METROLOGY, STANDARDIZATION AND CERTIFICATION

FOOD SAFETY CONTROL BY SPECTRAL ELECTRIC CHARACTERISTICS

page 4–6

The results of experimental studies of hard cheese aqueous extracts within a wide frequency electromagnetic field have been considered in the paper. Spectral specifications of a complex reactive conductivity, depending on a liquid content, which is located in a conductivity cell, have been obtained. Separate spectral specifications for liquids, containing harmful food additives, namely, nitrates, have been discovered. The main objective of the research lies in developing a quick safety control of hard cheeses by electrical characteristics. The application of a simulation method for developing means of controlling concentrations of controlled substances in a multi-component liquid has been substantiated. The proposed method and means allow obtaining quick data on the content of E 225 food additive and its concentration in hard cheeses under non-laboratory conditions, without a cost equipment and a specially trained personnel. The research results can be used by experts in quality and food safety, at a customs control, when testing in certification laboratories and at enterprises when inspecting raw materials for food products. The offered control method makes improvements in the standard one, providing quick and reliable safety control of nitrate content in hard cheese.

Keywords: food control, E 225, complex conductivity, conductivity cell, multi-component liquid.

References

1. Pokhodylo, Ye. V., Stoliarchuk, P. H. (2012). *Imitansnyi kontrol' iakosti*. L'viv: Vydavnytstvo L'vivs'koi politekhniky, 164.
2. Mikhalieva, M. S., Kutens'ka, O. V. (2008). Doslidzhennia suchasnoho stanu metrolohichnoho zabezpechennia, normuvannia iakosti kharchovoi produktsii, natsional'na stratehiia vyrishennia problem ii iakosti ta bezpechnosti v Ukraini. *Visnyk NU «L'vivs'ka politekhnika», № 608*, 143—149.
3. Mikhalieva, M. S., Stoliarchuk, P. H., Boiko, T. H., Bubela, T. Z. (2008). Shliakhy vdoskonalennia normuvannia pokaznykiv iakosti vodnykh seredovyshch. *Eastern-European Journal Of Enterprise Technologies, 2*, 34—37.
4. Mikhalieva, M., Stoliarchuk, P. (2008). Problemy normuvannia iakosti vodnykh seredovyshch, stichnykh vod, aparatne i metrolohichne zabezpechennia systemy hidromonitorynhu. *Vymiriuval'na tekhnika ta metrolohiia, Vyp. 68*, 199—203.
5. Nechaev, A. P., Traubenberh, S. E., Kochetkova, A. A. and others.; In: Nechaeva, A. P. (2001). *Pyshchevaia khymyia*. SPb.: HYORD, 592.
6. Mikhalieva, M. S. (2012). *Rozvytok normatyvno-tekhnichnoho zabezpechennia operatyvnoho vyznachennia kharakterystyk ridyn dlia kontroliu stichnykh vod. Avtoreferat*. Lviv, 29.
7. Majewski, J., Malacziwskyj, P., Yatsuk, V., Stolyarczuk, P., Michalewa, M. (2010). Zastosowanie sensorów pojemnościowych do szybkiej kontroli parametrówroztworów wieloskładnikowych. *Przegląd Elektrotechniczny, 10*, 92—95.
8. Stolyarcuk, P., Yatsuk, V., Pokhodylo, Y., Mikhalieva, M., Boyko, T., Basalkevych, O. (2010). Electric Sensors for Express-Method Checking of Liquid Quality Level Monitoring. *Sensors&Transducers Journal, № 2, Vol. 8*, 88—98.
9. Mikhalieva, M. S. (2010). Rezul'taty eksperymental'nykh doslidzhen' model'nykh vodnykh rozchyniv novym elektrychnym impedansnym metodom. *Visnyk Natsional'noho universytetu «L'vivs'ka politekhnika»*, № 665, 169—173.
10. Stolyarchuk, P. Mikhalieva, M. Yatsuk, V. Pokhodylo, Ye. Basalkevych, O. (2013). Multicomponent Liquids' Research. *Sensors and Transducers Journa, Vol. 148, Issue 1*, 95—99.

STATISTICAL ANALYSIS CONCERNING MODEL OF QUASI-STATIONARY MODE OF NATURAL GAS TRANSPORTATION THROUGH PIPELINE SECTION

page 6–8

The methods of simulation and statistical linearization are compared in the paper. The main objective of the research lies in determining the most effective method of implementing a stochastic model of a linear pipeline section, for ensuring high performance and accuracy in processing large amounts of information. Modern equipment provides a large amount of data that enables simulating a linear section of a pipeline in real time, possibly, using the suggested methods. The problem of comparing these methods is solved by applying them to a linear section model with specified statistics. As a result, it allows comparing accuracy of the results obtained with these methods. Both methods have advantages and disadvantages and can be used for various purposes. The results of the research are to improve the quality of gas transportation using the most accurate and efficient methods for data processing, in particular.

Keywords: stochastic model of pipeline, method of statistical linearization, simulation method.

References

1. Teviashev, A. D. (2013). Stochastic models and methods of optimization of gas transmission systems. *Technology Audit And Production Reserves, 6*(4(14)), 49—51.
2. Teviashev, A. D., Asaenko, Y. S. (2013). Statistical analysis of the properties of the stochastic model of the quasi-stationary mode of transport and distribution of natural gas in gas transportation systems. *19-th International Scientific Conference «Information Systems and Technologies» IST-2013*, 37.
3. Wentzel, E. S. (1969). *Probability Theory*. Ed. 4. Moscow: Nauka, 576.
4. Evdokimov, A. G., Teviashev, A. D. (1980). *Operational management of flow in engineering networks*. Kharkov: Visha shcola, 144.
5. Sukharev, M. G., Teviashev, A. D., Novitsky, N. N. and others. (2010). *Energy Piping Systems: mathematical modeling and optimization*. Novosibirsk: Nauka, 419.
6. Teviashev, A. D., Tevyasheva, O. A., Smirnova, V. S., Frolov, V. A. (2010). About one strategy of optimization of operating modes of gas-transport systems. *Eastern-European Journal Of Enterprise Technologies, 4*(3(46)), 48—52.
7. Teviashev, A. D., Tevyasheva, O. A., Frolov, V. A. (2011). A class of stochastic models of quasi-stationary modes of gas transport systems. *Electronics and Computer Science, 3*, 75—81.
8. Lurie, M. V. (2003). *Mathematical modeling of pipeline transport of oil and gas*. M.: Federal State Unitary Enterprise «Oil and Gas», 336.
9. Sardanashvily, S. A. (2005). *The calculation methods and algorithms (gas pipeline)*. M.: Federal State Unitary Enterprise «Oil and Gas», 577.
10. Merenkov, A. P., Sepnova, E. V., Sumarkov, S. V. (1992). *Mathematical modeling and optimization of systems, heat, water, oil and gas consumption*. Novosibirsk: VO «Science», 406.

METROLOGICAL ASSURANCE FEATURES OF VIRTUAL MEASURING INSTRUMENTS

page 9–11

The features of modern virtual measuring instruments, which are widely used nowadays, are described in the paper. The analysis of problems of using virtual measuring instruments, which have terminological and metrological aspects is presented. The absence of standardized terms and concepts in the field of virtual measurements in both the national and the international normative documents was established. The state of metrological assurance of virtual measuring instruments, which covers the issues of metrological software certification, metrological self-checking, establishing and rationing of metrological features of virtual instruments, their verification and calibration features, was analyzed. It was found that nowadays virtual measurements are not fully supported by normative-methodological base. The necessity of taking into account the metrological assurance features of virtual measuring instruments in the existing normative documents and their harmonization with international normative documents was shown.

Keywords: virtual measuring instrument, metrological assurance, universal computer, hardware, software.

References

1. Shabaldin, E. D., Smolin, H. K., Utkin, V. I., Zarubin, A. P. (2006). Metrolohiia i elektricheskie izmereniia. Ekaterinburh: HOU VPO «Ros. hos. prof.-ped. un-t», 282.

2. Petrin, A. A. (2010). Virtual'nye datchiki dlia primeneniia v informatsionno-izmeritel'nykh sistemakh. *Izmeritel'naia tekhnika, № 9*, 17—21.
3. Alekseev, V. V. (2009). Virtual'nye sredstva izmerenii. *Pribory, № 6*, 1—7.
4. ISO/IEC Guide 99-12:2007. (2008). *International Vocabulary of Metrology — Basic and General Concepts and. Associated Terms (VIM)*. Ed. 3. JCGM 200:2008. Available: http://www.bipm.org/utils/common/documents/jcgm/
5. Pronin, A. N., Sapozhnikova, K. V., Taimanov, R. E., Zviahin, N. D. (2012). Virtual'nye sredstva izmerenii i ikh metrolohicheskoe obespechenie. *Trudy 3-i Rossiiskoi konf. s mezhdunarodnym uchastiem «Tekhnicheskie i prohrammnye sredstva sistem upravleniia, kontrolia i izmereniia» (UKI-12)*. M.: IPU RAN, 631—633.
6. Oblachnye tekhnolohii. Available: http://cloud.tambov.ru/
7. WELMEC. Software Guide (Measuring Instruments Directive 2004/22/EC). (May 2005). *Issue 7*. Available: http://www.welmecwg.ptb.de/
8. General requirements for software controlled measuring instruments. (2008). *OIML D 31 Edition 2008 (E)*. Available: http://www.oiml.org/en
9. Taimanov, R. E., Sapozhnikova, K. V., Pronin, A. N., Zviahin, N. D. (2012). Osobennosti obespecheniia edinstva izmerenii s ispol'zovaniem prohrammiruemykh sredstv. *Mir izmerenii, № 11*, 3—7.
10. HOST R 8.673-2009 HCI. (2010). *Datchiki intellektual'nye i sistemy izmeritel'nye intellektual'nye. Osnovnye terminy i opredeleniia*. M.: Standartinform, 8.
11. HOST R 8.734-2011 HCI. (2012). *Datchiki intellektual'nye i sistemy izmeritel'nye intellektual'nye. Metody metrolohicheskoho samokontrolia*. M.: Standartinform, 20.
12. DSTU 2708:2006. (2007). *Metrolohiia. Povirka zasobiv vimiriuval'noï tekhniki. Orhanizatsiia ta poriadok provedennia*. K.: Derzhspozhivstandart,14.
13. DSTU 3989-2000. *Metrolohiia. Kalibruvannia zasobiv vimiriuval'noï tekhniki. Osnovni polozhennia, orhanizatsiia, poriadok provedennia ta oformlennia rezul'tativ*. Available: http://normativ.ucoz.org/

STRUCTURAL AND METROLOGICAL ASPECTS OF PISTON-TYPE GAS-MEASURING UNITS (GAS PISTON PROVER)

page 11–13

The article describes development and combination of a drive unit of primary standard of gas volume and volume flow units at the pressure of 1,6 MPa, which is a synthesis of power-speed reduction gear transmissions. The optimal design of a drive unit is application of a complex of gear reducers, where a reducer with cylindrical gear, with variable stepped transmission ratio, with reverse gear is used for high-speed transmission, while for power transmission a reducer with bevel gear, with hypoid gear, with involute profile of helical teeth is used. Oriented values of transmission ratios of gear drives are calculated on basis of the input data, i. e. a number of values of gas volume flow, selected for calibration (certification) of gas meters within the range from 4 m^3/hour to 200 m^3/hour. The general kinematic scheme of primary standard is worked out, the metrological aspect is considered and complex indices of kinematic accuracy of applied reducers of the drive unit are calculated in the article.

Keywords: gear transmission, accuracy, kinematic scheme.

References

1. DSTU EN 12261:2006. *Lichylnyky hazu turbinni. Zahalni tekhnichni umovy* (EN 12261:2002, IDT). Kyiv: Derzhspozhyvstandart Ukrainy, 39.
2. ISO 17089-1:2010. (2010). *Ultrasonic meters for gas. Part 1: Meters for custody transfer and allocation measurement*. Geneva, 108.
3. Petryshyn, I. S. and others. (2013). Vplyvovi faktory konstruktyvnykh osoblyvostei porshnevykh etalonnykh vytratomirnykh ustanovok, shcho pratsiut pry vysokomu tysku. *Metrolohiia ta prylady, № 5*, 6—16.
4. Kuzmyn, A. V., Maron, F. L. (1983). *Spravochnyk po raschetam mekhanyzmov podemno-transportnykh mashyn*. Mynsk: Vysshaia shkola, 350.
5. Bashta, T. M. (1972). *Hydropryvod y hydropnevmoavtomatyka*. Moskva: Mashynostroenye, 320.
6. Skoibeda, A. T., Kuzmyn, A. V. and others. (2000). *Detaly mashyn y osnovы konstruyrovanyia*. Mn.: Vysheishaia shkola, 584.
7. HOST 1643-81. (1981). *Osnovnye normy vzaymozamenaemosty. Peredachy zubchate tsylyndrycheskye. Dopusky*. M.: Yzdatelstvo standartov, 45.
8. HOST 1758-81. (1981). *Osnovnye normy vzaymozameniaemosty. Peredachy zubchatye konycheskye y hypoydnye. Dopusky*. M.: Hosudarstvennыi komytet SSSR po standartam, 43.
9. HOST R 52924-2008. (2008). *Avtomobylnye transportne sredstva. Sharnyry ravnykh uhlovykh skorostei. Obshchye tekhnycheskye trebovanyia y metody yspytanyi*. M.: Standartynform, 11.
10. Mykhailovskyi, E. V., Serebriakov, K. B., Tur, E. Ya. (1981). *Ustroistvo avtomobylia*. Ed. 4-e. M.: Mashynostroenye, 342.

METROLOGICAL ASSURANCE OF PRODUCT QUALITY

page 14–15

Using reference standards as the main resource base for product quality control is given in the paper. The main objective of the study lies in improving metrological quality assurance of non-electrical products. One of the promising methods of quality control is an immittance method, based on supplying products in the form of a multi-element two-terminal network, which electrical parameters reflect its physical and chemical properties. It was found that using the immittance control method enables setting the electrical parameters of reference standards as separate electrical parameters of a multi-element two-terminal non-electrical network, by which they are submitted. The research results can be used for merit rating and calibrating measuring instruments and for determining composition and properties of substances and materials. On the basis of immittance measurements, electrical models of reference standards with the established electrical parameters can be developed.

Keywords: immittance method, metrological assurance, reference standard, two-terminal network, equivalent circuit, control object.

References

1. *ISO/IEC Guide 99-12:2007. International Vocabulary of Metrology — Basic and General Concepts and. Associated Terms (VIM)*. Ed. 3. JCGM 200:2008. Available: http://www.bipm.org/utils/common/documents/jcgm/JCGM_200_2008 .pdf
2. Holovko, D. B., Skrypnyk Y. A. (2000). *Methods and means of frequency — dispersion analysis of substances and materials: physical principles*. K.: FADA, LTD, 200.
3. *SS 8.315-97. State system for ensuring the uniformity of measurements. Standard samples of composition and properties of substances and materials*. Introduction. 1997-04-25. M.: Standard's publishing, 26.
4. Pokhodylo, Y. V. (2004). *Theory and principles construction development of imittance measuring instruments of qualimetry objects*. Lviv: National University «Lviv Polytechnic», 40.
5. Pokhodylo, Y., Stolyarchuk, P. (2012). *Immitance production quality monitoring*. Lviv: Publishing of Lviv Polytechnic, 164.
6. Pokhodylo, Y., Stolyarchuk, P. (2003). Ways of quality monitoring due to immitance. *Quality monitoring methods and tools, № 11*, 105—108.
7. Atabekov, G. I. (1969). *Fundamentals of circuit theory*. M.: Energy, 434.
8. Morris, A. S. (2001). *Measurement and Instrumentation Principles*. Butterworth-Heinemann, 512.
9. *The Impedance Measurement Handbook. A Guide to Measurement Technology and Techniques. Agilent Technologies*. (2006). Inc. Printed in USA, 5950—3000.
10. Carstens, J. R. (1993). *Electrical sensors and transducers. Regents*. Prentice Hall, 498.

THE MATHEMATICAL MODELLING OF WATER SUPPLY SYSTEMS CONTAIING A PIPE NETWORK, PUMP STATIONS AND REGULATORY RESERVOIRS

page 16–18

The mathematical model of the steady flow distribution in the water supply system containing a pipe network together with pump stations and regulatory reservoirs has been presented. This mathematical model allows to guarantee the possibility of the parallel engagement of any number of pumping stations aggregates without the need for prior their characteristics.

The mathematical model of steady flow distribution in the water supply system, containing pumping stations and regulatory reservoirs has been used to analyze the quality of its operation under the implementation of the control actions at the pumping stations, solving the problem of evaluating the effectiveness of operational planning modes of water supply systems operation throughout the examined time interval, as well as to control the correctness of taken decisions on the management of the technological processes of water supply and water distribution. The method of imitational modeling of real functioning water supply systems has been used to carry out the research.

Keywords: mathematical modelling, model, water supply systems, steady flow distribution, pump station, regulatory reservoirs.

References

1. Evdokimov, A. H. (1976). *Optimal'nye zadachi na inzhenernykh setiakh*. Khar'kov: Vishcha shkola, 153.
2. Evdokimov, A. H., Dubrovskii, V. V., Teviashev, A. D. (1979). *Potokoraspredelenie v inzhenernykh setiakh*. M.: Stroiizdat, 199.
3. Evdokimov, A. H., Teviashev, A. D. (1980). *Operativnoe upravlenie potokoraspredeleniem v inzhenernykh setiakh*. Khar'kov, 144.
4. Fallside, F., Perry, P. F., Burch, R. H., Marlow, K. C. (1975). The Development of Modelling and Simulation Techniques Applied to a Computer — Based — Telecontrol Water Supply System. *Computer Simulation of Water Resourses Systems, 12*, 617—639.
5. Abramov, N. N. (1985). *Teoriia i metodika rascheta system podachi i raspredeleniia vody.* M.: Stroiizdat, 288.
6. Merenkov, A. P., Hasilev, V. Ya. (1985). *Teoriia hidravlicheskih tsepei*. M.: Nauka, 279.
7. Evdokimov, A. H., Teviashev, A. D., Dubrovskii, V. V. (1990). *Modelirovanie i optimizatsiia potokoraspredeleniia v inzhenernykh setiakh*. M.: Stroiizdat, 368.
8. Dyadun, S. V. (2001). Optimizatsiia potokoraspredeleniia v sistemah vodosnabzheniia s bol'shim chislom aktivnykh istochnikov. *Avtomatizirovannye sistemy upravleniia i pribory avtomatiki, 115*, 36—40.
9. Dyadun, S. V. (2002). Modelirovanie i ratsional'noe upravlenie sistemami vodosnabzheniia pri minimal'nom obiome operativnoi informatsii. *Radioelektronika i informatika, 20*, 111—115.
10. Dyadun, S. V. (2001). Otsenka kachestva i effectivnosti upravleniia sistemami vodosnabzheniia v zavisimosti ot stepeni neopredelennosti modeli obiekta. *Radioelektronika i informatika, 17*, 78—81.

AIRCRAFT'S WEIGHING & CENTERING SYSTEMS CALIBRATION

page 18–20

In this paper the concept of metrological modeling was considered. The follow definition offered for a metrological modeling: experimental and/or analytically study of phenomena, processes and products, based on their similarity and common factors. The similarity criteria was founded for models and studied objects. We justified the use of metrological modeling method in weighing system calibration and aircraft balancing, as currently these systems calibrate with metrological characteristics definition for weight measurement and there is no accuracy estimation for the founded position of center of gravity. Because of difficulties to have a real scale object with precisely know position of center of gravity, it is appropriate to use metrological modeling with scaled model. Additionally, the realistic scaled experimental aircraft model for weighing system calibration was developed. High accuracy of the calibration of weighing systems and balance of aircraft was provided, in the result of model simplification and its ability to accurately determine the parameters.

Keywords: center of gravity, calibration, metrological modeling, weighting and centering system.

References

1. *Federal Aviation Administration*. Available: www.faa.gov/aircraft.
2. Gayzner, S. I. (1989). *Samoletnyevesy i vzveshivanye samoletov*. Moskva: Oborongiz, 50.
3. Romanov, A. N., Girenka, F. I., Zavorotnyi, D. G.; NPO «Diskret». (2007). Opredelenie smescheniya centra tyazhesti gryza v zheleznodorozhnom vagone. *PiKAD, № 3*, 34—38.
4. *Vesovoe oborudovanie dlya staticheskogo vzveshivaniya letatelnyh apparatov firmy Axis*. Available: http://axis-ua.com/catalog_ru/c_165/p_471.html
5. Zavada, A., Cherepaschuk, G. (2009). Vagovymiruvalni systemy z bezdrotovymy liniyamy zvyazku. *Metrologiya ta prylady, № 3*, 26—32.
6. Borzenkova, A. V., Cherepaschuk, G. A. (2012). Otsenka neopredelennocti izmereniya polozheniya centra tyazhesti letatelnyh apparatov. *Systemy obrobky informatsii, № 1(99)*, 55—58.
7. Tirskiu, G. A. (2001). Podobie i fizicheskoe modelirovanie. *Sorosovskiu obrazovatelnyu zhurnal, № 5, T. 7*, 122—127.
8. Gorbokonenko, V. D., Shikina, V. E. (2005). *Metrologiya v voprosah I otvetah*. Ul'yanovsk: UlGTU, 196.
9. Sokolovskiu, S. S., Solomaho, D. V., Tsitovich, B. V. (2010). Metrologicheskoe modelirovanie kak osnova proektirovaniya i realizatsii metodik vypolneniya izmereniu. *Pribory i metody izmereniu, № 1*, 147—152.
10. GOST 8.009-84. *Izdaniya. Normiruemye metrologocheskie charakteristiki sredstv izmereniu*. (1988). Vzamen GOST 8.009-72; vved. 01.01.86. Moskva: Izdatel'stvostandartov, 38.

MEAN-SQUARE ERRORS OF OBJECT POSITIONING IN RECTANGULAR COORDINATE SYSTEM

page 21–23

The original method for determining object coordinates before drawing them on topographic maps in a rectangular coordinate system by sighting the angular object position by the navigation system (complex) from the mobile carrier was proposed, and mathematical expressions for the object positioning in the rectangular coordinate system were obtained in the paper. The main objective is to study the method and simplified algorithm for the location object positioning in the rectangular coordinate system, based on multiple measurements of the object sighting angle on the course from the mobile carrier. The methods and simplified algorithms for object positioning in the rectangular coordinate system, based on measurements of the search object sighting angles on the course from the mobile carrier with the motion trajectory, which provides multiple object sighting were proposed, mean-square sighting errors, caused by errors of angle sensors of the control system of the navigation system were defined, and requirements for measurement accuracy of angle sensors were determined. The obtained results prove the prospects of using the object positioning method and algorithm in navigation systems of aircraft and ground vehicles.

Keywords: coordinate, search object, carrier, sighting, mathematical model, mean-square error, control system.

References

1. Malkov, M. A. (1961). *Tankovye pritsely i pribory nabliudeniia*. M.: Voennoe izdatelstvo MO SSSR, 274.
2. Malyitv, V. V. (1989). *Optimizatsyia nabliudeniia s upravleniia letatelnykh apparatov*. M.: Mashynostroenie, 311.
3. Bezvesilna, E. N., Kyrychuk, Yu. V., Tkachenko, S. S. (2010). *Sistemy keruvannia navigactsiinykh sistem ruxomykh obektiv*. Zhytomyr, ZhSTU, 174.
4. Miasoedov, G. B., Timofeev, V. M. (1990). *Proektirovanie navigatsionnykh system uprovliaushchikh kompleksov*. L. 53.
5. Xomchenko, A. Ya., Mazurin, I. V., Gordienko, V. I., Zamocenchuk, V. N. (2005). Sistema indikatsii pologeniia linii vizirovaniia panoramnogo pribora nabliudeniia. *Artilleriyskoe i strelkovoe voorugenie, № 1(14)*, 42—45.
6. Gusev, D. I. (2011). Otsenka sistemy opredeleniia vzaimnyx koordinat perspektivnykh samolyetov pri realizatsii regima grupovogo samolyetovogdeniia. *Elektronnyy gurnal «Trudy MAI», № 44*. Available: http://www.mai.ru/science/trudy/published.php?ID=24996
7. Binkovskaia, A. B. (2006). Izmerenie koordinat podvignogo obekta s pomoshchiu inertsialnoy navigatsionnoy sistemy. *XIII international Conference on automatic control (Automatics-2006)*. Vinnytsia: VNTU, 265.
8. Petrov, N. N. (1998). Sistemy i kompleksy texnicheskifh sredstv mestoopredeleniia podvignykh obektov. *Spetsialnaia tekhnika, 3*, 7—11.
9. Buraga, A. B., Kostiukov, B. M. (2012). Sravnitelnyy analiz passivnykh metodov izmereniia dalnosti dlia malogo bespilotnogo letatelnogo apparata. *Elektronnyy gurnal «Trudy MAI», № 53*. Available: http://www.mai.ru/science/trudy/published.php?ID=29624
10. Prokhortsev, A. B., Savelev, B. B. (2011). Metody opredeleniaia koordinat i skorosti podvizhnykh obektov s pomoshchiu sputnikovykh

radionavigatsionnykh system. *Szvestiia TulGU. Tekhnicheskie nauki, № 2*, 264—274.
11. Roller, D., Daniilidis, K., Nagel, H. H. (1993). Model-based object tracking in monocular image sequences of road traffic scenes. *International Journal of Computer Vision, 10(3)*, 257—281.

ENSURING ACCURACY OF CEPHALOGRAPHY SYSTEM MEASUREMENTS

page 23–25

The application of existing approaches for calibrating video cameras for a cephalography system is considered and the results of our studies in this field are given. The main objective of the study lies in developing scientific ways of determining the internal and external parameters of video cameras with the ability of adjusting influence of the total distortion on an output image of a cephalography system. The application of modern software applications allows combining different approaches when calibrating cameras. The main steps of conducting calibration procedures and a mathematical tool for finding a camera matrix are considered and defined in the paper. The given steps in the form of methods allow reducing the final error, resulted from the total distortion by combining automatic and manual modes of estimating key points at calibrating. The research results can be used by medical experts, engaged in researching static and dynamic functions of a human-being.

Keywords: cephalography, calibration procedure, total distortion, camera model, calibration object.

References

1. Babiyak, V. I., Lantsov, A. A., Bazarov, V. G. (1996). *Klinicheskaya vestibulologiya: Rukovodstvo dlya vrachey*. St-Peterburg: Gippokrat, 336.
2. Kuzovik, V. D., Gamov, V. G., Onikienko, Y. Y. (2010). Osoblivosti programnogo zabezpechennya eksperimentalnih doslidzhen bioob'ektu. *Inzheneriya programnogo zabezpechennya, № 2*, 68—75.
3. Lunev, A. A. Vyibor optimalnyih parametrov kalibrovki tsifrovoy kameryi Available: http://www.info.donntu.edu.ua/el_izdan/geolog/sborniki/ggf111t2.pdf
4. Tsai, R. (1987). A versatile camera calibration technique for high-accuracy 3D machine vision metrology using off-the-shelf TV cameras and lenses. *IEEE Int. Journal Robotics and Automation, Vol. 3(4)*, 323—344.
5. Zhang, Z. (2000). A flexible new technique for camera calibration. *IEEE Trans. on PAMI, Vol. 22(11)*, 1330—1334.
6. Triggs, B., McLauchlan, P., Hartley, R., Fitzgibbon, A. (1999). Bundle Adjustment — A Modern Synthesis. *ICCV 99: Proceedings of the International Workshop on Vision Algorithms. Springer-Verlag*, 298—372.
7. Malek, S., Zenati-Henda, N., Belhocine, M., Benbelkacem, S. (2008). Calibration Method for an Augmented Reality System. *Proceedings of World Academy of Science: Engineering & Technology, Vol. 47*, 310—315.
8. Zhang, Z. (1998). Determining the epipolar geometry and its uncertainty: A review. *International Journal of Computer Vision, Vol. 27(2)*, 161—195.
9. Heikkila, J. (2000). Geometric Camera Calibration Using Circular Control Points. *IEEE Transactions on Pattern Analysis and Machine Intelligence, Vol. 22, No. 10*, 1066—1077.
10. Zhimbueva, L. D. Metod opredeleniya summarnoy distorsii tsifrovyih izobrazheniy. Available: http://www.computeroptics.smr.ru/KO/PDF/KO35-3/350309.pdf

PERSONNEL CERTIFICATION AS PRODUCTS QUALITY IMPROVEMENT FACTOR

page 26–28

The necessity of introducing personnel certification at agricultural enterprises is substantiated. The hierarchy of measures, encouraging labor productivity, at agricultural enterprises, which directly affect the reproduction processes of the industry and their financial situation improvement in conditions of economic instability, is proposed. Currently, any production system requires introducing new information technologies, highly sophisticated machinery and equipment, developing communication linkage that will significantly increase the standards of living and satisfying the needs of society. The purpose of the study is to solve the issues on reproducing the agricultural sector through introducing personnel certification.

It can be concluded from the aforesaid that all the complex and various tasks, which need to be solved at agricultural enterprises, require specific expertise and skills from their personnel, so personnel is one of the main enterprise quality resources. Appropriate level of expertise and skills is achieved primarily through training. High-quality training of personnel is its willingness to perform all the key functions of the company according to the quality system requirements. Consequently, it is based on the principles of universality, commitment, continuity and hierarchical order.

Keywords: certification, personnel, labor productivity, qualification, proficiency, product certification.

References

1. Astrinskii, D. (2001). Problemy vosproizvodstva osnovnykh fondov. *Ekonomist, № 6*, 35—38.
2. Bekov, M. B., Kvitka, I. I. (2002). Rehional'na politika v sferi osviti. *Mater. nauk.-prakt. konf. Probl. sots. upr. mistom v umovakh rinku*, 101—102.
3. Braun, R., Mzzon, R., Flamhol'ts, E.; In: Moudera, J., Zlmahrabi, S. (1981). *Issledovanie operatsii*. Translation from English. In 2 volumes. M.: Mir, 677.
4. Davletkhanova, O. Kh. (2005). Orhanizatsiini zasadi informatsiinoho zabezpechennia upravlinnia iakistiu. *Informatsiini resursi ta ikh vikoristannia v ahropromislovomu virobnitstvi, № 4*, 51—56.
5. Zharova, L. V. (2003). Rehional'ni kompleksni prohrami iak instrument rehional'noï politiki staloho rozvitku. *Sotsial'no-ekonomichni doslidzhennia v perekhidnii period. Rehional'na politika: dosvid Yevropeis'koho Soiuzu ta ioho adaptatsiia do umov Ukraini, Vip. 5, Ch. III*, 113—119.
6. In: Kulachinoi, H. D. (1997). *Natsional'noe schetovodstvo*. M.: Finansy i statistika, 89—94.
7. Pelikh, A. S. (2004). *Ekonomika mashinostroeniia*. Rostov-na-Donu: «Feniks», 256.
8. Panchenko, S. I. Pokazniki produktivnosti v rinkovoi ekonomitsi. *Rinkovi transformatsii ta rozvitok produktivnikh sil ahrarnoho sektora. Visnik KhNAU, № 7*, 286—291.
9. Rechkalov, A. (2003). Neobkhodimye usloviia orhanizatsii stratehicheskoho planirovaniia promyshlennykh predpriiatii. *Ekonomika i upravlenie, № 5*, 71—75.
10. Shapoval, M. I. (2007). *Menedzhment iakosti*. Znannia, KOO, 471.

STATISTICAL SIGNAL ANALYSIS OF THE GAS QUALITY INTELLIGENCE SYSTEM

page 28–30

The factor analysis of the measuring system was conducted in the paper. In particular, the descriptive statistics, correlation matrix, factor matrix and its geometrical interpretation were obtained. The visual structure of factors, affecting the measurement process was obtained. The analysis allowed to select two almost independent factors. Strongly correlated variables were combined in factors. It turned out that it was enough to investigate the influence of two factors to reflect the relations between six system variables and describe the object. They reproduce information on observation results with the accuracy, sufficient for practical purposes. The first factor affects the temperature modes of system elements and indicators, reflecting them. The second affects the pressure values in the system constriction device. The correctness of natural gas quality indicators investigation, performed in the measuring system by studying the influence of these two factors was proved.

Keywords: factor analysis, correlation matrix, natural gas humidity, statistical features, factor.

References

1. Lurie, A., Plekhotkin, V., Tkachenko, M., Shveikin, A. (2008). Dosvid promislovoi expluatatsii vimiruvachiv vologosti gazu na magistrslnikh gazoprovodah Ukraini. *Zbirnik prisvyacheniy 50-richchu Shebelinskogo rodovisha, Kharkiv, 32—36*.

2. Gordienko, I. A., Lurie, A. I., Koziy, V. M., Ivkov, A. G. (2006). Doslidgennia metrologichnikh kharakteristik vologomiriv prirodnogo gazu riznih tipiv v umovah expluatatsii na obiektah DK «Ukrtransgaz» *Pitannia rozvitku gazovoi promislovosti Ukraini, Vipusk XXXIV*, 187—195.
3. Shveikin, A. (2009). Priklad instrumentalnogo viznachennia temperaturi pochatku utvorennia kristalogidrativ v prirodnomu gazi. *Pitannia rozvitku gazovoi promislovosti Ukraini*, 131—133.
4. Shveikin, A. (2008). Instrumentalne viznachennia ridkoi ta tverdoi fazi komponentiv prirodnogo gazu v avtomatichnomu regimi. *Metrologiai i priladi, № 4*, 37—39.
5. Iberla, K. (1980). Faktornii analiz. M.: Statistika, 380.
6. Harman, H. H. (1976). Modern factor analysis. Chicago, 508.
7. Kim, J. O., Muller, Ch. U. (1989). Faktornii, diskriminantnii i klasternii analiz. M.: Finansi i statistika, 215.
8. Shumetov, V. G., Shumetova, L. V. (1999). Faktornii analiz: podhod s primeneniem EVM. Orel: OrelGTU.
9. Borovikov, V. P. (2003). Statisitica: iskusstvo analiza dannih na kompiutere. 2-e izdanie. S-Pb.: Piter, 688.
10. Khvostova, O. V., Lurie, A. I., Shveikin, A. L. (2011). Vologometria prirodnogo gazu. Kharkiv: Kursor, 74—78.

AUTOREGRESSIVE — SPECTRALLY INTEGRATED MOVING AVERAGE MODEL

page 30–33

The class synthesis of mathematical models, based on sharing ideas of two methods, which in separate are viewed skeptically by many experts of the prediction field, is carried out. However, they are well substantiated theoretically. The first method is a deterministic method of different types of analysis and prediction, which has not been included in the standard mathematical software yet, i. e. the «Caterpillar»-SSA method. The second one is a statistical method, i. e. the Box-Jenkins method. The model of autoregression, namely spectrally integrated moving average, is proposed. This model implements a trend approach, which lies in modeling the process as a deviation of actual values of a relative trend component and leads to synergy, mutually compensating the opposite in nature disadvantages of its model components. The proposed ARSIMA model identifies the long-term process dependence only by two parameters. This model has a wide range of application.

Keywords: time series forecasting, structural identification, the Box-Jenkins method, the «Caterpillar»-SSA method.

References

1. Boks, J., Dzhenkins H.; In: Pisarenko, V. F. (1974). *Analiz vremennykh riadov, prohnoz i upravlenie. Book 1*. M.: Mir, 406.
2. Boks, J., Dzhenkins, H.; In: Pisarenko, V. F. (1974). *Analiz vremennykh riadov, prohnoz i upravlenie. Book 2*. M.: Mir, 197.
3. Bezrukova, E. H., Rudenchik, E. A. (1997). *Prohnozirovanie statisticheskikh vremennykh riadov*. Yaroslavl': Yarosl. hos. tekhn. un-t, 94.
4. Evdokimov, A. H., Teviashev, A. D. (1980). *Operativnoe upravlenie potokoraspredeleniem v inzhenernykh setiakh*. Kh.: Vishcha shkola, 144.
5. Sedov, A. V. (2010). *Modelirovanie obiektov s diskretno-raspredelionnymi parametrami: dekompozitsionnyi podkhod*. Yuzhnyi nauchnyi tsentr RAN. M.: Nauka, 438.
6. Benn, D. V., Farmer, E. D. (1987). *Sravnitel'nye modeli prohnozirovaniia elektricheskoi nahruzki*. M.: Enerhoatomizdat, 200.
7. Andersson, M. K. (1998). On the Effects of Imposing or Ignoring Long Memory When Forecasting. *Working Paper Series in Economics and Finance, T. 225*, 1—14.
8. Hosking, J. R. M. (1981). Fractional differencing. *Biometrika, Vol. 68, No. 1*, 165—176.
9. Holiandina, N. E. (2004). *Metod «Husenitsa»-SSA: prohnoz vremennykh riadov*. SPb.: S.-Peterburhskii hosudarstvennyi universitet, 52.
10. Horelova, V. L., Mel'nikova, E. N. (1986). *Osnovy prohnozirovaniia sistem*. M.: Vyssh. shk., 287.

STATISTICAL PROCESSING OF VERY SMALL RANDOM CIRCLE SAMPLES

page 33–35

This article represents the statistical analysis of the very small random circle samples. The main purpose of the paper is to develop and experimentally investigate the new technique of statistical processing of circular data, received from various sources and spheres of activity. The bootstrapping is chosen as the basis method. The developed technique allows obtaining sample circular mean direction and its confidence interval. The usage of the proposed technique allows improving the accuracy of the confidence interval for the mean direction in comparison with traditional method. The research results can be applied for further investigations in scientific researches or used as independent development in such areas as metrology, biotechnology, medicine, economics, aviation, radiolocation etc.

Keywords: random circle, sample circular characteristics, uncertainty, bootstrap.

References

1. DSTU 2681-94. (1994). Metrolohiia. Termini ta viznachennia. Chin. z 1995-01-01. *K.: Derzhstandart Ukraini*, 68.
2. Guide to the expression of uncertainty in measurement (GUM). (1993). ISO, 101.
3. Kuts, Yu. V., Shcherbak, L. M. (2009). *Statistichna fazometriia*. V.: Ternopil', 383.
4. Fisher, N. I. (2000). *Statistical analysis of circular data*. Cambridge: Cambridge University Press, 277.
5. Shengur, S. V. (2013). Opratsiuvannia vibirok vipadkovikh kutiv z apriorno nevidomoho rozpodilu. *Sistemi obrobki informatsii, Vip. 8*., 130—135.
6. Efron, B., Tibshirani, R. (1993). *An introduction to the bootstrap*. Boca Raton, FL: Chapman&Hall/CRC, 436.
7. Kuts, Yu. V., Shengur, S. V. (2013). Podannia rezul'tatu kutovikh vimiriuvan' v kontseptsii neviznachenosti. *Sistemi obrobki informatsii, Vip. 3*., 97—100.
8. Kuts, Yu. V., Shengur, S. V., Dergunov, A. V. (2012). Circular data point and interval evaluation. *«Aviation in the XXI-st century 2012»: proc. VI World congress*. K.: NAU, 1.6.5—1.6.7.
9. Kuts, Yu. V., Shengur, S. V., Shcherbak, L. M. (2011). Circular measurement data modeling and statistical processing in LabView. *«MRRS-2011»: proceedings III International symposium. K.: NAU*, 317—320.
10. Jammalamadaka, S. Rao, SenGupta, A. (2001). *Topics in circular statistics*. Singapore: World Scientific Publishing Co. Pte. Ltd., 322.
11. Mardia, K. V., Jupp, P. E. (1972). *Statistics of directional data*. London: Academic Press Inc., 415.

QUALITY IN EDUCATION

ACCESS CONTROL TO RESOURCES USING ONTOLOGICAL MODELS IN INTELLIGENT ENTERPRISE

page 36–38

This article discusses the problem of controlling access to resources of intelligent enterprise using ontology. The main purpose is to develop methods of knowledge representation, that are used in access control and methods of their use. In this paper we propose to represent knowledge in the form of ontological models. The task of access control is performed in the context of a larger system, of ontological business process modeling. The usage of ontological modeling methods allows, when compared to known access control methods RBAC and ABAC, to realize dynamic, well documented access rights granting and withdrawing in context of currently executed business processes. The results of research can be used for implementation of effective access control system in intelligent enterprise. Proposed access control method, which uses the ontological models of knowledge, allows to simplify access control process and improve overall system security.

Keywords: access control, ontological model, business process modeling, intelligent enterprise.

References

1. Quinn, J. B. (2005). The intelligent enterprise — a new paradigm. *Academy of Management Executive, vol. 19, no. 4*, 109—121.
2. Ferraiolo, D., Kuhn, D. R., Chandramouli, R. (1992). *Role-based access control*. Artech House Publishers, 405.
3. Beyond Roles: A Practical Approach to Enterprise User Provisioning. Available: http://www.idsynch.com/docs/beyond-roles.html. Last accessed 10 January 2014.
4. Karp, A. H., Haury, H., Davis, M. H. (April 2009). From ABAC to ZBAC: The Evolution of Access Control Models. *Control*, 22—30.
5. Sandhu, R., Park, J. (2003). Usage Control: A Vision for Next Generation Access Control. *Control*, vol. 2776, 17—31.
6. Zhu, J. (2008). Attribute Based Access Control and Security for Collaboration environments. *Proc. W. W. Aerospace and Electronics conference NAECON 2008*, 31—35.
7. Park, J., Sandhu, R. (2002). Towards usage control models: beyond traditional access control. *Proceedings of the seventh ACM symposium on Access control models and technologies SACMAT 02*, 57—64.
8. Kulkarni, D., Tripathi, A. (2008). Context-aware role-based access control in pervasive computing systems. *Proc. 13th ACM Symp. Access Control Model. Technol. SACMAT 08*, 113.
9. Priebe, T., Dobmeier, W., Schläger, C., Kamprath, N. (2007). Supporting Attribute-based Access Control in Authorization and Authentication Infrastructures with Ontologies. *J. Softw., vol. 2, no. 1*, 27—38.
10. Thomas, R. K., Sandhu, R. S. (1994). Conceptual Foundations for a Model of Task-based Authorizations. *Proceedings of the 7th IEEE Computer Security Foundations Workshop, vol. 39, no. 1*, 66—79.

ACTIVE METHODS OF TRAINING IN THE MAPLE COMPUTER MATHEMATICS SYSTEM

page 38–40

The results of using the Maple computer mathematics system at different stages of a training process are given. One of the routine tasks, faced by teachers, is the accuracy control of completing practical assignments. The task gets more complicated if the solution consists of several stages. Each stage requires sophisticated mathematical transformations, and benchmark data regarding variants must be changed periodically. In the paper, it is suggested applying the Maple system tables. Matrices, procedures for solving equations and graphs can be inserted into the Maple table cells. It allows developing full-featured automated computing systems and monitoring the accuracy of carrying out each stage. In such subjects, like cryptography, it is necessary to perform precise computations with a great scale of whole numbers. The effectiveness of the Maple system when solving the cryptography problem concerning a private key formation over an open channel of communication is showed in the paper. Also, the examples of employing the Maple system as a virtual laboratory are given in the paper. Thus, using the Maple system at different stages of a training process showed its effectiveness as an active educational medium, which allow improving the quality of training.

Keywords: Maple, knowledge control, cryptography, secret key, prime number, virtual laboratory, the Gibbs effect, process.

References

1. Alekseev, E. R., Chesnokova, O. V. (2006). *Reshenie zadach vychislitel'noi matematiki v paketah Mathcad 12, MATLAB 7, Maple 9*. M.: NT Press, 496.
2. Govoruhin, V. N., Tsibulin, V. G. (1997). *Vvedenie v Maple. Matematicheskii paket dlja vseh*. M.: Mir, 208.
3. D'jakonov, V. P. (2011). *Maple 10/11/12/13/14 v matematicheskih raschet*ah. M.: DMK-Press, 800.
4. Litvinov, A. L. (2004). *Komp'yuternoe modelirovanie v ekonomike*. Belgorod: Izd-vo BelGU, 108.
5. Litvinov, A. L. (2004). *Matematichni metodi ta modeli v rozrahunkah na EOM. Sistema Maple ta ii vikoristannja dlja modelyuvannja tehniko-ekonomichnih sistem*. Harkiv: UIPA, 103.
6. Chetyrkin, E. M. (2004). *Finansovaja matematika*. M.: Delo, 400.
7. Barichev, S. G., Goncharov, V. V., Serov, R. E. (2002). *Osnovy sovremennoi kriptografii*. M.: Gorjacëhaja linija — Telekom, 175.
8. Venbo Mao. (2005). *Sovremennaja kriptografija: teorija i praktika*. M.: Izdatelskiy dom «Viljame», 768.
9. Bondarev, V. M., Rublineckii, V. I., Kachko, E. G. (1997). *Osnovy programmirovanija*. Kharkov: Folio, 368.
10. Ope, O. (1980). *Priglashenie v teoriyu chisel*. M.: Nauka, 128.

THE PREREQUISITE FOR SOCIAL-PSYCHOLOGICAL ADAPTATION OF TURKMEN STUDENTS, WHO ARE STUDYING IN UKRAINE

page 40–42

This article aims to determine the characteristics of the attitude to the Other as a premise prerequisite of the social-psychological adaptation of Turkmen students that are studying in Ukrainian universities. Successful adaptation contributes, on the one hand, the rapid inclusion of students to the learning process, allows to solve the problem of retention of contingent, and on the other — it helps to improve the quality of the training of young people in Ukrainian universities. The study sample consisted of students of the first and second years of study of International Educational Programs Department of the Ukrainian Engineering Pedagogics Academy. The techniques of «Diagnostics of social-psychological adaptation of K. Rogers and R. Diamond» and «Diagnostics of interpersonal relationships T. Leary» were used. The conducted empirical research has allowed to determine that the adaptability is associated with the manifestation of the tendency to dominate in interaction with others, leadership skills, self-acceptance. The relationships of indicators of social-psychological adjustment with indicators of severity of different styles of interpersonal interaction of Turkmen students were revealed. It was defined that self-acceptance is above when students have friendly attitudes with others. The external control is typical for Turkmen students, who are characterized by the tendency to dominate and straightforwardness in dealing with others. The adaptability index decreases among students from Turkmenistan, who are inclined to criticism, suspicion, frustration on environment, do not take themselves, do not dominate in relationships with others. Results can be used in the work of curators, teachers, psychologists and social workers.

Keywords: social-psychological adaptation, interpersonal interaction, education of foreign students, Turkmen student.

References

1. Kryisko, V. G. (1999). *Etnopsihologicheskiy slovar*. M., 343.
2. Abulhanova, K. A. (2007). Psihosotsialnyiy i sub'ektniy podhodyi k issledovaniyu lichnosti v usloviyah sotsialnyih izmeneniy. *Psihologicheskiy zhurnal, № 5, T. 28*, 5—14.
3. Rean, A. A., Kudashev, A. R., Baranov, A. A. (2006). *Psihologiya adaptatsii lichnosti. Analiz, teoriya, praktika*. SPb.: praym-EVROZNAK, 480.
4. Platonov, Yu. P. (2003). *Osnovyi etnicheskoy psihologii*. SPb.: Rech, 2003, 452.
5. Stefanenko, T. G. (2003). *Etnopsihologiya*. M.: Aspekt-Press, 368.
6. Vegvari, V. (2001). Mezhkulturnyiy dialog v epohu «otkryityih granits». *Russkiy yazyik kak inostrannyiy: spetsifika opisaniya, teoriya i praktika prepodavaniya v Rossii i za rubezhom*. M.: Mosk. un-t, 69—70.
7. Gudkov, D. B. (2000). *Mezhkulturnaya kommunikatsiya: problemyi obucheniya*. M.: MGU, 120.
8. Ionin, L. G. (1988). Kulturnyiy shok: konflikt etnicheskih stereotipov. *Psihologiya natsionalnoy neterpimosti*. Minsk, 104—114.
9. Lebedeva, N. M., Luneva, O. V., Stefanenko, T. G. (2003). *Mezhkulturnyiy dialog: Trening etnokulturnoy kompetentnosti*. M.: RUDN, 268.
10. Ivanova, M. A., Trusov, V. P. (1981). Issledovanie sostoyaniya trevozhnosti i lichnostnyih harakteristik studentov internatsionalnoy gruppyi. *Psihicheskie sostoyaniya (eksperimentalnaya i prikladnaya psihologiya), vyip. 10*, 167—174.

MEDIA EDUCATION IN THE CONTEXT OF INFORMATIZATION OF SCHOOL EDUCATION IN POLAND UNDER CONDITIONS OF EUROPEAN INTEGRATION

page 42–44

This article presents the analysis of the theoretical aspect of media education in the context of informatization in secondary schools in Poland under the conditions of European integration process. Dis-

tribution of information, development of information and communication technologies promotes the process of further media education in secondary schools in Poland. It is concluded that media education serves an instrument of intellectual maturity of a modern European citizen and the rapid changes in media education in Poland are related to public education, socio-oriented communication media, democratization and globalization of society. The process of media education lasts a lifetime, but it is not limited by school study, as the forms and information transferring technologies are changing and society is being under constant transformation. The nature and purposes of media education in school have been determined by Polish scientists and media pedagogical researchers. Critical perception of media content expands the user's needs and cultivates a respectful attitude towards media culture, shapes media competencies of Polish schoolchildren. Significant prospects for further research of media education in Polish schools through participation in international projects of the European Community are described in the article.

Keywords: informatisation of school education, media education, aims of media education, media competency.

References

1. Marczak, I., Talaga-Michalska, M., Skierska-Pięta, K. (2011). Innowacje i technologie informacyjne przyszłością nowoczesnej edukacji — wdrażanie rozwiązań informatycznych w procesie kształcenia. *Praktyka na miarę szyta. Program praktyk pedagogicznych podnoszących jakość kształcenia w zawodzie nauczyciela.*W.: Instytut Nauk Społeczno-Ekonomicznych, Drukarnia Cyfrowa & Wydawnictwo «Piktor», 87.
2. Kosmala, J. (2008) *Nauczyciele wobec procesu informatyzacji edukacji.* Wyd. im. Stanisława Podobińskiego Akademii im. Jana Długosza, 283.
3. Bednarek, J. (2012). *Multimedia w kształceniu.* W.: Wyd. Naukowe PWN SA, 412.
4. Fedorov, A. V., Levitskaia, A. A., Chelysheva, I. V., Muriukina, E. V., Hrihorova, D. E. (2014). *Mediaobrazovanie v stranakh Vostochnoi Evropy*. M.: MOO «Informatsiia dlia vsekh», 140.
5. Serwis edukacij medialney. Drogowskaz medialny: historia edukacji medialnej w KRRiT. (2012). Available: *http://www.krrit.gov.pl/drogowskaz-medialny/historia-edukacji-medialnej-w-krrit/*
6. European Parliament resolution. *(25, September, 2008). Community Media in Europe*. Available: *http://www.europarl.europa.eu/sides/getDoc.do?type=TA&language=EN& reference=P6-TA-2008-0456*.
7. Kość, I. (2006). *Przemiany systemu polskiej edukacji w warunkach procesu europeizacji.* Szczecin: «In Plus», 195.
8. Cyfrowa Przyszłość; In: Jarosław Lipszyc. (2012). Edukacja medialna i informacyjna w Polsce — raport otwarcia. *Część I. Konwergencja kompetencji — definicje edukacji medialnej i informacyjnej*. Fundacja Nowoczesna Polska, 196.
9. Siemieniecki, B. (2007). *Pedagogika medialna: podręcznik akademicki w 3 T. T. 1.* W.: Wyd. Naukowe PWN SA, 348.
10. Goban-Klas, T. (2002). *Media i komunikowanie masowe. Teorie i analizy prasy, radia telewizji i Internetu* . W.: Wyd. Naukowe PWN, 307.
11. Ivanov, V., Volosheniuk, O., Kul'chins'ka, L., Ivanova, T., Miroshnichenko, Yu. (2012). *Mediaosvita ta mediahramotnist'*. Ed. 2. K.: AUP, TsVP, 58.

FORMING CREATIVE SKILLS OF FUTURE ENGINEER-PEDAGOGUES

page 45–47

The problem of forming creative skills of future engineer-pedagogues is considered and some results in this field are given in the paper. The main objective of the research lies in substantiating theoretically the technique of forming creative skills of future engineer-pedagogues in the process of their professional training while studying a course of pedagogical disciplines. The important point is that creative works attract the attention of nearly all students; here they express themselves from a positive side. The concept of «creative skills» is defined in the paper. The structure of creative skills of an engineer-pedagogue, needed for developing methods of forming creative skills of an engineer-pedagogue is determined. The given method is based on the methods (heuristic conversation, heuristic tasks, business games, project-based learning, business games, trainings, etc.), which promote development of students' creative thinking. The results can be used by teachers of the course of pedagogical disciplines.

Keywords: creativity, creative skills, creative skill components, method of forming creative skills.

References

1. Andreev, V. I. (1988). *Dialectica vospitaniya i samovospitaniya tvorheskoi lihnosti: osnovu pedagogiheskogo tvorhestva*. Kazan: KSU, 238.
2. Andrievska, V. V.; In: Kremen, V. G. (2008). Kreativnist. *Enzyklopediya osviti*. K.: Yurinkom INTER, 432.
3. Bogoyavlenskaya, D. B. (2002). *Psychologyiya tvorcheskyh sposobnostey*. Moskwa: Academiya, 320.
4. Brul, M. M. (2006). Psihologichna gotovnis pedagoga vuchoi chkolu do aactuvizaciyi tvorchogo potencialu uchnivskoi molodi. *Teoretuchni i prucladni problemu psyholohiyi, № 33(14)*, 40—44.
5. Vasiliev, I. B. (2003). *Profesionalnaya pedagogica. Vol. 2*. Kharkov, 175.
6. Kravchenko, L. M., Kravchenko, N. V. (2010). Strategiyi inzhenerno-pedagogichnoi osviti in konteksti integratciyi in yevropeysky prostir. *Zb. nauk. prace BDPU (Pedagogichni nauki), № 2*, 113—118.
7. Lazarev, M. O. (1995). *Osnovu pedagogichnoyi tvorchosti*. Sumi: VVP «Mriya-1». — LTD, 212.
8. Moliako, V. O. (2007). Tvorhiy potentsial osobistosti. *Naukovuy chasopis NPU im. M. P. Drahomanova. Ser. № 12. Psihologichni nauku, Vup. 17*, 16—22.
9. Sisoieva, S. O. (1998). *Pedagogichna tvorchist*. H.-K.: Knizhkove vidavn. «Karavela», 150.
10. Ribalka, V. V. (1996). *Psihologiya rozvitku tvorchoy osobistosti*. K.: IZMN, 236.

NATIONAL PROGRAMMES OF SPECIALISTS TRAINING — FAST TRACK OF THE SPECIALISTS RESERVE CREATION

page 47–50

The issues of training specialists, namely low, mid and top-level managers, implementing enterprises and organizations development programs under the State Plan for management training for the national economy of the Russian Federation are considered in the paper. The reasons for the Programme popularity among listeners and employers were identified. The main objective of the study is to assess the reasons for the President's programme popularity among managers of companies — Programme listeners and heads of sending organizations as the fastest way for professional development and training of specialists reserve for the innovation economy, respectively. The analysis of results of the sociological survey of listeners of educational programs, implemented under the State Plan for management training for the national economy of the Russian Federation in the Nizhny Novgorod branch of the Federal State Autonomous Educational Institution of Higher Professional Education «National Research University «Higher School of Economics» (NRU HSE — Nizhny Novgorod), and representatives of the sending organizations is given in the paper. Following the survey results it can be concluded on the Programme's ability to meet the requirements of specialists reserve training for the innovation economy. The research results can be applied in developing practice-oriented specialists training programs and for selecting educational trajectories at continuous managers training for rapid specialists reserve formation.

Keywords: specialists training, President's programme, action learning.

References

1. Zinov, V. H. (2005). *Menedzhment innovatsii: Kadrovoe obespechenie*. M.: Delo, 496.
2. Mitsuaki, S. (2006). *Epokha sistemnykh innovatsii*. M.: Mirakl, 248.
3. Sviridova, L. V. (2009). *Problemy formirovaniia professional'nykh upravlencheskikh komand v usloviiakh innovatsionnoho razvitiia orhanizatsii*. N. Novhorod: OOO «VEK», 184.
4. Taker, R. B. (2006). *Innovatsii kak formula rosta. Novoe budushchee vedushchikh kompanii*. Translation from English. M.: ZAO «Olimp-Biznes», 240.
5. Bovin, A. A., Cherednikova, L. E., Yakimovich, V. A. (2009). *Upravlenie innovatsiiami v orhanizatsii*. Ed. 3. M.: Izdatel'stvo «Omeha L», 415.
6. In: Pedler, M.; English translation edited by Vikhanskiy, O. S. (2000). *Praktika obucheniia deistviem*. M.: Hardariki, 336.
7. Abrosimova, E. B.; In: Chernova, S. S. (2012). Model' otsenki kompetentsii vypusknikov obrazovatel'nykh prohramm. *Problemy*

i perspektivy razvitiia obrazovaniia v Rossii: Sbornik materialov XIV Mezhdunarodnoi nauchno-prakticheskoi konferentsii. Novosibirsk: Izdatel'stvo NHTU, 180—183.
8. Abrosimova, E. (2011). Mesto Prezidentskoi prohrammy podhotovki upravlencheskikh kadrov v sisteme nepreryvnoho obrazovaniia v usloviiakh ekonomicheskoi nestabil'nosti. *Navstrechu 15-letiiu Prezidentskoi prohrammy podhotovki upravlencheskikh kadrov: opyt i perspektivy: Sbornik materialov Moskovskoi mezhdunarodnoi nauchno-prakticheskoi konferentsii*. Moskva, 72—74.
9. Al'tshuller, I., Fiiaksel', E. (2007). *«Kub innovatsii» i palitra innovatorov. Idei, proekty, uroki i kommentarii*. M.: Delo, 280.
10. Shatilov, A., Iudel'son, A., Doichenko, S. (2007). *Kadrovye rezervy Rossii. Sostav i osobennosti elitoobrazovaniia*. M.: Tsentr politicheskoi informatsii, 232.

SOME ISSUES OF QUALITY MANAGEMENT OF AGRARIAN EDUCATION

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This article describes the main trends in the development and reform of Ukrainian agrarian education, the problems associated with increasing the quality of training, strategic ways to address them and the results obtained at this stage.

Today only in the system of national agrarian education is conducting an annual independent checkup of university students' knowledge via computer remote testing.

This method allows actualizing the state control and standardization in the system of high agrarian education using diagnostic, educational and organizational functions.

The results of these experiments are used during the State control as a customer of staff, the effectiveness of training for agricultural production.

Conducting of independent distance measuring of students' knowledge and experimental rising of the time for practical training requires further investigation as the part of the quality management of agricultural education.

Keywords: agrarian education, standard, the control of knowledge quality, testing.

References

1. Bologna Declaration. Joint Declaration of the European Ministers of Education Convened in Bologna on the 19th of June 1999. *The European Higher Education Area*. Available: http://www.bologna-berlin2003.de/pdf/bologna_declaration.pdf
2. Zhuravs'kii, V. S., Zhurovs'kii, M. Z. (2003). *Bolons'kii protses: holovni printsipi vkhodzhennia v Yevropeis'kii prostir vishchoi osviti*. K.: IVTs «Vidavnitstvo «Politekhnika», 200.
3. Kremen', V. H. (13–19 hrudnia 2003). Bolons'kii protses: zblizhennia, a ne unifikatsiia. *Dzerkalo tizhnia, № 48(473)*, 6—13.
4. Ukaz Prezidenta Ukraini «Pro zakhodi shchodo prioritetnoho rozvitku osviti v Ukraini» vid 30 veresnia 2010 r. № 926. Available: http://www.president.gov.ua/ru/documents/12323.html
5. Trends in Learning Structures in Higher Education (II). (2001). *Follow-up Report prepared for the Salamanca and Prague Conferences of March/May 2001*. Helsinki: National Board of Education, 63.
6. Zakon Ukraini № 2984-III «Pro vishchu osvitu». (2002). *Vidomosti Verkhovnoi Radi, № 20*, 134.
7. Implementation of «Education And Training 2010» Work. (November 2004). Key Competences for Lifelong learning: A European Reference Framework. — Work programme, Working Group B «Key Competences». Available: http://formacion.educalab.es/eva2013/pluginfile.php/2331/mod_resource/content/2/Key%20competences%20for%20lifelong%20learning.%202004
8. Zakon Ukraini «Pro osvitu». Available: http://zakon4.rada.gov.ua/laws/show/1060-12
9. Nakaz Ministerstva ahrarnoi politiki Ukraini № 412 vid 14.07.2010 r. «Pro provedennia eksperimentu i vprovadzhennia eksperimental'nikh navchal'nikh planiv pidhotovki fakhivtsiv osvitn'o-kvalifikatsiinoho rivnia «Bakalavr» u vishchikh navchal'nikh zakladakh Minahropolitiki». Available: http://document.ua/pro-provedennja-eksperimentu-i-vprovadzhennja-eksperimentaln-doc36471.html
10. Nakaz Ministerstva ahrarnoi politiki Ukraini № 464 vid 4.08.2010 r. «Pro vnesennia zmin do Polozhennia pro provedennia eksperimentu i vprovadzhennia eksperimental'nikh navchal'nikh planiv pidhotovki fakhivtsiv osvitn'o-kvalifikatsiinoho rivnia «Bakalavr» v okremo vziatikh vishchikh navchal'nikh zakladakh Ministerstva ahrarnoi politiki Ukraini». Available: http://document.ua/pro-provedennja-eksperimentu-i-vprovadzhennja-eksperimentaln-doc36471.html