

ABSTRACTS

UDC 623.746

INTELLECTUALIZATION OF INTERFACE FOR AGENT INTERACTION IN SYSTEMS OF MANAGEMENT OF COMPLICATED TECHNOLOGICAL COMPLEXES

L.S.Sikora, U.M.Semenyuk, T.I.Shcherbyna

Lviv Polytechnic National University 12, Bandera St., Lviv, Ukraine, 79013

Research Methodology. The basis of the research is made by the information technology of the dialogue interface development and cognitive psychology of intellectual logical solutions formation as the basis for solving problems of management at the operational level of the hierarchical system.

Result. Structural and information-logic scheme of a dialogue in the integrated system ACS-TP and concepts of forming conclusions about the condition of the system have been developed.

Novelty. On the basis of logic and cognitive concepts, we have developed the interface structure for a dialogue of intelligent agents (human - ACS-TP, II ACS), which provides the efficient representation of the data flows from all levels of management of the information structure.

Practical Significance. The proposed method was used to develop a simulator of ACS-TP operator.

UDC 655.027

MODELLING OF INK COVERAGE OF TEN-POINT SCALE IN FLEXOGRAPHIC PRINTING SYSTEM OF PARALLEL STRUCTURE OF THE FOURTH DIMENSION

M. M. Lutskiv, O. S. Sidiki

*Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine
sidikioleg@gmail.com*

Research Methodology. The methodological basis of research is the material balance equation of ink flows in the printing system. To solve this problem we have applied the signals theory to analyze the ink flow of modulated raster printing plate, graphs to describe and modulate the ink flow simulation for calculation and building characteristics of the coating.

Results. The study has elaborated the mathematical model of transferring ink flows of modulated raster printing plates which describe the coating of ink application of ten-point scale. We construct the graph of the ink printing system on which we have processed a block diagram of a simulation model in Simulink. The results of simulation modeling have been presented as an ink coating characteristics of ten-

point scale for different capacity of an anilox roller. It was established that the error of ink coating of scale fields is not dependent on the capacity of an anilox roller and is within + 8.64% on light areas to -16.62% in the shadows and does not fully provide technical requirements for the precision of ink coating on the whole range of tone reproduction. The work has practical value.

Novelty. Scientific novelty of the results is the fact that the first mathematical model of ten-point scale of ink coating in flexographic printing system of parallel structure has been developed describing the dependence of the thickness of ink on the tone reproduction range which is the basis for the analysis of the properties of the system.

Practical Significance. We have found out that the thickness of the ink does not fully ensure the standard requirements for the precision of ink coating of raster prints. The results of the study can serve to organize tone reproduction combination spacing density of the original density of raster prints.

UDC655.027

FEATURES OF INK APPLICATION ON SQUARE RASTER ELEMENTS IN INK PRINTING SYSTEM OF THE SIXTH DIMENSION

P. Z. Kurka

Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine
petiaman@gmail.com
petiaman@gmail.com

Research Methodology. The methodological basis of the research is made by the equation of modulated ink flows balance in the ink printing system. To solve this problem we have applied the signals theory to analyze the ink flows modulated by raster printing plates, graphs to describe the structure of modulated flows and the package MATLAB-Simulink for the simulation.

Results. In the study we have worked out a mathematical model of short ink printing system of consistent structure of the sixth dimension, which describes the dependence of the number of colors on the surface of the square raster elements on the tone reproduction. The block diagram of the mathematical model has been developed on basis of which a simulator has been developed in the package MATLAB-Simulink that calculates and builds graphs of inking characteristics of raster elements. The results of the simulation for square raster elements of the lineature 50 lin/cm have been presented. It has been found out that inking characteristics are nonlinear, and the maximum deviation from the linearity is -19.42%, which will cause brightening of raster images to mid-range tone reproduction.

Novelty. Scientific novelty of the results is that for the first time a mathematical model of ink application on square raster elements in short ink printing system of

the sixth dimension and a simulator for design of inking characteristics have been developed, their analysis has been done.

Practical Significance The revised models and the simulator of ink application of raster elements in the short ink printing systems can be used to assess the quality of tone reproduction and it can be used as the basis for non-linearity correction of images tone reproduction in preparation for screening.

UDC 6813.06

A DISCRETE MODEL FOR GRAPHIC INTERPRETATION OF FUZZY SETS

M.M. Lutskiv

*Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine
e-mail: lutolen@i.ua*

Research Methodology. The methodological basis of research is the theory of fuzzy sets and fuzzy logic. To solve this problem we have applied the theory of digital image processing for constructing discrete models and fuzzy sets, Z-transformations to build the block diagram of the model, object-oriented programming in a package Matlab: Simulink to build a simulator for a graphic interpretation of fuzzy sets of different shapes and spatial period.

Results. In the conducted study we have processed a discrete model of fuzzy sets in Z-transformation. The block diagram of the mathematical model has been developed on which a simulator has been processed in the package Matlab: Simulink which reproduces fuzzy sets such as "Opil N» of the period of the given space and form. We have presented devices of simulation modeling in a sequential and parallel graphic interpretation of fuzzy sets of different shapes. The simulator can be applied for a graphic interpretation of arithmetic operations such as addition/subtraction of fuzzy sets and others.

Novelty. Scientific novelty of the results is that we have processed a discrete model of a fuzzy set as a Z-transformation, which made it possible to build a block diagram of mathematical models and a simulation to develop a graphic interpretation of fuzzy sets and arithmetic operations on them.

Practical Significance. The developed simulator simplifies the graphical interpretation of fuzzy sets regardless by which method a fuzzy set is given (a mathematical expression or a table); it is convenient for a graphic interpretation and the execution of arithmetic operations.

UDC 004.56.5(043.2)

A MODEL OF TECHNIQUE OF RISK ASSESSMENT OF INFORMATION SYSTEMS DESIGNED ON SAAS PLATFORMS

Haranyuk P.I., Pantelyuk D.M., Romaka V.A., Stetsyak T.B.

*Lviv Polytechnic National University 12, S.Bandera St., Ukraine, Lviv
e-mail: garanyuk@gmail.com*

Research Methodology. The main fundamentals of the methodology of structural analysis and design, systems analysis, probability theory, graph theory, methods of expert estimates have been used in the article.

Results. The method of risk assessment for cloud computing has been developed based on the existing methods of expert evaluation and models of an attack tree.

Novelty. We have designed a scale for qualitative assessment of probability of risk implementation, adapted the method of constructing a model of information attacks for more accurate values of risk than traditional methods and an example of their use has been presented.

Practical Significance. This technique can be used in commercial organizations when auditing information security to show the benefits of using cloud technology. Expert assessment can be carried out by the company personnel, as the technique is easy to use. This reduces the cost on information security, which is especially important for small businesses.

UDC 004.056:061.68; 004.3.75:061.68

ANALYSIS OF STOCHASTIC AND DYNAMIC MODELS OF UNAUTHORIZED ACCESS TO STATE INFORMATION NETWORKS

I.R. Opirskyy, P.I. Garanyuk, T.I. Holovatyj

*Lviv Polytechnic National University 12, Bandera St., Lviv 79013, Ukraine
e-mail: garanyuk@gmail.com*

Research Methodology. The methodological basis of the research is the studies of foreign and domestic literature in the context of general patterns of unauthorized access to information networks of the state. To ensure the integrity of the consideration we have used general scientific methods: evaluation, comparison, synthesis, analysis and synthesis.

Results. In this study (based mainly on unpublished archival data) there have been singled out and developed a systematic diagram of process modeling problems of unauthorized access to the information and its protection. The authors have analyzed stochastic and dynamic models of security policies of unauthorized access in state information networks. It has been determined that the disadvantage of the

model of Volokita-Lukin, limiting its scope, is the need to obtain sufficient statistical sampling, on which we build the graph of criminal purposes, and the disadvantage of the application of the dynamic model of Kobozeva and Khoroshko is the difficulty of obtaining a model of attack process on the information in explicit analytic form through the use of direct methods; and the lack of Yazov model is cumbersome calculations, which greatly complicate its intended application in practice, and the advantage is the possibility of quantitative field assessments of the feasibility of threats in computer networks, taking into account the time factor, thus achieving thorough increasing demands to the measures undertaken to protect the information.

Novelty. The scientific novelty of the results is that we have analyzed stochastic and dynamic models of security policies of unauthorized access in state information networks and found their advantages and disadvantages based on the identified problems of unauthorized access to the information and its protection. In the future it will allow professionals to choose between these models and their use.

Practical Significance. Advantages and disadvantages of stochastic and dynamic models may be used by information security experts in choosing a particular model of application and monitoring the implementation of their activities in the future.

UDC 004.942: [616.9-022-021.484]

COMPUTER AND MATHEMATICAL MONITORING OF CLINICAL AND LABORATORY SYNDROME IN TUBERCULOSIS INFLAMMATION

G. I. Ilnytskyy

Lviv National Medical University named after Danylo Halytskiy

69, Pekarska St., Lviv

suhiv-lviv-oksana2@rambler.ru

Lviv Polytechnic National University 12, S.Bandera St., Ukraine, Lviv

suhiv-lviv-oksana2@rambler.ru

Research Methodology. The basis of the methodological approach of the research is computer and mathematical evaluation of clinical, radiological and laboratory manifestations of tuberculosis inflammation considering the features of the development and the disease. At that stage the attention is paid to patients with newly diagnosed and recurrent (repeated) tuberculosis, which allowed processing digital verification criteria and predicting the course of disease in outpatient conditions and the stage profile medical hospital.

Results. The conducted studies substantiate computer and mathematical monitoring of clinical and laboratory symptoms of tuberculosis with the development and course of pathological process. The data allowed increasing significantly the effectiveness of the disease diagnosis up to 90.7 % and to 85.2 % of newly diagnosed tuberculosis and re-ignition respectively.

Novelty. Scientific novelty of the research allowed to select the most informative parameters of clinical course, radiological features, and microbiological and immune-biochemical criteria when first diagnosed (initial) and recurrent (secondary) tuberculosis and to create a mathematical algorithm for diagnosis and prognosis of the disease.

Practical Significance. The experience and the proposed mathematical model of monitoring in different variants of the tuberculosis inflammation is promising to implement in practical health care both at the outpatient unit, as well as in specialized medical hospital.

UDC 550.838.08

RESEARCH OF A MODEL OF QUANTUM CONVERTER «CURRENTS – FREQUENCY» WITH IMPULSE EXCITATION

P.V.Mokrenko¹, I.T.Strepko²

Lviv Polytechnic National University¹ 12, Stepan Bandera St., Lviv, 79000, Ukraine

Ukrainian Academy of Printing² 19, Pid Holoskom St., Lviv, 79020, Ukraine

Strepko-uad@ukr.net

Research Methodology. The methodological basis of the research is the theory of magnetic resonance. To solve this problem we have used Bloch mathematical model describing the dynamics of magnetic moments of atoms, which operates within the external magnetic field. The conditions of impulse excitation of magnetic moments in quantum converters “current – frequency” have been studied based on the converter modeling.

Results. In this study we have worked out a mathematical model of quantum converter with impulse excitation, we have developed an algorithm and a simulation program, which allows determining the conditions of excitement, metrological parameters and stability of the converter.

Novelty. Scientific novelty of the results is that based on a mathematical model we have developed a program of the study of impulse impact of magnetic field excitation on Cs³³intake cell.

Practical Significance. Results of modeling is the basis for the development of quantum converters “current – frequency” with a predetermined conversion errors.

UDC 621:395**ANALYSIS OF THREATS AND PREVENTION OF UNAUTHORIZED ACCESS TO THE PHONE LINE**

M.Y. Mykytyuk

*Lviv Polytechnic National University, Department of Information security
12, S.Bandera St., Lviv, 79013, Ukraine
mykytyuk.my@gmail.com*

Research Methodology. The methodological basis of the study are ways to protect the user's telephone lines, and methods of preventing or limiting physical access to the site of the user's telephone lines. To ensure privacy and prevent unauthorized use of telephony resources we will certainly need to develop protection device telephone line as the development of information technologies available security devices do not provide adequate protection.

Results. The article analyzes the main aspects that need to consider the implementation of telephone channel and basic methods of access to a telephone line. It has been shown that the method of limiting physical access is only possible within the controlled area, and use the method of "burning" requires additional hardware that destroy the device electrically interception.

Novelty. The scientific novelty of the results is that we have processed and classified the methods of preventing unauthorized use of telephone communications resources, including the telephone fraud. Also systematized and reasonable methods of limiting physical access to telephone lines provide or even prevent complications of unauthorized connections and retrieval of information.

Practical Significance. To ensure proper operation and proper functioning of telephone line protection device in its development it is recommended to take into account the results given in this paper. It has examined and described all the threats related to unauthorized access to telephone lines and protection methods considered the latest in order to prevent misuse of telephony resources. The results presented in this paper can be used in further research and development control devices of the user's telephone line.

UDC 004.423**INFORMATION TECHNOLOGY OF INFORMATION SYSTEM DATA PROCESSING WITH VARIABLE STRUCTURE AND PARAMETERS**

R.V.Oliynyk, O. I. Ohirko.

*Ukrainian Academy of Printing 19, Pid Holoskom St., Lviv,
Lviv State University of Internal Affairs, Lviv
enigmus@ukr.net*

Research Methodology. The method of data formation in relational knowledge databases, the method of planning processes and method of automated processing have been suggested. The methods of preservation of time-dependent data and methodology for evaluating the quality of software information system have been improved.

Results. The information technology has been developed, oriented on the processing of characteristics of information systems with dynamic changes in their structure and parameters, which makes the prospects of using the technology to develop a wide range of automated systems.

Novelty. Analysis of the present structure shows that the described system differs from other similar resources. Primarily this is due to the use of cloud technologies that simplify the storage and use of materials, keeping the entire system on the advanced level of IT-technologies.

Practical Significance. The main advantages that can be given by cloud technologies are: the economy of means for purchase of software; reducing the need for specialized areas; performing many types of learning, monitoring and evaluation online; saving disk space; antivirus, security and openness of educational environment. Data processing platform is defined by the data, and its architecture is focused on services, of which the composition procedure can be applied to compose data processing applications.

UDC 621.396

C-RAN PLANNING BASED ON END-TO-END LATENCY CRITERION

P.O. Huskov, R.I. Bak, A.L. Shvets, R.S. Kolodiy, B.V. Koval

*Lviv Polytechnic National University,
12, S. Bandera St., Lviv, 79013, Ukraine
p.huskov@gmail.com*

Research Methodology. The methods of linear algebra, fundamentals of the communication theory, analytical modelling and simulation have made the methodological basis of the study.

Results. We have done the research of latency in C-RAN and developed a model of latency calculation. The research and simulation of average latency in the transport subsystem channel have been done based on restrictions of maximum latency. Part of BBUP, that are serving only one site, comes down to the latency value of 150 μ s, and further increases due to reducing the total quantity of BBUP. The obtained data confirms the effectiveness of the proposed method. It has shown that the limitation of maximum latency to 75 μ s lowers the part of BBUPs that serves only one site to 10%.

Novelty. The method of Radio Access Network deployment that takes into account the limitation of transport subsystem maximum latency for distribution of BBUP and core nodes has been developed. This approach increases the efficiency of BBUP resources usage.

Practical Significance. The experimental results allow describing the expected network behavior by the mathematical models for future network deployments. Based on the expected load and acceptable values of permissible delay operators are able to predict the expenditures on mobile networks modernization.

UDC 686.12.056

TRENDS OF IMPROVING OF TRANSPORTATION SYSTEMS IN UNITS FOR TRIMMING BOOK AND MAGAZINE BLOCKS ON THREE SIDES

P.V. Topolnitskiy, O.I. Strepko

*Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine
olessu1@yandex.ru*

Research Methods. The methodological bases of the research are the principles of credibility and scientific objectivity. For an objective assessment of the subject state we have used general scientific methods: generalization, comparison and analysis, which created the conditions to single out the most significant issues in the direction of the research.

Results. The study allowed concluding that existing transportation means and devices for changing the direction of block movement in the unit to trim the blocks on three sides do not provide the necessary precision of trimming at speeds of block supplying in the trimming area of 2 m/sec.

Novelty. The novelty of the results is to identify the areas of improvement of transportation systems that provide reliable block placement during their feeding and moving from the first to the second trimming section.

Practical Significance. The results of the research can be used in the improvement of the existing three-knife devices for trimming book and magazine blocks and in developing new high-performance equipment.

UDC 621.914

HIGH SPEED PROCESSING OF MACHINE UNITS

Ya. Shakhbazov, M. Bilyavskiy, A. Stetsko

Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine

Research Methodology. The existing structures of mills for possible practical applications in the processing of materials of high hardness have been studied. The features of mills have been analyzed based on their structures and their functional characteristics.

Results. Based on the studies we have developed the design of end mills and the method of mounting the conical blade made from super-hard materials which greatly enhance the milling speed and expand the range of processed materials.

Novelty. The analysis of existing designs of end mills suitable for implementing high-speed cutting has been done. Based on the analysis we have defined the progressive directions of improving the design of end mills for processing materials at high cutting speeds.

Practical Significance. A new scheme of mill mounting from super-hard materials has been developed which can increase the lifespan of the tool and the speed of processing of different types of materials, including hardened ones.

UDC 686.12.056

ONE-ARM TWO-CAM DRIVE MECHANISM OF GRIPPER OF THE PRESS «PRINTMASTER GTO 52»

Ya. B. Stetsiv, B. S. Stetsiv

*Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine
stetsiv.jaroslav@gmail.com*

Research Methodology. In developing a sequence diagram and phase angles of the drive mechanism of a gripper, we have used the method developed by Chekhman Ya.I. To study the kinematics and kinetic-statistic parameters of a hinge four-section unit with a drive from a cam mechanism, we have used the method of similarity and individual mechanisms.

Results. The use of the proposed one-arm two-cam drive mechanism (OKDKM) reduces the maximum torque of a gripper directly on the shaft, on the arm of a cam mechanism and on the shafts of transmitting and printing cylinders.

Novelty. Based on the existing methods of calculating the parameters of the mechanisms, we have developed the methodology for the calculation of the proposed OKDKM with a multi-layer four-section unit mechanism. The lack of power circuit leads to a reduction of contact stresses in the contact zones of the roller with cam profiles. The presence of springs, which serves to select the gaps at the joints at the same time, helps selecting gaps between rollers and profiles, but due to the eccentric finger, which rotates as the profiles work they do not cause additional contact stresses.

Practical Significance. Due to reducing the operating points and the efforts that arise when the mechanism works, contact stress in the contact area of the roller cam with profiles is reduced in 20% than the existing mechanisms of gripper drive with power closure. The proposed mechanism and method of its calculation can be used to develop new and upgrading the existing sheet rotary presses.

UDC 535.37

LUMINESCENCE OF LaBr₃-Ce MICROCRYSTALS, EMBEDDED IN NaBr MATRIX

A.S. Pushak¹, Ya.S. Pushak¹, V.V. Vistovskyi², S.V. Myahkota³,
T.M. Demkiv², A.S. Voloshynovskyi²

¹*Ukrainian Academy of Printing, 19, Pid Holoskom St., Lviv, 79020, Ukraine*

²*Lviv Ivan Franko National University, 8, Kyryl and Mephodyi St., Lviv, 79005, Ukraine*

³*Lviv National Agrarian University, 1, Volodymyr Velykiy St., Dubliany, 80381, Ukraine*

Research Methodology. LaBr₃-Ce crystals are characterized by scintillation properties, and today they are a basic material for the manufacture of high radiation detectors. However, these crystals are highly hygroscopic, which complicates their manufacturing technology. As a way to solve the problem of water absorption designs, we have proposed to use LaBr₃-Ce microcrystals, embedded in the dielectric non- hygroscopic matrix.

Results. With the help of Bridgman-Stockbarger technique we have obtained a crystal system based on LaBr₃-Ce microcrystals embedded in NaBr matrix. A spectral-luminescent radiation of NaBr-LaBr₃-Ce crystal system has been done using synchrotron radiation. The method of scanning electron spectroscopy has revealed LaBr₃-Ce microcrystals of 1-10μm size, embedded in NaBr matrix.

Novelty. Over-absorbing mechanisms has been established for the transfer of excitation energy to cerium centers from NaBr matrix and LaBr₃microcrystals. Spectral-luminescent parameters of LaBr₃-Ce microcrystals are identical to their bulk counterparts.

Practical Significance. Interspersing of LaBr₃-Ce microcrystals in non-hygroscopic or less hygroscopic matrix of cubic symmetry allows obtaining large samples compared to single LaBr₃-Ce crystals. Spectral-luminescent parameters of a crystal system are identical.

UDC 538.915:537.312.6

DESIGN OF ELECTRONIC STRUCTURE OF *n*-ZrNiSn THERMOMETRIC MATERIAL

V. Ya. Krayovskyy

Lviv Polytechnic National University, 12, Bandera St., Lviv, 79005, Ukraine

vkrayovskyy@ukr.net

Research Methodology. The calculations of electronic structure have been conducted by the semi-empiric extended method of Hunkel (EHTB), the method of func-

tions of Green (KKR) in approaching of coherent potential (CPA) and local closeness (LDA) and the full potential method of flat waves (FP-LAPW) in approaching of the generalized gradient (GGA) and local closeness (LDA) and the method of LMTO within the frame work of the theory to the functional of closeness (DFT). For calculations we have used the values of permanent grate of a k-net by the size $10 \times 10 \times 10$ and the type of parameterization of exchange-cross-correlation potential of Moruzzi-Janak-Williams. The width of power window that is embraced by a contour presents 16 eV. The number of values of energy for the calculation of DOS presented 1000. The exactness of calculation of the position of the level to Fermi ϵ_F presented ± 8 meV.

Results. Bases of creation of new thermometric materials have been worked out with high efficiency of transformation of thermal energy in electric. It has been shown that n-ZrNiSn is characterized by imperfectness of structure. It allowed setting the mechanisms of their conductivity and explaining reason of instability of descriptions.

Novelty. It has been shown that on the condition of coincidence of signs of basic transmitters of feedstock current and generating defects in the created materials, it rises the efficiency of transformation of thermal energy in electric, and for differences – new thermo-electric materials of electronic and p-type types of conductivity have been received.

Practical Significance. The mechanism of stabilizing of thermo-electric descriptions of materials has been offered on the basis of n-ZrNiSn by the corresponding alloying.

UDC 538.915:537.312.6

DESIGN OF ELECTRONIC STRUCTURE OF $\text{Hf}_{1-x}\text{Lu}_x\text{NiSn}$ THERMO-METRIC MATERIAL

V. Ya. Krayovskyy

*Lviv Polytechnic National University, 12, Bandera St., Lviv, 79005, Ukraine
vkrayovskyy@ukr.net*

Research Methodology. The calculations of electronic structure have been conducted by the method of functions of Green (KKR) in approaching of coherent potential (CPA) and local closeness (LDA). For calculations we have used the values of permanent grate of a k-net by the size $10 \times 10 \times 10$ and the type of parameterization of exchange-cross-correlation potential of Moruzzi-Janak-Williams. The width of power window that is embraced by a contour presents 16 eV. The number of values of energy for the calculation of DOS presented 1000. The exactness of calculation of the position of the level to Fermi ϵ_F presented ± 8 meV.

Results. Bases of creation of new thermometric materials have been worked out with high efficiency of transformation of thermal energy in electric. It has been shown that $\text{Hf}_{1-x}\text{Lu}_x\text{NiSn}$ is characterized by imperfectness of structure. It allowed

setting the mechanisms of their conductivity and explaining reason of instability of descriptions.

Novelty. The nature of the mechanism of generation of structural defects in $\text{Hf}_{1-x}\text{Lu}_x\text{NiSn}$ has been established, leading to a change in the band gap and the degree of compensation of the semiconductor, the essence of which is in simultaneous reduction and the elimination of structural defects of the donor nature as a result of displacement of $\sim 1\%$ of Ni atoms from the position of Hf (4a), the generation of structural defects with acceptor nature by substitution of Ni by Lu atoms in 4c site and the generation of defects with donor nature in the form of vacancies in Sn (4b) site.

Practical Significance. The mechanism of stabilizing of thermo-electric descriptions of materials has been offered on the basis of n-HfNiSn by the corresponding alloying.

UDC 621.317

ERROR CORRECTION CAUSED BY INSTABILITY OF BIOCHEMICAL COMPOSITION OF PARTICULATE MATERIALS WHILE MEASURING THE HUMIDITY

Ivakh Roman¹, Ivakh Myroslava²

¹*Lviv Polytechnic National University, 12, Stepan Bandera St., Lviv, 79000, Ukraine
ivakh.r@gmail.com*

²*JV "RosanPak" ltd, 3, Lvivska bichna St., Sokilnyky, Pustomyitivskyy district,
Lviv region, 81130, Ukraine*

Research Methodology. The methodological bases of the research are fundamental tenets of the theory of measurement, errors theory, structural and algorithmic methods for improving the accuracy, electromagnetic field theory, the theory of linear circuits, the theory of differential and integral calculus. Theoretical studies have confirmed the results of modeling and the model experiment.

Results. In the conducted study the method of measuring the dielectric penetrability of particulate material has been suggested, which enables to reduce significantly the impact of uncontrollable parameters and we have conducted evaluating of the effectiveness of the proposed method. Thanks to the proposed method of partial replacement, the component of errors from the effects of biochemical composition and other uninformative parameters that determine the ambiguous dependence of the dielectric penetrability of the studied parameter can be reduced to a few dozen times to the level of a few hundredths of a percent in the ambiguity of the dielectric penetrability in (1 - 2)% and the level of a few tenths of a percent in the ambiguity of (3 - 5)%.

Novelty. Scientific novelty of the results is that we have proposed the way to reduce systematic error component from the influence of uninformative parameters related to the instability of the studied biochemical environment, on the outcome

of the measurement of dielectric penetrability and related moisture of particulate material, based on the method of partial replacement.

Practical Significance. The practical significance of the results is that the proposed technique of reduction of systematic error component from the influence of uninformative options makes it possible to adjust the impact of the biochemical composition on the result of express control of grain humidity. The results of theoretical and experimental research can be used to measure not only the dielectric penetrability, but other physical quantities that are functionally related to it.