mathematical statistics means to work out such statistic methods and criteria that are free, not dependant on distributive curve or distributing. The main problem of non-parametric mathematical statistics in pedagogical works is verifying hypotheses.
Various hypotheses exist in pedagogical research. We've to pay attention to the hypotheses that are discussed on the basis of non-parametric mathematical statistics. There are two types of hypothesis:

I. Hypothesis about stochastic (probable) dependence among two or more characteristics.
II. Hypothesis about the laws of equality or difference of distributing casual quantity (which is unknown) in two or more characteristics.

In pedagogical research we'll get two types of hypotheses.
Keywords: Non-parametric, Mathematical statistic, Pedagogical research, Hypothesis, Mc Namara criteria.

აბსტრაქტი
არაპარამეტრული მათემატიკური სტატისტიკა ნიშნავს ისეთი სტატისტიკური მეთოდებისა და კრიტერიუმების შემუშავებას, რომელიც თავისუფალია, არ არის დამოკიდებული განაწილების მრუდისგან ანუ განაწილებისაგან. არაპარამეტრული მათემატიკური სტატისტიკის ძირითადი ამოცანა პედაგოგიკურ გამოკვლევებში არის ჰიპოთეზების შემოწმება.
პედაგოგიკურ გამოკვლევებში მრავალნაირი ჰიპოთეზა არსებობს. ჩვენ შევჩერდეთ იმ ჰიპოთეზებზე, რომლებიც განიხილება მხოლოდ არაპარამეტრული მათემატიკური სტატისტიკის საფუძველზე. ასეთი არის ორი სახის ჰიპოთეზა. ესენია:
I. ჰიპოთეზა სტოქასტიკური(ალბათური) დამოკიდებულების თაობაზე ორ ან რამდენიმე ნიშან-თვისებას შორის. სხვანაირად რომ ვთქვათ, ეს არის კორელაციის ამოცანა. მაგალითად, უფრო მაღალ დონეზე ფიზიკის სწავლება სტოქასტიკურად არის დამოკიდებული მასწავლებლის კვალიფიკაციაზე.
II. ჰიპოთეზა შემთხვევითი სიდიდის განაწილების კანონების (რომლებიც უცნობია) ტოლობის ან განსხვავების შესახებ ორ ან რამდენიმე შერჩევაში. ამ შემთხვევაში H_0 ძირითადი ჰიპოთეზა მდგომარეობს იმაში, რომ ამ ორ ნაკრებს შორის განსხვავება არის შემთხვევითი. ალტერნატიული H_1 ჰიპოთეზა კი - განსხვავება არის არის გამოწვეული ექსპერიმენტული ფაქტორით.
პედაგოგიკურ გამოკვლევებში გვექნება II სახის ჰიპოთეზა.
საკვანძო სიტყვები: არაპარამეტრული, მათემატიკური სტატისტიკა, პედაგოგიკური კვლევა, ჰიპოთეზა, მაკნამარას კრიტერიუმი.

INTRODUCTION

Non-parametric mathematical statistics means to work out such statistic methods and criteria that are free, not dependant on distributive curve or distributing. Some authors consider the term "non-parametric statistics" is not good and it's a weaker method than parametric one. However, nowadays these methods have become so strong that they're almost similar to parametric. The first works over non-parametric statistics appeared at the end of XIX century: Pearson's articles, criteria of symbols in Phisher's work, later Fotelin and Habot published their work over plane correlation.

There were three errors in non-parametric statistics. The first was Kolmogorov theorem in 1933. While increasing the volume of selection the empiric distribution function (equally to the arguments) strives to the theoretical distributing function by probability of equality to one.

However, this theory is true to quantitative measurements, the second was the discovery of plane criteria by Willcocson in 1945; the third was in 1963, when hojer and Leman used plane criteria for evaluating unknown options.

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Let's consider two major sums of mathematical statistics.

I. Evaluation of options. Discuss an example. While selecting calculate arithmetical means, i.e. according to the arithmetical mean we've to evaluate the arithmetical mean of general totality. No wonder, this sum is considered only in parametric mathematical statistics. In non-parametric mathematical statistics not only parametric but evaluation of measurable quantities or treatment effects are possible. In pedagogical works we don't meet evaluation sums.

II. The second major sum is verification of hypothesis. We come across it in parametric as well as in non-parametric mathematical statistics. Consider an example. Toss a coin ten times. The emblem lands nine times and the price – once. Is money homogeneous? Selection is ten, general totality – numerous.

Allot the probability. Suppose, P is probability of emblem is P=1/2, q–is probability of price and q=1/2, n- number of experiments in selection, m- is number of favorable cases. Binomial distribution probability would be (1)

$$P = C_n^m p^m q^{n-m}, \text{ where } C_n^m = \frac{n!}{m!(n-m)!}$$

General hypothesis H_0 means that money is homogeneous, but alternative hypothesis H_1 means that money isn't homogeneous.

Calculate the probability of tossing a coin, if in nine cases out of ten, it'll land with an emblem up or in all ten cases.What would this probability be?

$$P = C_{10}^9(\frac{1}{2})^9(\frac{1}{2}) + C_{10}^{10}(\frac{1}{2})^{10}(\frac{1}{2})^0 = 0{,}0107$$

We've got the probability of nine or ten cases, with an emblem up. This case is little. Suppose, we have 100 throws, then the probability will be equal to 1.
This is the sum checking up hypotheses in mathematical statistics.

MATERIALS AND METHODS

The main problem of non-parametric mathematical statistics in pedagogical works is verifying hypotheses. Find out the types of hypothesis (2).

Various hypotheses exist in pedagogical research. We've to pay attention to the hypotheses that are discussed on the basis of non-parametric mathematical statistics. There are two types of hypothesis:

I. Hypothesis about stochastic (probable) dependence among two or more characteristics. In other words, this is the problem of correlation. e. g. studying physics at a higher level stochastically depends on a teacher's qualification.

II. Hypothesis about the laws of equality or difference of distributing casual quantity (which is unknown) in two or more characteristics. In this case H_0 major hypothesis means that difference between these two combinations is accidental Alternative H_1 hypothesis, on the other hand, the difference is caused by experimental factor. In pedagogical research we'll get two types of hypotheses.

The hypothesis, according to which the difference between choices is accidental, is called the major or zero hypothesis and is expressed by H_0. In common theory any number of choices is considered. In pedagogical works these two are enough.

We don't only check the hypothesis H_0, but the results followed from that at a level of probability. H_0 either remains or is changed by alternative hypothesis.

Alternative hypothesis is expressed by H_1. Alternative hypothesis means that the difference between the two choices isn't accidental, i.e. is caused by non-accidental factors (e g. In pedagogical works by a new teaching method).

Verification of this or that hypothesis in mathematical statistics, about a casual value or a phenomenon,is based on practically impossible principle.

Select a certain meaning of probability, little, as usual. What the "less" means, depends on the sum. For pedagogical research it'd be enough to take five hundredth or sometimes one hundredth of this little meaning, i. e 5% level and is and 1% level. The selected probability meaning is called the meaning level and is expressed by α.

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If the probability of casual phenomenon is $P \leq \alpha$, then such case is practically impossible. However, if such case was possible, we already know it would not be accidental and would be important for us. The reasons of its non-fortuity should definitely be found out.

Let's show the level of meaning noticeably. Imagine a great number of cases. E g. a big number of tossing a coin. Suppose, α=5. It means, while throwing it many times, we'll make a mistake in 5 out of 100 if we say the given case is non-accidental.

Consider $\theta = 1 - \alpha$. This is a probability of non-fortuity. That's why it's called quality of authenticity. Obviously, we need criteria whose quality of authenticity would be high, and the quality of meaning –low.

Using statistical method, besides measuring method, depends on selection particularity. If in these two choices the results of measurements of the first selective objects' features don't affect the results of measurements of the second selective objects' features, then these two selections are independent. If this condition isn't fulfilled, the two selections are dependant. i. e. the results of the measurements of the first one affects the second measurement results. E.g. we carry out the inquiry twice in the same group.It is an example of the dependence selection. Consider the method that is used for dependence selection. This is Mc Namara criteria.

On the basis of Mc Namara we compare two selections when their research features are measured by Naming Scale. Consider the explanation of professional orientation at class. Put the pupils such question- what kinds of professions are you interested in? We'll get some categories of answers. They are: I like, I don't like, I'm interested in…, I'm not interested in.., I've never thought about it. In general, lots of categories might occur in the Naming Scale. The criterion is carried out for only such case when there are two categories in the scale. Put 0 to one of the criteria and 1 – to the other.

Let X stand for the occasional variable(which characterizes some features of dependence selective objects at the first measurement) , Y will stand for the occasional variable which characterizes the same feature at the second measurement. Suppose, X and Y get certain meanings as a result of measurement. Specific meanings of X variable will be $x_1, x_2, x_3, \ldots x_n$, Specific meanings of variable Y will be $y_1, y_2, y_3, \ldots y_n$. (x_i, y_i) is the result of the double measurement of the same features by the same student, of course on the two-category scale. On the two-category scale we'll have the following couples: 0,0; 0,1; 1;0; 1,1. Make a table that's called two to two (2×2) (3).

II Measurement

I Measurement		$y_{i=0}$	$y_{i=1}$	
	x_i =0	a (0;0)	b (0;1)	a +b
	x_i =1	c (1;0)	d (1;1)	c +d
		a+c	b+d	N

In what cases are McNamara criteria possible? Consider the following cases.

I. Suppose:

1) Choices are accidental i. e representative;
2) Choices are dependent, i e. two measurements are carried out in the same class
3) Each $x_i y_i$ pair is independent. It means that there is no chance for students to communicate with each other or even cheat.
4) Measuring scale is the Naming Scale with two categories, such as high- low, good- bad, more- less, like- dislike.

II. Hypotheses

H_0 hypothesis for McNamara Criterion is formed in the following way: :P $(x_i=0, y_i=1)=P(x_i=1, y_i=0)$,, so that probabilities are the same. It means that the difference between the two choices is accidental, i.e. isn't caused by pedagogical methods.

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H_1 hypothesis is the following: P (x_i=0, y_i=1)≠P(x_i=1, y_i=0). These hypotheses are not the same and the difference between the two selection isn't accidental, it's caused by the pedagogical method.

III. Statistics of criteria:

Find the difference between two cases. The first, if b+c>20, then so called T_1 criteria works as follows $T_1 = \frac{(b-c)^2}{b+c}$;

the second, if b+ c ≤20, then so called T_2 criteria works T_2=min(b,c).

a and **d** stand for the cases when the characteristics doesn't change. These pairs are indifferent to the pedagogical method, that's why the criteria doesnt include it.

IV. The rule of making decision

Check the verity of Zero hypothesis. Choose a certain meaning level α. In pedagogical works α=0,05, but sometimes α=0,01. We'll need the number b+c=n. There are the tables which indicate how criteria T_1 and T_2 depend on the number "n" or b+ c for the given α. Find the difference between the two cases. The tables are taken according to the Binomial Distribution for T_2, though χ^2 Distribution law works for T_1 quite effectively when the liberation quality is 1.

From the tables we get the probability that T_2 is no more than T_{2k} (critical): P ($T_2 \le T_{2k}$). Consider the bilateral criteria. If the probability $P < \alpha/2$, then H_0 would be ignored and H_1 would be accepted to the level α. These tables are taken for n=25.

T_{1k} (critics) meaning should be taken out of other tables. T_{1k} =3,84. When α=0,05 and T_{1k}=6,64. If α=0,01, H_0 is objected to the level of α and we get H_1, if the calculated T_1 is more than T_k, it means pedagogical method affected it. It depends whether b or c is more. If b >c, the influence would be positive and if b <c, it would be negative. If b=c, then McNamara criteria doesn't work.

Discuss the following sum. Find out the influence of conversations and lectures, school trips on the professional orientation studying. Put the question: "What's your attitude to the physicist's profession?" Consider the two categories of answers. The first - I like it, the second – I don't like it. 150 students from different schools were questioned. The inquiry was accidental and it involved 20 students. The inquiry was held twice. The first was before conversations, lectures and school-trips and the second – after them. Let's make the table 2x2 (4).

		II inquiry		
I inquiry		a 2	b 2	4
		c 11	d 5	1
		13	7	20

6

a=2; b=2; c=11; d=5

b+ c=13< 20, i. e we use the criteria T_{2k}

b=2, if T_2 coincides with the meaning of b, i. e T_2=2. We get P=0,0011, this is the probability if T_2 gets to the critical area, H_0 objected. $\alpha/2$=0,025, or $< \alpha/2$.

We considered the case when H_0 is objected in favor of H_1 on the 5% level ($\alpha = 0,05$); Pedagogical methods affected choosing a profession . This influence is positive, as the answers"I like it" are more.

According to McNamara criteria the following pedagogical sums can be easily done:

1) The influence of pedagogical process on studying process;

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2) The research of pedagogical influence (The form of controlling knowledge) on pupils separating according to the level;
3) The study of pedagogical influence on getting education.

After studying the subject, a pedagogical experiment was carried out in order to study the influence of controlling the studying process by separating pupils according to levels. Two inquiries were held:
1) Written task- test, including three questions. Each had to be evaluated by 5 points.
a) 3; 4; 5 –to those who studied the material; b) 1; 2-to those who couldn't study
2) A test-with 20 questions. 13 correct answers are accepted positively; if not- evaluation is negative. 100 students were chosen by the accidental selection Two tasks had to be done without an interval.

Make a table 2x2

	studied	couldn't sts study	test
studied	a=63	b=21	a+b=84
couldn't study	c=4	d=12	c+d=16
control work	a+c=67	b+d=33	100

We get H_0 hypothesis when forms of controlling knowledge doesn't influence on students separating according to their level. We get H_1 hypothesis when the form of controlling knowledge affects the students' separating according their level of knowledge.

b+ c = 21+4 =25 > 20

$$T_1 = \frac{(b-c)^2}{b+c} = \frac{(21-4)^2}{25} = 11{,}56$$

$$\alpha = 0{,}01, \text{then } T_{1k} = 6{,}64, \text{i.e } T_1 > T_{1k}$$

H_0 is objected on the level of $\alpha = 0{,}01$ and we get H_1, i.e. all forms of controlling aren't equal.

CONCLUSION

To summarize, McNamara criteria is acceptable if the two choices are dependant and the measurement is carried out on the Naming Scale.

REFERENCES

1.M. Nadareishvili, I. Skhirtladze. The theory of probability and mathematical statistics. Tb. 1990
2.Mathematical linguistics. R. G.Petersky, K. B.Beqtaev, A.M. Petrevsky, High school,1997
3.A. A. Kiverialg, Research Methods in Professional Pedagogy. Talin, Valgus,1993
4. N. Maisuradze, Specifics of methodical system of transfer of knowledge and assimilation when training physics. Tb.,2004
5.M. Nadareishvili, I. Skhirtladze. The theory of probability and mathematical statistics. Collection of tasks Tb. 1990
6. R. A. Shmoilova. Theory of statistics. M.,2005
7. Processing of information at the person. P. Linsey, D. Norman. Translation from English. M., Mir,1995
8.Barbara H partee, Alice Geraldine Baltina Ter Meulen, Robert E.Wall. Mathematical Methods in Linguistics. Kluwer Academic Publishers 1990.
9. Marcus Kracht. The mathematics of language. Berlin 2003.

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Economic Science

NEW METHODICAL BASIS OF FINANCIAL RISKS ASSESSMENT

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ABSTRACT

Classification of the risks formed because of shortage of financial providing which plays significant role in competitive development of the enterprise has been carried out in the paper.
For this purpose considering financial possibilities of the enterprise new methods of risks assessment has been worked out. As a result of application of the offered methods risks assessment has been carried out at the end of the paper. Probability of becoming bankrupt has been calculated and strategic development directions of the enterprise have been offered.
Keywords: enterprise risk, bankruptcy, financial providing, net benefit, capital.

INTRODUCTION

From the researches of foreign and national experts (96%) investigating the main reasons forming risks in the activity of the enterprise it becomes evident that “shortage of financial opportunities” influences significantly the rivaling development of the enterprise (included into economic factors). That’s why there is a necessity to work out new methods of assessment financial opportunities of the enterprise.
Financial indices of the enterprise and their assessment.
The followings are included into the assessment:
Amount of the remainder profit at the (net profit)disposal of the enterprise;
Unrealized remainder profit;
Product manufacturing and realization expenses;
Volume of turnover capital of the enterprise;
Measure of private capital and whole capital of the enterprise
In the wide scope of market economy for substantiating the choice of the indices well characterizing the state of the enterprise authorities (expert)- included into Altman models content have been looked through. These indices:
Ratio of net turnover capital (k_1= efficient capital)/ (assets) to assets.
The index makes possible to evaluate efficiency of enterprise assets.
Ratio of net profit (k_2=net profit) / (assets) to assets (the first calculation version). This coefficient shows ability of industrial enterprise to use its assets to get net profit.
Ratio of profits to assets (the second calculation variant). If compared enterprise capital has various structures, correlation of profit to “K2” can pervert the value of the situation. Its main reason is that more the enterprise pays big percent amount on credit means tax applied profit amount will be less. That’s why K3 index is used “to clean” the index from the differences in capital structure.
Correlation of net profit to the enterprise capital: k_4= (pure profit) / (private capital of the enterprise). This index characterizes efficiency of the investment to the capital.
Turnover coefficient of the assets (k_5= profit from ready product) / (assets).
Coefficient characterizes efficiency of the industry that’s how much product will be produced and realized the existing and attracted means? (ability of the shown assets to generate realization of the goods)
Correlation of the profit (balance benefit) to total capital. (k_6=(balance benefit) / (total capital). This index characterizes activity efficiency of the capital invested to the enterprise.
Profit margin (difference) (k_7=(pure profit) /(profit from ready product)). This index characterizes ability of gaining profit from all volume of the realized product in the enterprise. More is the index measure , more is the profit gained by stockholders.
Profit norm (k_8= (pure profit) / (expenses)). This index determines efficiency, existence of financial reserves durability and increase of rivaling.
Finance coefficient.This coefficient describes financing structure of economical activity of the enterprise.
10.General meeting correlation (k_{10}= (current assets) / (short – term obligations)).This coefficient mobilizing all turnover means shows possibility of meeting of shorter- term obligations.
11. Special weight of the private capital in the enterprise activities (k_{11}=(private capital) / (assets)). This coefficient shows the danger on investing this enterprise.

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12.Coefficient of meeting of investment (k_{12}= (special mean+ long= term obligation/assets)). This coefficient shows financing of what part of enterprise is carried out at its own means, long-term credit means, that's stable sources.
13. Turnover index of the private capital (k_{13}=(profit from ready product). This coefficient makes possible to asses love of use turnover capital.
Assessment of danger degree of the enterprise bankruptcy
For compiling prognosis model of the level of bankruptcy danger of the enterprise three independent and occasionally chosen bases are formed due to the finance reports of oil machine , - building enterprises in the field of countries refining industry. The first main data base is the base of quarter data on finance reports of the enterprises ("Balance" and "Report on benefits and damages"). The second data is the quarter financial reports of the enterprise ("Balance" and "Report on profits and damages"). This base is formed to compare its analyses results with the ones of the first base. The third is the base of main data ("Balance" and " Report on benefits and damages") [1,2]
As a result of carried out analysis of balance structures it has been determined that 2% enterprises use long-term credits, 91% use short-term credits, 7% enterprises don't use credit means, but 72% enterprises are overloaded with little used assets.
To increase the observations, using "plant-year" method, data on the same enterprise's various time periods are included into the selections. To exclude the repeated factors in the model prepared for determining bankruptcy danger of the enterprise special correlation coefficients are prepared, it makes possible to see repeat of K2/K3, K2/K4, K3/K4 factors. That's why K2 and K3 indices are excluded from the further analyses. For additional assessment of variability of sizes of modern factors and indicators depending on the choice, comparison of the sizes of 13 factors and the first and the second basis has been carried out [3,4] . As a result of statistic analysis of initial and calculated data, the following four-factors model is achieved:
R=K1+K4+K5+K8, (1)
Then 1 equation is written in the following form:
R=K1+K2+K3+K4, (2)
here , R- is indicator of enterprise's bankruptcy danger:
k_1= (efficient profit) / (assets);
k_2= (net profit) / (private capital of the enterprise)
k_1= (profit from ready product) / (assets)
The existing situation shows that in future we'll suppose that factors K1, K2, K3 and K4 have equal rights on the bankruptcy danger of the enterprise. That's why average measure of each factor on the collection of all enterprises is determined when analyzing correspondence of factors influence to compared type. Average measure of K2 factor in calculating of coefficients of correspondence of factors to the compared type.
Diagrams reflecting dynamics and character of each factor of the industry enterprises and average measures for corresponding factors have been set up. Then each measure changing character for average measure of corresponding factors of all the enterprises is observed.
During the prognosis of any period for determining probability of enterprise bankruptcy the comparative analysis with the closing time of the enterprise is carried out according to the average measure of corresponding factor and observed measure at the enterprises.
Probably measure of bankruptcy prognosis of the enterprise has been calculated as correlation of the measure of the analyzed factor before the closing of the enterprise to the quantity of the liquidated enterprises. Profit norm has been calculated as correlation of expenses spend on the balance profit. Analysis of change dynamics of K4 factor measure showed that in comparison with average norm when profit norm in three quarters is more than 30%, the enterprise with 64% probability will be liquidated during next four quarters.
Determination the computability level of the enterprise
The following equation can be offered when there is a danger for the enterprise with no computability and this danger approaches 10%
$GN_{min}=GN_{or}*(100-30)/100=0.7*GN_{or}$ (4)
here GN_{min} - is minimum profit norm when enterprise's danger without competition approaches 100%. GN_{av} is average field or average profit norm of competitors.
The enterprise's danger without competition analyzed because of the reduce of profit norm size can be determined as following.
$R_{gn}= GN_{min} / GN_S$ (5)
here, R_{pn} –danger of the goods of the enterprise without competition because of the reduce of profit norm size, GN_a is profit norm of the analyzed enterprise.
If to assess danger of enterprise goods without competition in the relation to any competitor then instead of GN_a competitor's profit norm is included.
Professor M.I. Bakanov's methods was used to determine the influence of profit norm size chance on product manufacturer with the help of this methods in the case of 30% exceeding of profit norm size than in competitors, product price of the enterprise can be reduced 9%. It will cause the competitors to lose their manufactures. With the help of K4

factor (profit norm), quantitative analysis enterprise's four quarter danger without competition can be assessed with 64-68% accuracy.

REFERENCES

Azerbaijan industry. Statistic collection, Baku, 2015, p334.
М.В.Грачева, Анализ проектных рисков, -М.Финстатинформ, 1999,с.215.
Дубинин Евгений, Анализ рисков инвестиционно проектаю. Журнал "Финансовый дектор "http://www.cfin.ru/finanalysis/invrisk/inv_risk.shtml 24.04.2008(с.23-28).
Коломина М. Сушность и измерение инвестиционных рисков, Финансы-1994 №4(с.17-19).

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Economic Science

INNOVATIVE PROCESS AS BASIS OF ECONOMIC DEVELOPMENT

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ABSTRACT

The work is dedicated to innovative process, as studying sequential chain of transferring scientific knowledge into innovations. It is proved that innovative processes are results of innovative business and have independent institutional status, it is also highlighted main conceptual approach towards origination and development of innovative processes, structure of innovative process, definition and characterization of innovations and innovations diffusion, cycles and stages of main peculiarities of innovative process. The article discusses structure of innovative process and comparative modules, their functional consequence in order to study organizational structure of innovative entrepreneurship.
Keywords: Innovative process, innovations diffusion, models of innovative processes, scientific technical process, innovators, science, innovative business, innovations.

INTRODUCTION

History proves that successes of economic development are based on innovations. For example, XVIII century economic revolution, inculcation of machines and technologies supported world leadership of Europe, USA and Canada. Asian countries joined the list of leaders by means of innovations in the 1990s. The whole humankind history is endless chain of innovation which is some kind of forward step of development. Nowadays demands for renewal temps and intensity have importantly increased.
In the last decades a lot of countries' political elite consider innovations as comparatively important and decisive factor of social development.
In different periods of time scientist-economists make different interpretation about innovative process. For example: In the fifties of the XX century innovative process was discussed in the frames of linear model, the so-called conception of innovative chain. According to this conception Innovations begin with fundamental researches and end with its inculcation in producing process.

French Andre Piater proves that innovative process is transformation of an idea into an object that should be sold or used.

Linear model of informative process is considered from the following positions:

- Transfer of scientific or technical knowledge in the sphere of satisfaction of consumers' requirements;
- Transformation of a product into bearer of technologies. In addition, the form of a product's technology is defined after satisfaction of its maker's requirements.

According to the author of this work innovative process of creation of novelties can be conventionally presented as a chain of – science (scientific-research and experimental- constructive works) – technique (manufacturing consumption) and production (industrial production) – linear and parallel stages.

Modern innovative processes have complicated structure, space-time measurement, special tendencies and dynamics of development. Famous researchers of science and economics call global stage of modern development "epoch of innovations", and the first half of the XXI century- epoch of radical innovations which will change and transform the face of mankind. This epoch coincided with transfer from industrial into post-industrial society. One of the founders of post-industrial society Daniel Bell thinks that post-industrial society is new principle of social-technological organization and new rule of life which tightens industrial system. It pays special attention to technological order of post- industrial society. Basis of technological society is created by the following conditions from the point of innovations:

-Change of mechanical, electrical and electro-mechanical systems with electronic system;

-Miniaturization of elements, discovery of transistors, which equals discovery of steam energy;

-Transformation of information into digital form;

-Programmed support which enables a computer user to solve different kinds of tasks quickly;

- Key technology of photonic-transportation in absolutely pure glass or optical fiber in big size if digital data by means of lazer [Bell D., 1999]

For today as purposeful program, priory directions of development of researches and scientific-technological complex of elaborations may be named the following:

- Live systems;
- Industry of nanosystems and materials;
- Informational- TV-communicational systems;
- Rational nature-consumption;
- Energetics and energy supply.

The very above mentioned challenges conditioned my interest towards the mentioned problem.

The aim of the presented work is transformation of innovative processes as scientific knowledge into innovations, as sequential chain of development of events, scientific initiation of transformation of the whole process of innovations into concrete product, study of essence of innovative processes, structure, main directions of development, research of their cycling nature and structure of innovative process according to innovative articles.

2. Main part.

2.1. Innovative process as result of innovative business.

Innovative process – is transformation of scientific knowledge into innovations, which can be discussed as sequential chain of development of events and meanwhile innovation is transformed into concrete product from an idea, into technology or service and is spread while practical usage. Differently from scientific-technical progress innovative process does not end with inculcation, i.e. by bringing out new goods into market. This process does not stop after inculcation or after spreading (diffusion), novelty undertakes completion, becomes more effective, gains consuming features that was unfamiliar before.

In modern conditions **innovative processes** are results of innovative business which have independent institutional status. Innovative business needs specific kind of management, the object of which is innovative business. In broad understanding, innovative management is oriented on initiation of innovative processes, realization and control.

Innovative business - is business oriented on usage and commercialization of results of scientific researches and elaborations. It means enlargement and consumption of nomenclature of released production (goods, service), improvement of their quality, technological completion of production job, their further inculcation and effective fulfilment on inner and outer markets. Innovative business is the whole complex of scientific, technological, organizational, financial and commercial events which lead us to innovations with its unity.

Innovative process supports advancement because it enlarges abilities of producers' goods and service as well as consumers' abilities. It encourages cheapen of production and full satisfaction of increasing demands as possible. But, together with it, innovative process is not fulfilled in advance without definite obstacles. Such factors as sizes of innovations, the level of their radicalism, speed of inculcation influence on character of innovative process. The bigger sizes it has and the stronger is shown radical character of innovations, the more difficult is realization and development of innovative process.

In table 1 is shown comparatively important differences between innovative process and stable process.

While managing innovative processes it is important to remember impossible character of defining exactly its definite aim in advance. Specialists of innovative management sphere explain the mentioned feature by "weak structure of innovative sphere, aims of process". Resulting from its indefiniteness, with probable character of innovative process, the latter one combines features of researches and business, also possibility of transfer of aims, i.e. change of purposeful sphere of using novelties, existence of results accompanying innovative processes, possibility of a loss of actuality of innovations in the process of elaborating researches.

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Table 1

Main differences of innovative and stable processes

Indicators of a process	Innovative process	Stable process
Main final aim	Satisfaction of new social aim	Satisfaction of created social demands
Risk while realization of target	high	low
Type of process	discrete	continuous
Process as management of one whole	low	high
Possibilities of development of a system	Transfer of development into newer, more progressive level	Maintenance of development of existed level
Inter-influence of participants' interests of a process on created system	Is at odds	Bases on them
Features of organization of process	Flexible, structured form of system	System based on strict, normative regulations

Source: Innovative management.2007. S.d. Ilenkov . M.: Unity-Dana.p.3

Participants of innovative process are conventionally divided into the following groups: innovators, earlier researchers, middle majority, conservatives.

Innovators are called creators of innovations. As a result of elaborating and pioneer inculcating of novelties (innovations) they get excess profit. A clear example of an innovator can be named H. Ford, whose innovative business supported to get excess profit, on the basis of which was created a world famous largest auto concern. It should be considered the fact that on innovative products market no conditions of pure competitiveness are formed. Here always exists monopoly, though temporary, but still monopoly. In terms of temporary monopoly development trend may be established, offering of new technology and getting monopoly profit. Herewith, tendencies may be paid attention, technologies may be used and owners of basis technologies may be offered inventory materials.

Earlier followers borrow innovations from investors, they also get excess profit and raise their competitiveness on condition that they will organize innovative process effectively.

Middle majority –inculcate innovations, which already got massive recognition and spread. These entrepreneurs also can get higher than middle profit.

Conservatives try to adapt innovations with considerable lagging. As a result they cannot manage to conduct their business successfully and in most cases are made to leave the market. So stimulated role of innovations is clear in economic development as getting profit by an entrepreneur on account of realization of innovations directly matches commercial function of any economic subject. It appears to be in the role of a stimulus so that an entrepreneur could activate innovative business.

Researchers distinguish three logically proved types of innovative business: 1) simple inner-organizational; 2) simple inter-organizational and 3) extended.

Simple inner-organizational process means innovative business in inner enterprise. Inter-organizational innovative business is innovative inter-influence of two organizations-buyer and seller of innovations. During extended innovative process innovation is created by orientation of market on definite segment.

Effective innovative business requires knowledge of main conceptual approaches towards originating and development of innovative processes in market conditions.

According to the **first conception** (**technology push- model**) development is carried out by technologies and market appears to be in the role of passive consumer of innovative activity, it reacts on inculcating novelties in the way of forming demands on its results. It dominated until mid- 1960-s. According to this model innovative process begins with fundamental researches in big research centers and ends in the frame of selling and usage of products. So, it is simple linear-sequential direction in innovative process where it is in the role of a leader and accent is made on scientific-research and experimental-constructive works. In most researchers' opinion this model did not reflect interrelations inside innovative process with all its hardness.

The second approach (need pull-model) was worked from the second half of 1960 -s until the beginning of 1970 -s. The essence of this this approach is the following: Innovative process is initiated by market and is depended on changes of requirements, it is mainly the same linear-sequential model, but accent is moved to importance of market, on requirements of which scientific –research and experimental –constructive works react (reflection of hypothesis "market pressure").

In 1980-s the **third approach** spread (**Coupling model**) in which there was an attempt of synthesis of two approaches and was based on status of their priorities. Another name of this model is "chain". Innovations here are discussed as dynamic process which can be modelled by feedback of inter-influence of two different types.

From the end of 1980-s the **fourth approach** is activated which is known as "**Japanese model of advanced experience**". It concentrates on parallel activity of integrated groups, also on outer horizontal and vertical links. Characterizing Japanese experience in innovative sphere positively, one of the famous founders of innovation management J. Kozminsky proves that "technological innovation process requires parallel organization of work", as much should be done in different places at the same time. But in this chaos there should be linking parallel structure, which combines different actions and should be finished timely in order to advance continuously on technologies market by numerous organizations by all means. On national level it is interesting to mention multi - function Japanese approach, which has components to be carried out parallelly.

On a firm level company IBM's example is interesting, which carries out commercialization of technical innovations, in a way of two-stage process _by strong connection of processing and producing cycles. While one kind of products are on producing stage, it is necessary researchers and' group to work on the following stage. At the same time it is necessary to continue working for evolutional improvement of the already existing products.

The next **fifth model** of innovation process which has been developing actively since the third millennium is **model of strategic nets**. Its characteristic feature is that for successful innovative development it is necessary to combine common non-stop web of innovators, orderers and consumers. It is the process of carrying out scientific-research and experimental-constructive works using newest informational technologies, by means of which strategic links are established. It enables innovation process to become more manageable, predictable and effective.

On the basis of aimed analysis of models of innovation processes a conclusion may be made that together with development of technologies and economics , the earlier established opinion about the fact that innovation business is linear- functional with numerous process, it is replaced with another opinion- innovation process is far more complicated, with numerous interactions and feedbacks.

2.2. Structure of innovation process.

Innovation process consists of the following elements: novelty, innovation and novelty diffusion (picture 1).
Basis of innovation processes are **fundamental researches.** Results of fundamental researches, as a rule, is not structural. It is true that their importance for innovation business in techniques and technological processes is quite big, they don't have goods nature, are not formed as a product of consumer values. Finally, as a result of fundamental researches hypothesis, theories, methods etc. are created.

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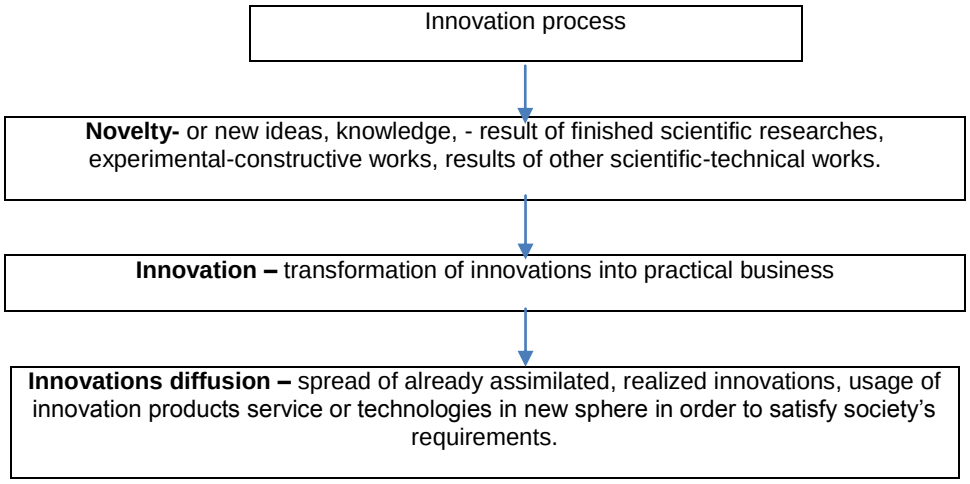

Picture 1**. Structure of innovative process.**

Source: Qoqiauri L., Qoqiauri N.,Gechbaia B. 2018. P. 101.

Researches of applied character- it is original works, directed to getting new knowledge for solving concrete practical tasks. Researches of applied character define possible ways of usage of fundamental research results, new methods of solving methods formulated before.

Treatments- it is systematic works, which are based on knowledge basis received as a result of scientific researches or practical experience and is directed to create new products or equipment, inculcation of new processes, systems or service or upgrading of already produced production or inculcated processes, systems or service. Theoretical are researches which the aim of which is new discoveries, creation of new theories, statement of new essences and presentations.

Searchable are fundamental researches, the task of which is discovery of new principles of creating work-pieces and technologies, creation of materials unknown before and their compounds, analysis and methods of synthesis. In searchable works usually are the aim of carrying out works are known, theoretical fundaments are known more or less, but their directions are not concretized. During the process of such researches theoretical sentences are found out and ideas will be rejected if they are looked through.

Practical realization of innovation business results are carried out on the marketing stage of innovation business, the main summery of which is organization of massive production and adoption of market, on this stage innovation becomes goods which will pass all traditional stages of vital cycles given to products: inculcation on market, enlargement of market, ripening of products and last, fall, when innovation loses its novelty character, production is stopped and , it leaves market and is replaced with new goods. All the above mentioned stages have their own specifics. Namely, on the stage of inculcating on market for small enterprises it is important problems of license and specification of production (the latter one is especially important while appearing on foreign markets); during market enlargement (enlargement of market sizes) expenses are sharply increased for gaining market, in ripening stage search of new innovations becomes actual.

As we have mentioned in the first chapter**, innovations diffusion** – it is continuing process of innovations in time or in places of usage. As a result of diffusion the number of producers and consumers are increasing and their quality characteristics change as well. Speed of novelties diffusion are depended on the following factors: on decision making forms, means of information transfer (rule), ability of novelties consumption by subjects of social-economic system; on novelties characters themselves.

Process of creation and spread of novelties (diffusion) are cyclic and consists of the following stages. They are: serial circulation, massive circulation, differentiation of production, imitation, service of novelties.

Considering experience of other countries, structural components of innovation process may be imagined like this:

- Academic and branch institutes, universities and scientific-research subdivisions of firms, which are responsible for fundamental researches and searching works, are on state finances and get other forms of state assistance. These organizations produce intellectual product in the forms of accounts, different documentations, inventions, scientific articles or carry out training of scientific stuff;
- Technical and industrial-technical organizations which own innovative know-how, work on pilot projects, create and test experimental models, prepare technical description, patents, standards and regulations. These structures have relevant production powers, professional and technological centers;
- Educational and teaching structures for scientific and engineering- technical staff, also qualified staff;
- Organizations which control carrying out research and treatment and make inter-influencing coordination with industrial centers;
- Consulting organizations, which carry out studying requirement on goods and service and their extension ;
- Scientific-technical information offices which gather , prepare and spread information about perspective treatment.
- Market structures which combine consumers and professionals and who are busy with topics about realization of products [Kuzyk B. N., Yakovets Yu.V., 2005].

Inter-influence scheme between structural subdivisions of innovation process is difficult and includes direct conducts as well as cooperation by means of mediators and distributing centers. Production created as a result of innovation business, service consumption and extension stages are difficult, comparatively labor-intensive and expensable. As it is proved by developed countries' experience, only 15-30 % of processed technologies are subordinated to practical usage.

2.3. Cyclic and staging character of innovation process.

Any novelty can by transformed into innovation only when society acknowledge, evaluate and state appropriateness of its usage. **Novation transforms into innovation, any kind of economic kindness, as a result of innovation process.** According to I. Schumpeter's argumentation, **innovation is generator of profit.** It includes consequential chain of events: "science-technique- production" In other words, it means consequential scheme of creation of action and novelty, which fulfils different functions: processional, additional, basic, productive, etc. Thus, innovation process is getting novelty and its commercial realization. It includes not only scientific-technical treatments, production, but also exchange and consumption.

Analysis of scientific literature shows that most authors fix common opinion towards "innovation process". Innovations end up by inculcating new product, service, technology (process) on market. But in any case, working subjects and working means, especially new consuming subjects, should own consuming values. So, innovation process should be discussed in two views:

- First, innovation process is transformation process of novelties into new technologies;
- And second, innovation process is inculcation of new technologies in any kind of sphere or process of importantly improvement and perfection of existed technologies aiming production of economic prosperity, fulfilment of progressive changes of organization.

Innovation process is very large sphere including unity of hard and different processes and events. Innovation business is more common essence and includes aims of economic subjects and innovation processes as possible.

Basis of innovation process is vital cycle of new product: from the moment of origination of a new idea up to practical exploitation by consumers. According to some specialists, innovative process, as complicated multi-aspect category, may be discussed at least in three aspects:

- Parallel-consequential fulfilment of scientific-research, scientific-technological, innovative, industrial business and marketing ;
- Stages of innovation vital cycle from origination of an idea up to its treatment and extension;
- Investing and funding process of treatment and extension of new types of production and service.
- Generally, innovation process includes: inventions, new technologies, new kind of production and service and commercialization; industrial, financial, administrative, or other kinds of decisions; other results of intellectual business.

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Contents of concrete innovation process is defined by inculcating object-new product or process. On the basis of the latter one two types of innovation process arte set up.

Main peculiarity of innovation process is cyclic process and staging; their essence may be formed as following: any kind of new knowledge will pass full cycle in certain stages and phases until moral aging of products and processes objectivized in it.

In some definitions of innovation cycle “intersected” (mixed) structure was discussed, which considers inculcation of experimental models of new products in enterprise

Such tendency was characterized for innovation sphere in early years. Then 85 % of scientific- technological works were inculcated only in one or two enterprises, in five or more enterprises only 1-2 % of consumption was carried out.

It should be mentioned that in the structure of innovation cycle some authors distinguish “science” and “technique” stages, they are used instead of “research” and “treatment”. However, such difference of opinions is non-principle, because of essence of mentioned elements of cycle, also content of relevant phases of these stages.

Any kind of stage consists of separate phases, which characterizes it in two aspects: on the one hand, a part of one whole i.e. innovative cycle; and on the other hand, as isolated, comparatively independent element of cycle with its characteristic completed complexes of events.

By considering dependence on sizes of innovation business different levels of cycles are discussed. Accordingly, innovation process itself is discussed in two understandings; **from the position of regularity of innovative changes cycle forms** it is unity of changes carried out in products, technique, technologies. Changes are caused by so-called radical novelties, namely qualitatively new production output, changes of structure of expenses, production and consuming conditions. According to vital cycle of concrete novelties –innovation process is the whole chain of already established or novelties of satisfaction of society’s new demands.

As it is mentioned above, a lot of foreign and native economists’ works are known about cycling theory of different social processes. Kondratiev’s greatest contribution is famous worldwide in this sphere. In 1920s he discovered the so-called **existence of big cycles** and accordingly, he worked out the theory by this name. The essence of the latter one is the following: each market innovation in life causes “new cycle”, in the form of creation of unity of further second-hand novelties. It somehow fills the basis of cycle- modernized new product. For example, consequential change of technique generation (we will discuss the mentioned topic later).

2.4. Structuration of innovation process according to stages.
Innovation process itself. Entrepreneurship, as a process includes four stages: search of new ideas and its evaluation; composing business-plan; search of necessary resources; management of created enterprise. For innovative entrepreneurship it is appropriate to divide these stages into narrower stages. Logical chain of main stages of innovative processes are presented in picture 2.

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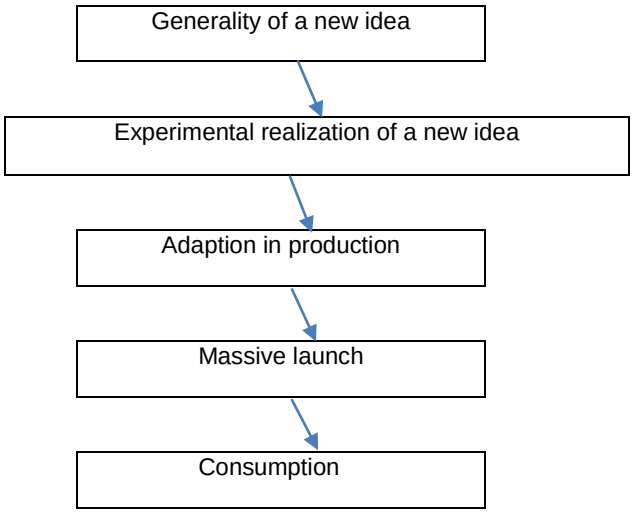

Picture 2. Structuration of innovation process according to stages.

Source: Qoqiauri L., Qoqiauri N., Gechbaia B. 2018. P.123.

In innovation process separation of scientific-research, technical-technological, enterprise and commercial functions are defined by aims of a firm. It begins with evaluation of existed resources, definition of strategic aim and is finished with returning invested sources back.

On the stage of scientific research enterprise authorship form demand on ideas, sentences, recommendations, which are formed as a result of inter-influence of participants of innovation process. Then stricter technological and commercial predictable prognosis are worked out, which in whole warrants expectable formation of technical parameters, existence of material sources and time expenses, reduction of risk and so on, but in case of unsuccessfulness- alternative variants of decisions. All these support to work out strategic plan, which becomes decisive factor in further development of innovations.

Transfer of technologies means not only exchange of relevant documentation, but also tight inter-influence of scientific-technical centers, laboratories, subdivisions, co-operation, which take part in preliminary preparation of innovations.

Together with finishing preparation process for scientific-technical production, participation of researchers and manufacturers in innovative process gradually reduces, accordingly, the character of their innovative business changes, on this stage researchers and manufacturers' subdivisions are busy with rising labor productivity, reducing expenses, problems of minimizing risk factor. While taking products on the market, they consider feedback and market demands, they aim further development and perfection of products.

Peculiarities of innovation processes, which are necessary to be considered while creating organizational-economic mechanism of concrete business, come from character of novelties.

Comparatively simple model of innovation process is the result of logical division of the whole process into separate functional or structural parts. Namely, they are:

Fundamental researches;

1. Researches of applied character;
2. Engineering- technical works
3. Demonstration
4. Entrepreneurship and exploitation
5. System management
6. Usage.

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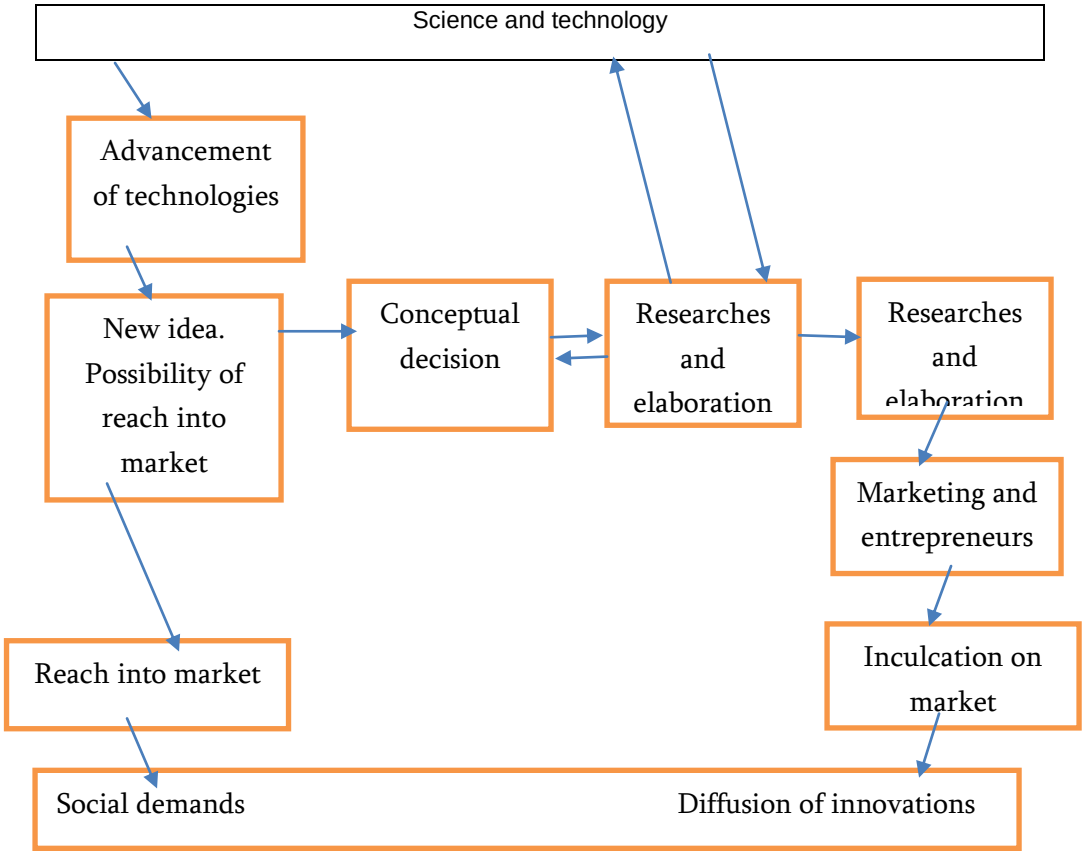
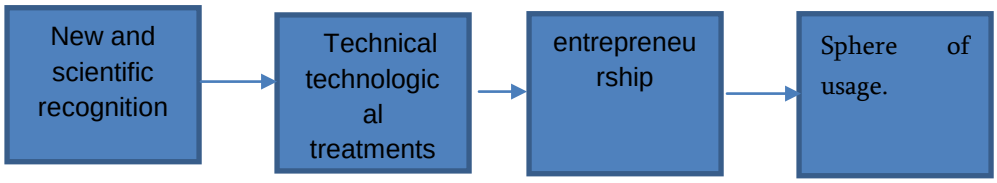
Comparative general model of innovation process is presented on picture 3.



Picture 3. General model of innovation process.
Source:

According to this conception innovation begins with fundamental researches and ends in the sphere of product usage. (P.4)



P. 4. Functional sequence of innovation process.
Source:

The result of innovation business is intellectual product, which may be defined as a business result in spiritual enterprise sphere which is aimed to satisfy its consumers' demands (in the form of commodity or non-commodity).

Intellectual products are:

- **Scientific-technical production** – or discoveries, hypothesis, theories, conceptions, models, (product of fundamental researches), inventions, scientific and constructional treatments, projects, experimental samples of new technique, new work-pieces, production of informatics;
- Programmed product, radio and TV programs and so on;
- Culture programs.

Let's discuss ingredient elements of product of scientific-technical creative business in which new principles or construction of technical systems are carried out. Objects of inventions are equipment (machines, equipment, tools). Means (methods, rules, processes). Substances (materials, alloys and so on) .Usage of brand name equipment, methods and substances in new purpose.

New technique is materialized scientific knowledge, which supports growth of working effectivity. With narrow understanding it is new, more effective working means, and with broad understanding, it is new materials, energy sources, technological processes, medical, social, ecological and other technique.

We should distinguish from each other improved new technique, level of improved novelties and principally new technique which makes realization of basic novelties and support jump up the level of effectivity of novels and technique.

New work-piece is production with improved or principally new consuming characters, which are created on the basis of scientific researches, experimental-construction and object works. Two main levels of novelty may be distinguished, which did not appear on the market before and inculcation of new components on market towards already brand - name goods.

According to legislation, physical and juridical persons are given special rights on results of intellectual property and equal works or means of individualization of service-doer juridical persons (firm names, goods marks, service marks and so on).

LITERATURE

1. **Bell D., 1999.** The Coming of Post-Industrial Society. Experience of social prediction. M. Academia.
2. **Kyzuk B. N., Yakovets Yu. V., 2005.** Rassia. 2 - 50. Innovative Profit Strategy. M.: Economic. pp. 223 - 224.
3. **Qoqiauri L, Qoqiauri N, Gechbaia B., 2018.** Innovation - Driven Economy. Publishing House Kalmosani. pp.650.
4. **Shumpeter J. A., 1961.** Konjunkturziklen. Bd, 1. Guttingen. c. 95
5. Innovative Management. 2007. Editor Ilenkov S.D. M.: UNIT.

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Theoretical Medicine

URINARY TRACT INFECTION IN KIDNEY TRANSPLANT PATIENTS: MICROBIAL SPECTRUM AND ANTIBIOGRAM PROFILE

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ABSTRACT

Urinary tract infections (UTIs) are the most common infections in renal transplant recipients and are considered a potential cause of bacteremia, sepsis, and affects graft outcomes and a major cause of morbidity and mortality. The risk for UTI after kidney transplantation is highest during the first year of transplantation with up to 60% . Other risk factors are advanced age, female sex, diabetes mellitus and vesicoureteral reflux . The incidence of drug resistant urinary pathogens seems to be increasing and has become a rising therapeutic challenge for clinicians. Drug resistant strains seem to have significant negative impact on the clinical course .

The purpose of this retrospective study was to determine the incidence of UTI, its causative agents, and antimicrobial resistance pattern among renal transplant recipients. In total, 60 patients were study from 2013 to 2018, in kidney transplant therapy department of High Technology Medical Centre University Clinic ,Tbilisi, Georgia.Meadstreameam urine cultures were performed for all cases, causative microorganisms were identified and colony count was performed according to the standard protocol. Antibiotic susceptibility testing was then performed to determine the susceptibility pattern of recovered bacteria from confirmed UTIs.

UTI was diagnosed in 19 patients(31.66%). Gram-negative bacteria were the most prevalent isolated microorganisms with E.coli 7(36.84%), Klebsiella pneumoniae4(21.05%),Pseudomonas aeruginosa 3(15.78%). Among Gram positives, Enterococcus faecalis 2(10.52%), Staphylococcus aureus 1(5.26%) . The rate of resistance to all tested antibiotics accorging EUCAST guidelines was high among gram-negative bacteria even against the last resort antibiotics(carbapenems, polymyxinE).

In our study according to the single-centre expirience bacterial infection had no significant impact on survival by itself. We observed a incidence of infection with antibiotic resistant bacteria, most frequently Gram negative enteric bacilli. The significantly higher antibiotic resistance against cephalosporins ,trimethoprim-sulfamethoxazole, and fluorofuinolones groups in this study may be due to higher rate of this group antibiotic usage by people in our country , even in the absence of a prescription, and UTI is more common in the early years of life. Of course, this is not a surprising finding, since the antibiotic resistance shows an emerging increase especially among gram negative bacteria worldwide.

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Since the pattern of the sensitivity of microorganisms to antibiotics varies over time and among different locations, antibiotic treatment should be initiated based on the local susceptibility test patterns which are mainly achieved by application of the standard bacteriological testing.

Keywords: multiresistant bacteria, transplant recipients, antibiotics.

INTRODUCTION

Infectious complications remain a major cause of morbidity and mortality among transplant recipients. Urinary tract infection (UTI) is the most common infectious complication in kidney transplant recipients with a reported incidence of between 25%-75%.Despite improved surgical techniques, antimicrobial prophylaxis, new immunosuppressive therapies and hygiene measures in the management of transplant patients, infectious complications remain a major cause of morbidity and mortality in kidney transplant patients(1-5). Kidney recipients have the highest risk of developing UTI, with an incidence of 0.45 episodes per 1000 days of transplant. Most episodes of UTI occur during the first 6 months after the transplant , being, the first month the main period of events (6). During the first month, asymptomatic bacteriuria (AB) occurs in 22%-71% of the patients (7,8), and symptomatic UTI in 12%-34% (9,10). The study with the longer follow-up time, 36 months, recorded an incidence of APN during the first 6 months of 6.4%, with an incidence of 10% at the end of follow up. The rates of urosepsis in the first six months and 36 months from transplantation were 0.6% and 5%, respectively (11). In a prospective study of 161 renal transplant recipients half of the episodes occurred in the first 44 days after transplantation (12). Risk factors of APN are: female sex, acute rejection, use of mycophenolate as immunosuppressor agent, age, days of bladder catheterization, genitourinary structural or functional abnormalities, UTI the month prior to the transplant, ureteral stent, frequent episodes of acute rejection, cytomegalovirus (CMV) disease, illness of the native kidney, cadaveric donor graft, urological catheter, more than 2 AB episodes, and advanced age of the donor(13,14). Reported risk factors of acute cystitis are: female sex, over a week of bladder catheterization, no preoperative prophylactic antibiotic, immunosuppressor induction, recurrent UTI before transplantation, acute rejection, CMV disease, AB, age, haemodialysis just after transplant (reflecting delayed graft function), and BMI of recipient (15).

The latest guidelines issued by the “Infectious Diseases Society of America” state “No recommendations” can be made for screening, or treatment of asymptomatic bacteriuria in renal transplant recipients (16). UTIs are important not only because they are widespread, but they also represent a potential risk factor for poorer graft and recipient outcomes .

A review of the literature clearly illustrates the paucity of data from developing countries , and periodic evaluation of the results is linked to successful outcomes in renal transplants. Furthermore, incidence of infections with nosocomial origin with multiple antibiotic resistance among transplant recipients has been emerging. Increased nosocomial bacterial resistance has emerged not only for Gram positive bacteria, such as *Staphylococcus aureus* and *Enterococcus spp*., but also for Gram negative bacteria (17).

The purpose of this retrospective study was to determine the incidence of UTI, its causative agents, and antimicrobial resistance pattern among renal transplant recipients in a kidney transplant therapy department of High Technology Medical Centre University Clinic ,Tbilisi, Georgia .

Material and Methods:

In total, 60 patients patients consist of 31 (51,66%) men and29(48.33%) women medical records were study from 2013 to 2018, in kidney transplant therapy department of High Technolo gy Medical Centre University Clinic ,Tbilisi, Georgia. The patients’ age ranged from 5-67 years . Confirmed UTI was defined as the presence of one of the following signs or symptoms: fever, urine frequency, dysuria or suprapubic tenderness, together with a positive urine culture (10^5cfu/ml) and pyuria (10 white blood cells/mm^3). General urinalyses were conducted several times daily and, bacteriological analysis were performed when leukocytes were up to 10 per microscopic field . Midstream Urine and urine sample obtained from catheter were culture on Columbia agar with 5% sheep blood (biomerieux,France) and MacConkey agar (biomerieux,France) and Sabouraud dextrose agar. For manual microorganism identification to the species level, bioMérieux’s API identification products were used for identification of Gram positive and Gram negative bacteria and yeast(api20E, api 20NE,apiStaph, apiStrep 20,api 20C AUX)colony count were done as per standard protocol (12).

Positive urine cultures were processed for antimicrobial susceptibility testing on Mueller-Hinton agar plates, using the Kirby-Bauer disk diffusion method, according to the EUCAST guideline (14). Gram-negative bacteria were evaluated against piperacilline+tazobactam,amikacin, nitrofurantoin,fosfomycine, cotrimoxazol, gentamycin, ceftriaxon, cefuroxime,ceftazidime,cefotaxime,nalidixic acid, cefepime,ciprofloxacin, levofloxacine, moxifloxacine, meropenem, imipenem. (Bio-Rad). Minimal inhibitory concentrations (MICs) were used for determine antimicropbial suscebtibility

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against colistin. Colistin diffuse poorly into agar, creating potentially inaccurate Etest and disk diffusion results, and testing by these methods is not recommended.

Results: UTI was diagnosed in 19 patients(31.66%). Gram-negative bacteria were the most prevalent isolated microorganisms with E.coli 7(36.84%), Klebsiella pneumoniae 4(21.05%),Pseudomonas aeruginosa 3(15.78%). Among Gram positives, Enterococcus faecalis 2(10.52%), Staphylococcus aureus 1(5.26%) .Candida albicans was isolated in 1 case.

According to the results from the susceptibility testing, the rate of resistance to all tested antibiotics was higher in Klebsiella pneumoniae and Pseudomonas aeruginosa. compared to Escherichia coli .The most common resistance were seen against cephalosporins, trimethoprim-sulfamethoxazole and fluoroquinolones .Carbapenem resistance were seen in 3 cases. In two case isolate were Pseudomonas aeruginosa, in one case Klebsiella pneumoniae.Colistin resistance were not detected.

Conclusion: In our study according to the single-centre expirience bacterial infection had no significant impact on survival by itself. We observed a incidence of infection with antibiotic resistant bacteria, most frequently Gram negative enteric bacilli. The significantly higher antibiotic resistance against cephalosporins ,trimethoprim-sulfamethoxazole, and fluorofuinolones groups in this study may be due to higher rate of this group antibiotic usage by people in our country , even in the absence of a prescription, and UTI is more common in the early years of life. Of course, this is not a surprising finding, since the antibiotic resistance shows an emerging increase especially among gram negative bacteria worldwide.

Since the pattern of the sensitivity of microorganisms to antibiotics varies over time and among different locations, antibiotic treatment should be initiated based on the local susceptibility test patterns which are mainly achieved by application of the standard bacteriological testing.

REFERENCES

1. Hassanzadeh J, Hashiani AA, Rajaeefard A, Salahi H, Khedmati E, et al. Long-term survival of living donor renal transplants: A single center study. Indian J Nephrol. 2010;
2. El Amari EB, Hadaya K, Bühler L, Berney T, Rohner P, et al. Outcome of treated and untreated asymptomatic bacteriuria in renal transplant recipients. Nephrol Dial Transplant. 2011;
3. Esezobor CI, Nourse P, Gajjar P. Urinary tract infection following kidney transplantation: frequency, risk factors and graft function. Pediatr Nephrol.2012
4. Iqbal T, Naqvi R, Akhter SF. Frequency of urinary tract infection in renal transplant recipients and effect on graft function. J Pak Med Assoc. 2010;60:826–829.
5. Esezobor CI, Nourse P, Gajjar P. Urinary tract infection following kidney transplantation: frequency, risk factors and graft function. Pediatr Nephrol. 2012;27:651–657
6. Barbouch S, Cherif M, Ounissi M, Karoui C, Mzoughi S, Hamida FB, Abderrahim E, Bozouita A, Abdalla T, Kheder A. Urinary tract infections following renal transplantation: a single-center experience. Saudi J Kidney Dis Transpl. 2012;23:1311–1314
7.Clinical and Laboratory Standards Institue. Performance standards for antimicrobial susebtibility testing: 17th informathional supplement. CLSI document M100- A20. Clinical and Laboratory Standard Institue; wayne, PA: 2010.
8.Pinheiro HS, Mituiassu AM, Carminatti M, Braga AM, Bastos MG (2010) Urinary tract infection caused by extended-spectrum beta-lactamase-producing bacteria in kidney transplant patients.2010
9.Mitra S, Alangaden GJ (2011) Recurrent urinary tract infections in kidney transplant recipients. Curr Infect Dis Rep 13: 579–587.
10.Khanna P, Abraham G, Mohamed Ali AA, Miriam PE, Mathew M, Lalitha MK, et al. Urinary tract infections in the era of newer immunosuppressant agents: A tertiary care center study. Saudi J Kidney Dis Transpl. 2010;21:876–80.
11.Bodro M, Sabé N, Tubau F, Lladó L, Baliellas C, Roca J, et al. Risk factors and outcomes of bacteremia caused by drug-resistant ESKAPE pathogens in solid-organ transplant recipients. Transplantation. 2013
12.Gołębiewska JE, Dębska-Ślizień A, Rutkowski B. Treated asymptomatic bacteriuria during first year after renal transplantation. Transpl Infect Dis. 2014
13.Origüen J, Fernández-Ruiz M, López-Medrano F, Ruiz-Merlo T, González E, Morales JM, et al. Progressive increase of resistance in Enterobacteriaceae urinary isolates from kidney transplant recipients over the past decade: narrowing of the therapeutic options. Transpl Infect Dis. 2016;
14.Rossignol L, Vaux S, Maugat S, Blake A, Barlier R, Heym B, et al. Incidence of urinary tract infections and antibiotic resistance in the outpatient setting: a cross-sectional study. Infection (Springer Berlin Heidelberg). 2017
15.Toner L, Papa N, Aliyu SH, Dev H, Lawrentschuk N, Al-Hayek S. Extended-spectrum beta-lactamase-producing Enterobacteriaceae in hospital urinary tract infections: incidence and antibiotic susceptibility profile over 9 years. World J Urol. 2016;

16. R, Geerlings SE, Bemelman FJ. Asymptomatic bacteriuria and urinary tract infections among renal allograft recipients. Curr Opin Infect Dis. 2015
17.Lee JR, Bang H, Dadhania D, Hartono C, Aull MJ, Satlin M, et al. Independent risk factors for urinary tract infection and for subsequent bacteremia or acute cellular rejection: a single-center report of 1166 kidney allograft recipients. Transplantation. 2013;

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PLICATIVE METHOD FOR LINEARIZATION CHARACTERISTICS OF MEASURING SYSTEMS TRANSFORMATION

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ABSTRACT

There are technological, constructive, structural, schematic, structural, structural-algorithmic and algorithmic methods for linearizing the transformation characteristics of measuring instruments [1-10].
Only algorithmic methods, based on the processing of measurement information obtained from the measuring system (IC) can meet the requirements imposed on the linearization methods, excluding the need for using high-precision model measures and disabling the measured value from the input of the IC and interference in the structure and principles of their construction [1 -4,6,8].
Known algorithmic methods of linearization require the reproduction of a non-linear function, the inverse of the IC transformation function or the non-linear correction function [5-7,9,10].
The proposed multiplicative linearization method based on the introduction of correction factors for the analytically determined and memorized microprocessor in the memory of the microprocessor for each part of the partition of the transformation characteristic is considered in the article.
The essence of the multiplicative method is that the nonlinear characteristics of TS are divided into parts in the ordinate axis. For each division part, in order to approximate it the value on linear characteristic (Z*= X) which is the bisector of Decart coordinating system, the correction coefficient to which the output quantity of TS is to be multiplied is defined. Thus, in each division part the non-linear characteristic of TS is rotated to the linear characteristic, and the corrected characteristic obtains the form of the curvilinear-shaped function in the boundaries of division parts.
The situation where the corrected characteristics of TS is based on the linear characteristic depends on the values of correction coefficients. The correction coefficients are determined from the condition providing the equality of positive and negative deviations of linear characteristic of the corrected section of non-linear characteristics in each division boundary.
This method eliminates the need to reproduce non-linear functions, differs by its applicability to a wide class and methods for specifying non-linear characteristics, has no limitations on the degree of their nonlinearity, and excludes operations for subtracting the initial values of the output value of the IC and allows solving the problem of distributing computational resources between the functional blocks of information -measuring and control systems.
Keywords: measuring system, measuring instruments, linearization, transformation function, transformation characteristic, correction, corrective coefficient, multiplicative method, fragmentation partition.

REZÜME

Ölçmə vasitələrinin çevirmə xarakteristikasını xəttiləşdirən texnoloji, konstruksiya, sxem, struktur, struktur-alqoritmik və alqoritmik xəttiləşdirmə üsulları mövcuddur [1-10]. Yalnız ölçmə sistemindən (ÖS) alınmış ölçmə informasiyasının emal olunmasına əsaslanan alqoritmik üsullar xəttiləşdirmə üsullarına qoyulan– yüksək dəqiqliyə malik olan nümunəvi ölçülərdən istifadə olunma, ölçülən kəmiyyətin ÖS-in girişindən ayrılma və onların strukturuna və qurulma prinsipinə müdaxilə olunması ehtiyaclarının aradan qaldırılması tələblərinə və cavab verə bilər [1-4,6,8].
Məlum olan alqoritmik xəttiləşdirmə üsulları ÖS-in çevirmə funksiyasına əks olan qeyri-xətti funksiyanın, və yaxud korreksiyaedici qeyri-xətti düzəliş fuhksiyasının yaradılmasını tələb edir [5-7,9,10].
Məqalədə ÖS-in çevirmə xarakteristikasının hər bir bölmə parçası üçün ədədi qiyməti analitik yolla təyin edilən və mikroprosessorun yaddaşında saxlanılan korreksiyaedici düzəlişlərin ölçmə nəticəsinə daxil edilməsinə əsaslanmış təklif olunan multiplikativ xəttiləşdirmə üsuluna baxılır.
Multiplikativ üsulun məğzi ondan ibarətdir ki, ÖS-in qeyri-xətti xarakteristikası ordinat oxu üzrə parçalara bölünür. Hər bölmə parçası üçün onu Dekart koordinar sisteminin tənböləni olan xətti (Z^* = X) xrakteristikası üzərindəki qiymətə yaxınlaşdırmaq məqsədi ilə ÖS-in çıxış kəmiyyətinin vurulmalı olduğu korreksiya əmsalı təyin edilir. Beləliklə, hər bölmə parçası daxilində ÖS-in qeyri-xətti xarakteristikası döndərilərək xətti xarakteristikaya yaxınlaşdırılır və korreksiya olunmuş xarakteristika bölmə parçaları sərhədlərində kəsilən parçalarla-əyrixətli funksiya formasını alır.
ÖS-in xarakteristikasının korreksiya olunmuş parçalarının xətti xarakteristikaya nəzərən aldığı vəziyyət korreksiya əmsallarının qiymətindən asıldır. Korreksiya əmsallarının qiyməti hər bir bölmə sərhədlərində qeyri-xətti xarakteristikanın

korreksiya olunmuş hissəsinin xətti xarakteristikadan müsbət və mənfi işrəli yayınmalarının bərabərliyini təmin edən şərtdən təyin edilir.
Bu üsul qeyri-xətti funksiyaların yaradılması ehtiyacını aradan qaldırır, geniş sinif qeyri-xətti xarakteristikalar və onların verilməsinin müxtəlif üsulları üçün tətbiq edilə bilməsi ilə fərqlənir, onların qeyri-xəttilik dərəcəsinə məhdudiyyətlər qoymur, eləcə də ÖS-in çıxış kəmiyyətinin başlanğıc qiymətinin çıxılması üzrə əməliyyatları istisna edir və hesablama resurslarının informasiya-ölçmə və idarəetmə sistemlərinin funksional blokları arasında paylanması məsələsini həll etməyə imkan verir.
Açar sözlər: ölçmə sistemi, ölçü alətləri, lineerləşmə, transformasiya funksiyası, transformasiya xarakteristikası, düzəliş, düzəldici əmsal, çarpma üsulu, parçalanma bölməsi.

РЕЗЮМЕ

Существуют технологические, конструктивные, схемные, структурные, структурно-алгоритмические и алгоритмические методы линеаризации характеристики преобразования средств измерения [1-10].
Только алгоритмические способы, основанные на обработку измерительной информации, полученной от измерительной системы (ИС), могут отвечать предъявляемым к способам линеаризации требованиям, как исключение необходимости использования высокоточных образцовых мер, отключения измеряемой величины от входа ИС и вмешательства в структуру и принципы их построения [1-4,6,8].
Известные алгоритмические способы линеаризации требуют воспроизведения нелинейной функции, обратной функции преобразования ИС или нелинейной функции корректирующей поправки [5-7,9,10].
В статье рассматривается предложенный мультипликативный способ линеаризации, основанный на введении в результат измерения ИС аналитически определяемых и запоминаемых в памяти микропроцессора корректирующих коэффициентов для каждого участка разбиения характеристики преобразования.
Сущность мультипликативного способа линеаризации заключается в том, что нелинейная характеристика ИС разбивается на участки по оси ординат. Для каждого участка разбиения определяется корректирующий коэффициент, на которую необходимо умножить выходную величину ИС с целью приближения ее к соответствующему значению на линейной характеристике являющейся биссектрисой Декартовой системы координат ($Z^* = X$). Таким образом, на каждом участке осуществляется поворот и сближение характеристики СИ к линейной, и скорректированная характеристика имеет вид кусочно-криволинейной функции с разрывами на границах участков разбиения.
Расположение скорректированных участков характеристики ИС относительно линейной зависит от величины корректирующих коэффициентов. Корректирующие коэффициенты определяются из условия, обеспечивающего равенство положительного и отрицательного отклонения скорректированного участка нелинейной характеристики от линейной характеристики, на границах каждого участка разбиения.
Этот способ позволяет исключить необходимость воспроизведения нелинейных функций, отличается применимостью к широкому классу и способам задания нелинейных характеристик, не имеет ограничения на степень их нелинейности, а также исключает операции по вычитанию начальных значений выходной величины ИС и позволяет решить задачу распределения вычислительных ресурсов между функциональными блоками информационно-измерительных и управляющих систем.
Ключевые слова: измерительная система, измерительные приборы, линеаризация, функция преобразования, характеристика преобразования, коррекция, корректирующий коэффициент, мультипликативный метод, фрагментационный раздел.

INTRODUCTION

Problem statement

Measuring instruments designed for operating as part of information-measuring systems or with digital measuring instruments are subject to increased requirements with respect to the linearity of their transformation characteristics. This is due to the fact that the nonlinearity of measuring instruments transformation characteristic leads to the appearance and accumulation of additional errors in further linear transformations, complicates the algorithm for determining and representing the value of the input quantity in its units.
The task of linearization is to reduce the nonlinear part to such a value that, with an admissible error, the transformation characteristic of measuring systems (MS) can be represented as a linear function.
In order to combine linearization operations and present the result of a digital measurement of an input quantity in its units, it is necessary to approximate the transformation characteristic of MS to a linear characteristic with a coefficient equal to one, for example, $Z^* = X$.

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Analysis of recent research and publications

There are technological, constructive, schematic, structural, structural-algorithmic and algorithmic methods of linearization characteristics of MS transformation [1-10].
Technological, structural, schematic, structural and structural-algorithmic methods do not meet the demands for linearizing the non-linear characteristics of MS without the need for highly accurate standard measures and disconnecting the measured value from the input and interfering with the structure and principles of MS construction [1-4,6,8].
Only algorithmic methods, based on the processing of measurement information obtained from MS, and not involving the introduction of additional functional units or elements into its structure, can meet the above mentioned demands.

Formulating the purpose of the article. The aim of the article is to propose an algorithmic multiplicative linearization method based on the processing of measurement information, which is applicable to a wide range of classes and methods for specifying nonlinear transformation characteristics, without limiting their nonlinearity degree.

The main material statement

The introduction of microprocessors into the composition of measuring devices increases the possibility of using algorithmic methods to improve their metrological characteristics and expand their functionality.
One of the common algorithmic method of linearizing the nonlinear characteristic of MS transformation Z = f (X) is the method of reciprocal nonlinear transformation. The basis of this method is the following ratio:

$$F^{-1}(Z) = f^{-1}[f(X)] = X \quad (1)$$

Here, X is a measurable quantity; f (X) is the nonlinear characteristic of the measuring instrument transformation; f^{1} (Z) is the inverse nonlinear transformation of the MS output value.
As it is seen from the equation (1), the application of this method provides for performing a non-linear transformation operation on the MS output value [7, 9, 10].
Another algorithmic linearization method is based on introducing a nonlinear correction function $\Delta Z(X) = f(X) - X$, obtained as the difference between the nonlinear Z = f (X) and the desired linear transformation function Z * = X to the MS output value:

$$f(X) - \Delta Z(X) = f(X) - [f(X) - X] = X \quad (2)$$

As it is seen from equations (1) and (2), the well-known algorithmic methods of linearization require the reproduction of a nonlinear function, the inverse of MS transformation function, or a nonlinear difference function [5–7, 9, 10]. In addition, the implementation of the second method is much more complicated in cases where the nonlinear and desired linear characteristics intersect due to the difference in the difference function signs before and after the intersection point.
The article considers the proposed multiplicative linearization method, which eliminates the need to reproduce nonlinear functions that are based on analytically introducing numerical corrections to the measurement result and stored in the microprocessor memory for each fragmentation partition of the MS characteristic.
The essence of the multiplicative method of linearization is explained by a graphical construction, shown in Fig.1. The nonlinear characteristic of the MS Z = f (X) is divided into sections along the axis of ordinates Z. For each fragmentation partition, a correction factor M_i is determined, to which the output value of the MS must be multiplied in order to approximate it to the corresponding value on the linear characteristic Z * = X.
Fig. 1 shows a linearized multiplicative part of a nonlinear characteristic.

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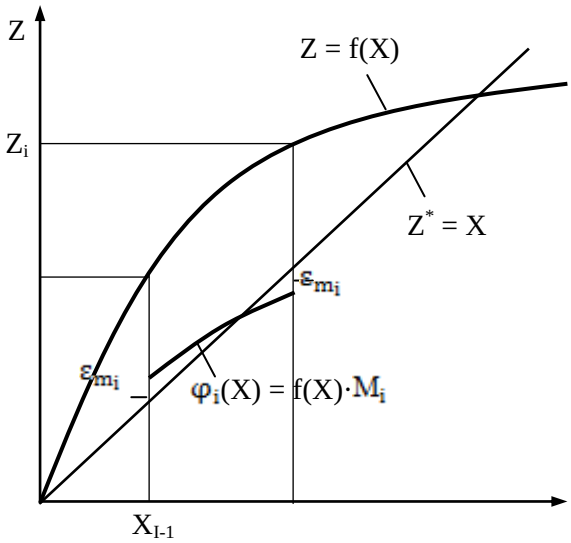

Fig.1. Linearized multiplicative method of nonlinear characteristics part

Fig. 1 represents the function $\varphi_i(X) = f(X) \cdot M_i$ denoting the linearized multiplicative section of the nonlinear characteristic, where M_i is the corrective multiplicative coefficient for linearizing the section of the nonlinear characteristic of the MS in the interval $[X_{i-1}, X_i]$.

Similarly, the linearization of the remaining sections of the MS nonlinear characteristics is constructed.

Thus, at each site, the rotation and convergence characteristics of the MS to a linear one is performed, and the corrected characteristic has the form of a piecewise curvilinear function with discontinuities at the boundaries of the partition sites.

The position of the corrected areas of the MS characteristic relative to the linear depends on the magnitude of the corrective coefficients.

Depending on the initial position of the nonlinear and linear characteristics, the corrective coefficient M_i may acquire values of more or less units. If the MS characteristic is located above the linear characteristic, then $M_i < 1$, otherwise - $M_i > 1$.

In case when the output value has an initial value ($X = 0$; $Z \neq 0$), for the optimal position of the corrected areas relative to the linear characteristic, the condition should be satisfied as follows:

$$\pm M_i \cdot f(x_{i-1}) \mp x_{i-1} = \pm x_i \mp M_i \cdot f(x_i) = \varepsilon_{mi} \qquad (1)$$

Here, the upper signs refer to the characteristics of convexity upwards ($f'' < 0$), and the lower signs refer to convexity downwards (f "> 0). Condition (1) means that the positive and negative deviations of the corrected area of the nonlinear characteristic from the linear characteristic should be equal at the boundaries of each fragmentation partition.

From (1), for characteristics with convexity upwards or downwards, the equation for the corrective coefficient is obtained as follows:

$$M_i = \frac{x_{i-1} + x_i}{f(x_{i-1}) + f(x_i)} \qquad (2)$$

Substituting (2) into (1) for the upper boundary of the fragmentation partition along the abscissa axis and the ordinate axis, the following expressions are obtained, respectively:

$$x_i = \frac{1}{f(x_{i-1})} \cdot \{x_{i-1} \cdot f(x_i) \pm \varepsilon_{mi} \cdot [f(x_i) + f(x_{i-1})]\} \qquad (3)$$

$$z_i = f(x_i)$$

In expression n (3), x_{-1} and ε_{mi} are known, since the beginning and end of the operating range of the characteristics of each MS and the allowable maximum value of $\varepsilon_{мдоп}$ are known in advance.

After some transformations from (1), the following expression is obtained to determine the methodological error:

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$$\varepsilon_i = \pm\frac{1}{2}\cdot[M_i\cdot\Delta f(x_i) - \Delta x_i] \quad (4)$$

$\Delta f(x_i) = f(x_i) - f(x_{i-1})$ is the increment of the nonlinear characteristic on i site;

$\Delta x_i = x_i - x_{i-1}$ is the increment of the linear characteristic Z * = X on i site.

According to the multiplicative method, the mathematical model of the linearization process is as follows:

$$Z_{Ki} = \omega_i(Z)\cdot Z\cdot M_i$$

Here: Z is the output value of the MS;

$\omega_i(Z)$ is a logical function if the condition $Z \in [Z_{i-1}; Z_i]$, $\omega_i(Z) = 1$, otherwise $\omega_i(Z) = 0$

Mi is the multiplicative coefficient, the corrective result of MS measuring within the i fragmentation partition characteristic;

Z_{Ki} is the corrected value of the measurement result of MS.

Functional-structural model of the multiplicative nonlinear linearization method characteristics of the MS has the form shown in Fig.2.

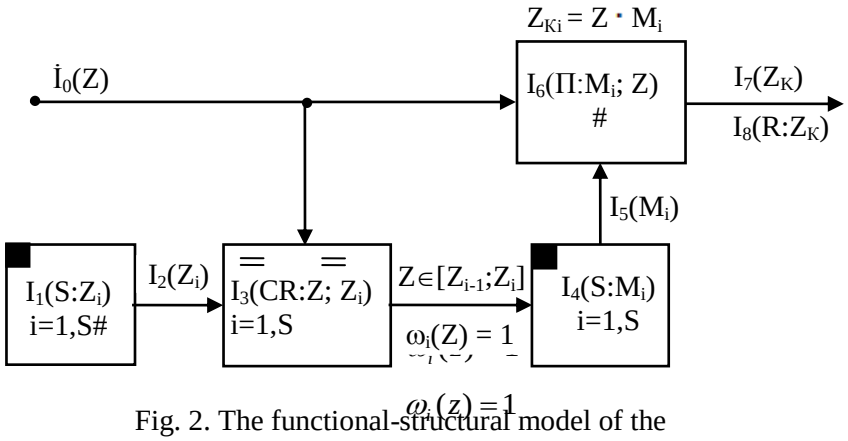

Fig. 2. The functional-structural model of the multiplicative linearization method

The content of functional operators is explained as follows.

$I_0(Z)$ is transmission of the measurement result to the microprocessor device to perform the multiplication and comparison operation;

$I_1(S:Z_i)$; i = 1, S is the storage in memory of the fragmentation partition boundaries values of the nonlinear characteristic Z = f (X);

$I_2(Z_i)$, $I_5(M_i)$, $I_7(Z_K)$ is transmission of the fragmentation partition boundaries values for comparison with the output value of MS, the numerical values of the corrections and the measurement result corrected in MP for the corresponding modules;

$I_3(CR: Z, Z_i)$ is comparison of the output value of MS with fragmentation partition boundary values Zi;

I_4 (S: M_i); i = 1, S is the storage in memory of the values of the correction coefficients for fragmentation partition of the non-linear characteristic;

$I_6(\Pi:M_i; Z)$ denotes the fulfillment of the computational multiplication operation between the correction coefficient M_i and Z;

$I_8(R:Z_k)$ is a digital indication of the corrected value of MS the measurement result.

Thus, using multiplicative method on a microprocessor in the linearization process of MS nonlinear characteristics, the following operations are performed.

1. Storage of the values Zi corresponding to fragmentation partition boundaries of the nonlinear characteristic Z = f (X) and the correction coefficients (Mi).
2. Determining the number of (i) fragmentation partition characteristic, the limits of which corresponds the current value of the output value of the measuring system $Z \in [Z_{i-1}; Z_i]$.
3. Performing a computational multiplication operation between the correction coefficient M_i and the output value Z of the measuring system.

In order to determine the number of the site, the current value of the measured value is alternately compared with the boundary values stored in the microprocessor memory. When the condition $Z_{i-1} \le Z \le Z_i$ is fulfilled, the logical function becomes equal to unity, $\omega_i(Z) = 1$, which indicates the determination of the number of the area within which one can find the value of the measured value. After that, from the memory of the microprocessor, the correction coefficient M_i is selected, corresponding to this fragmentation partition number. The corrected value Z_K is obtained by performing a computational multiplication operation between the correction coefficient M_i and the output value Z of the measuring system in accordance with the multiplicative linearization method.

CONCLUSION

The proposed multiplicative linearization method based on the processing of measurement information differs by its applicability to a wide class and methods of defining nonlinear characteristics of MS transformation and has no restrictions on the appearance and degree of their nonlinearity, as well as excludes operations on subtracting initial values of the MS output value. The use of this method also allows to solve the problem of distributing the computing resources between the functional units of information-measuring and control systems.

REFERENCES

1. Aliyev T.M., Seidel L.R. Automatic error correction of digital measuring devices. - M: Energy, 1975.-216p.
2. Bromberg, E.M., Kulikovski, K.L. Test methods for improving the accuracy of measurements. M: Energy, 1978. -176 p.
3. Larionov V.A. The linearization method of the calibration characteristics of the measuring transducer.
4. Lapin A.P., Sipina Y.N., Sukhodoeva S.S. Transformation function correction of the analog sensor using a programmable amplifier of type PGA 309. Series “Computer technology, control, electronics”, issue 11, p.11-16. https://cyberleninka.ru/.../korrektsiya-funktsii-preobrazo-vaniya-analogovogo-datchik...
5. Polyakova E.S. Transformation functions linearization of standard temperature transducers in microprocessor thermometers. https://cyberleninka.ru/article/n/linearizatsiya-funktsiy-preobrazovaniya-standartnyh-preobrazovateley-temperatury-v-mikroprotsessornyh-termometrah
6. Radoil Radevich, Marijana Pavlov-Kagadeev, Nikola Milivoevich. Analog linearization of the operating characteristics of Pt100. Serbian Journal of Electrical Engineering Vol. 12, No. 3, October 2015, 345-357.
7. Tokarev, O. D., Leonets V. A., Pavluk S. O., Chaus L. M. Algorithmic linearization method of sensor characteristics. Journal: Sensors and Systems, Publisher: Sensidat Plus (Moscow) p. 6 - 9. ISSN: 1992 - 7185.
8. Tuz Y.M. Structural methods for improving the accuracy of measuring devices. - Kiev: High school, 1976. 256 p.
9. Shestakov A. L, Lapin A. P., Lapina E. A. The task of optimizing the transformation functions of measuring transducers. Bulletin of the South Ural State University. Series: Computer technology, management, radio electronics №2, 2010.- p. 1-4. https://cyberleninka.ru/article/n/zadacha-optimizatsatsii-funktsiy-preobrazovaniya-izmeritelnyh-preobrazovateley.
10. Yan Stursel, Miroslav Kamenski. Approximation function and digital linearization in sensor systems. AT & P PLUS2 Journal. 2006 SENZOROVÉ SYSTÉMY A SPRACOVANIE SIGNÁLOV P. 13-17.

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