INFORMATION TECHNOLOGY AND CONTROL SYSTEMS

EFFICIENCY ESTIMATION OF WATER SUPPLY SYSTEMS CONTROL DEPENDING ON THE VOLUME AND CONTENT OF THE CONTROLLED OBJECT OPERATIONAL INFORMATION

page 4-6

The efficiency of realized control depends on the degree of the adequacy of using simulation models of the object. In the article the criteria that characterize the degree of the received solutions proximity are suggested using various forms of the water supply systems model. The algorithm of efficiency estimation of water supply systems control depending on the volume and content of the controlled object operational information is suggested. It is shown that to provide the optimum values of these criteria it is sufficient to have the pressure measures at all the local dictating points of the network. It is demonstrated that further increase of the numbers of measurements do not result in improvement of the criteria meaning. The research is carried out using the method of imitation modeling of the real water supply systems functioning.

Keywords: control, model, criteria, quality, efficiency, water supply systems, pump station.

References

1. Evdokimov, A. H. (1976). Optimal'nye zadachi na inzhenernykh setiakh. Khar'kov: Vishcha shkola, 153.
2. 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.
3. Abramov, N. N. (1985). Teoriia i metodika rascheta system podachi i raspredeleniia vody. M.: Stroiizdat, 288.
4. Merenkov, A. P., Hasilev, V. Ya. (1985). Teoriia hidravlicheskih tsepei. M.: Nauka, 279.
5. Evdokimov, A. H., Teviashev, A. D., Dubrovskii, V. V. (1990). Modelirovanie i optimizatsiia potokoraspredeleniia v inzhenernykh setiakh. M: Stroiizdat, 368.
6. Evdokimov, A. H., Teviashev, A. D. (1980). Operativnoe upravlenie potokoraspredeleniem v inzhenernykh setiakh. Khar›kov, 144.
7. Evdokimov, A. H., Dubrovskii, V. V., Teviashev, A. D. (1979). Potokoraspredelenie v inzhenernykh setiakh. M.: Stroiizdat, 199.
8. Dyadun, S. V. (2000). Matematicheskoe modelirovanie ustanovivshehosia potokoraspredeleniia v sistemakh vodosnabzheniia. Radioelektronika i informatika, 4, 54-56.
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. (1992). Vybor optimal'nykh kombinatsii ahrehatov nasosnoi stantsii horodskoho vodoprovoda. Kommunal'noe khoziaistvo horodov, Vyp. 1, 63-70.

THE PECULIARITIES OF MEDICAL SCIENTIFIC NEOLOGISMS TRANSLATION FROM ENGLISH TO UKRAINIAN

page 6-8

In the pursuit of fidelity and equivalence at the word level a translator must face numerous problems. This article provides a contribution to the issue of handling abbreviations and acronyms in medical translation, which are one of the most problematic lexical groups. The article deals with the translation of medical terminology, especially neologisms, abbreviations and acronyms that are an objective translational problem that can cause serious difficulties despite the professional interpreter's skills. The most effective solution of this problem is to perceive not only the structural peculiarities of medical terms as well as abbreviations and acronyms, but also to realize a segment of reality that is in the process of perception and processing by an interpreter when appropriate interpretation of a neologism or abbreviation is carried out. The procedures for handling shortened forms provided here are universal and can be applied to all languages. It needs to be pointed out at the beginning that the English words abbreviation and acronym are differently defined in various dictionaries and scholarly papers, leading to misunderstanding and chaos in nomenclature. As a matter of fact, not all of them recognize the lexical opposition of those two notions at all. Because of such a divergence, it is necessary to state which definition is adopted here.

Keywords: adequacy of translation, pragmatics, cognitive analysis, neologism, abbreviation, acronym.

References

1. Parshin, A. (2000). Teoriia i praktika perevoda. M., 278.
2. Zabolotnyi, K. F.; Chernovits. hos. med. in-t. (1987). Neolohizmy v slovoobrazovatel'noi sisteme anhliiskoho iazyka. Chernovtsy, 290.
3. Retsker, I. Ya. (1987). Uchebnoe posobie po perevodu s anhliiskoho iazyka na russkii. M.: Vysshaia shkola, 277.
4. Eleseeva, V. V. (1973). Leksikolohiia anhliiskoho iazyka. M.: Prosveshchenie, 345.
5. Honcharov, B. A. K voprosu o tipolohii i perevode cokrashchenii v anhloiazychnoi nauchno-tekhnicheskoi literature. Teoriia i praktika, 323.
6. Balishin, S. I. O sokrashcheniiakh v podiazyke meditsiny (na materiale anhliiskoho iazyka). Raznovidnosti i zhanry nauchnoi prozy, 360.
7. Yanko, N. A. (1987). Perevod anhliiskikh slozhnykh slov-neolohizmov. Teoriia i praktika perevoda. Kiev, 318.
8. Ermakova, O. V. Neolohizmy v sovremennom anhliiskom iazyke i ikh perevod na russkii iazyk. Luchshie vypusknye kvalifikatsionnye raboty 2004. Tiumen': Tiumen. hos. un-t. Ch. 3: Humanitarnoe napravlenie, 271.
9. Karaban, V. I. (1997). Abreviaturi i skorochennia. Posibnik-dovidnik z perekladu anhliis'koi naukovo-tekhnichnoi literaturi na ukrains'ku movu. Chastina II. TEMPUS, 345.
10. Stupin, L. P. (1963). Abbreviatury i problema ikh vkliucheniia v tolkovye slovari. Vopr. Teorii i istorii iazyka. L., 291.
11. Hughes, H. K. (1977). Dictionary of Abbreviations in Medicine and the Health Sciences. Lexington, 123.

THEORETICAL PROBLEMS OF LANGUAGE TRANSLATION OF OFFICIAL PAPERS

page 8-10

The article deals with the translation of legal documents. The analysis of the translation peculiarities, involving the adequate ways to business correspondence translation has been conducted. Since the translation of contracts and commercial agreements is referred to legal literature, this article describes the features of the legal literature and the requirements for its translation because legal translation reflects

the socio- political and cultural characteristics of the society. Apart from terminological lacunae, or lexical gaps, the translator may focus on the following aspects. Textual conventions in the source language are often culture-dependent and may not correspond to conventions in the target culture. Linguistic structures that are often found in the source language may have no direct equivalent structures in the target language. The translator therefore has to be guided by certain standards of linguistic, social and cultural equivalence between the language used in the source text to produce a text in the target language.

Keywords: legal documents, contracts, agreements, legal translation.

References

1. Arnold, I. V. (1991). Fundamentals lynhvystycheskyh of research : learning. The manual. M.: High society. HQ, 140.
2. Burmistrova, N., Kotlyar, V. (1994). English for effektive management. Moscow: Tehnological School of Business, 264.
3. Leech, G., Svartvik, J. (1983). Communicative Grammar of English. M.: Education, 304.
4. Halperin, Y. R. (1981). Stylystics of English. Moscow: Education, 336.
5. Omental, L. V. (1992). English for managers. M.: Education, 183.
6. Gordon, E. M., Krylova, I. P. (1973). The English Verbals. M.: Education - International Relations, 215.
7. The Issues in English Philology (Study Manual): For advanced students and for teachers of English. (1998). Irkutsk, 140.
8. Longman Dictionary of Contemporary English. (1992). M.: Education, 743.
9. In: Shpak, V. K. (2007). Fundamentals of Translation grammatical and lexical aspects. Tutorial. Kyiv: Knowledge, 387.
10. Chernovaty, L. M. (1994). Translation of English economic literature. U.S. Economy: General principles. Kyiv: Nova Knyha, 284-339.

LOGICAL AND PROBABILISTIC MODELING OF POWER SUPPLY SYSTEMS RELIABILITY IN INTELLIGENT CONTROL SYSTEMS

page 11-13

The article is devoted to the method of database construction for power system operations control at crisis situations based on equipment reliability. Some results of suggested approach are shown with specific example illustration. The main research object is developing the method of representing progressing chain of equipment failure in terms of production networks in database. Such representing of reliability characteristics of power supply system objects allows unifying intelligent database and, consequently, unifying inference of machine operation. The opportunity of applying theoretical base of probabilistic calculus and probability estimate of reliability parameters for making equipment failures graph is under consideration in the article. Represented method allows forecasting accidents in power systems and setting decision support systems for loss minimizing. Offered method can be applied at power systems of different complexity and voltage classes. Research results can be used in operations control of power supply modes in emergency conditions and other technical areas but also for making decision support system at crisis situations.

Keywords: probability, model, reliability, equipment failure, production, control, electricity

References

1. Fokin, Y. A., Venikova, V. A. (1989). Energosberegayuschaya tehnologiya elektrosnabgeniya narodnogo hozyaystva. Nadyoghnost i effektivnost setey elektricheskih sistem. Book. 3. M.: Vish. shk, 151.
2. Basova, T. F., Borisov, E. I., Bologova, V. V. and others; In: Kozhevnikova, N. N. (2004). Ekonomika i upravlenie energeticheskimi predpriyatiyami. M.: Izdatel'skiy tsentr Akademiya, 432.
3. Samsonov, V. S. (2003). Ekonomika predpriyatiy energeticheskogo kompleksa. M.: Vysshaya shkola, 416.
4. Manov, N. A., Khokhlov, M. V. (2010). Metody i modeli issledovaniya nadezhnosti elektroenergeticheskikh sistem. Syktyvkar, 292.
5. Billinton, R., Allan, R. (1988). Otsenka nadezhnosti elektroenergeticheskikh system. Translation from English. M.: Energoatomizdat, 288.
6. Rudenko, Yu. N. (1994). Nadezhnost' sistem energetiki i ikh oborudovaniya: Spravochnik. Tom. 1. Obshchie modeli analiza i sinteza nadezhnosti sistem energetiki. M.: Energoatomizdat, 480.
7. Fokin, Yu. A., Tufanov, V. A. (1981). Otsenka nadezhnosti sistem elektrosnabzheniya. M.: Energoizdat, 224.
8. Stroganov, A., Zhadnov, V., Polesskiy, S. (2007). Obzor programmnykh kompleksov po raschetu nadezhnosti slozhnykh tekhnicheskikh system. Komponenty i tekhnologii, 5, 183-190.
9. Guk, Yu. B. (1990). Teoriya nadezhnosti v elektroenergetike: Ucheb. Posobie dlya VUZov. L.: Energoatomizdat. Leningr. Otd.-ie, 208.
10. Kotov, I. A., Konstantinov, G. V. (2008). Predstavlenie logicheskikh modeley prinyatiya resheniy v produktsionnykh ekspertnykh sistemakh na osnove apparata setey Petri. Razrabotka rudnykh mestorozhdeniy, Vyp. 92. Krivoy Rog: KTU, 189-193.

DEVELOPMENT OF CONTROL SYSTEMS FOR GSM/GPS/ MCUDEVICES BASED ON USB

page 13-15

The development of control systems for integrated GSM/ GPS/MCU-devices, which are used in information systems for moving objects, is considered in the paper. The main purpose of the study is the selection of components and development of the system structure, taking into account the need of using the USB interface. Definition of the weak points of the structure and possibilities of their improvement is carried out. As a result of the conducted researches, the system structure, the main element of which is a hardware USB-bridge, is proposed. The control system for the portable control device, which is connected directly to the USB-bridge, is developed. It was found that the use of RAM by the control device can be reduced using the additional information processing module, which performs the filtering function. The research results can be used in the development of information systems for moving objects.

Keywords: MCU-systems, USB interface, control systems.

References

1. Musiyenko, M. P., Tomenko, V. I., Savchuk, O. L., Rud, M. P. (2007). Razrabotka navigatsyonnyh programmno-apparatnykh complexov na dvizhushchikhsya objektakh. Visnyk Cherkaskogo derzhavnogo tekhnologichnogo universytetu, 1, 119-122.
2. Savchhuk, O. L., Musiyenko, M. P. (2007). Ukrainian Patent No. 27895.
3. System On-Line Monitoring "ZIT Track" (2012). Available: http://zit.lviv.ua/index.php/gps-monitoring-en.html. Last accessed: November 23, 2013.
4. Accessories (2013). Available: http://uk.farnell.com/ftdi/ft2232hq-mini-module/mod-usb-to-serial-fifo-ft2232h/dp/1697465. Last accessed: November 16, 2013.
5. Pricing and inventorying availability (2013). Available: http://www.cypress.com/?mpn=CY7C68001-56LTXC. Last accessed: November 19, 2013.

6. Android 4.0 APIs (2013). Available: http://developer.android.com/about/versions/android-4.0.html. Last accessed: November 23, 2013.
7. Google Maps Android API v2 (2013). Available: https://developers. google.com/maps/documentation/android/. Last accessed: November 23, 2013.
8. NMEA 0183 (2013). Available: http://en.wikipedia.org/wiki/NMEA_0183. Last accessed: December 1, 2013
9. NMEA data (2013). Available: http://www.gpsinformation.org/dale/ nmea.htm. Last accessed: December 1, 2013.
10. SIMCOM - SIM508EVB - EVAL KIT, FOR SIM508 (2013). Available: http://uk.farnell.com/simcom/sim508evb/eval-kit-for-sim508/dp/1678300. Last accessed: December 3, 2013.

STAND FOR STUDYING MICROCONTROLLERS

page 15-17

The problems of studying the basics of microprocessor technology and microcontrollers in technical high schools are considered in the paper. The version of the educational stand - Control computer LMakPic24-64 is proposed. Due to the thought-up design, the computer has a low cost and is suitable for replication in high school conditions. The computer is also suitable for the development of applications, based on the Microchip 16-bit PIC24 family.

The main purpose of the study is to solve the following problems: formulation of the subjects of studying the microcontroller systems, design and construction of the sub-module of the PIC24F64GA004 microcontroller; design and creation of the Control computer LMakPic24-64 microcontroller for studying the basics of the microprocessor technology; design and creation of the «open» programmer, function-compatible with PICkit- 2; creation of the complex of programs, which reflect the basic features of modern microcontrollers.

Application of modern methods of software development using the IDE MP LAB X compiler CX16 and firm libraries allowed to develop a package of demonstration programs for PIC24 in the shortest time. The control computer LMakPic24-64 is a platform for users, who study microprocessor technology, microcontrollers, and is also suitable for the development of applications, based on the Microchip 16-bit PIC24 family. We hope that the device, together with the developed demonstration software will find broad application in the educational process of technical high schools.

Keywords: microcontroller, microprocessor technology, control computer, USB, CPU module, debug board.

References

1. Borisov, A. (2006). 16-bitnye mikrokontrollery Microchip. Komponenty m tekhnolohii, 9-11.
2. Lobachev, D., Safronov, M. (2007). Periferiia 16-rakhriadnykh mikrokontrollerov Microchip. Komponenty m tekhnolohii, 2.
3. Lusio di Dzhasio. (2009). Prohrammirovanie na S mikrokontrollerov PIC24. MK-Press, Korona-Vek, 336.
4. Mahda, Iu. (2009). Mikrokontrollery PIC 24. Arkhitektura i prohrammirova-nie. DMK Press, 240.
5. Shpak, Yu. (2011). Prohrammirovanie na iazyke S dlia AVR PIC mikrokontrollerov. Korona-Vek, MK-Press, 546.
6. Microchip Explorer 16 Development Kit Hacks. Available: http://www.machinegrid.com/2010/06/microchip-explorer-16-development-kit-hacks/
7. Obzor otladochnykh sredstv dlia 16-bitnykh mikrokontrollerov PIC24. Available: http://www.picmicro.ru/articles/microchip/138--microchip-dev-tools?start=4
8. What is EasyPIC Fusion™ v7?Available: http://www.mikroe.com/easypic-fusion/
9. Microchip® PIC32MX795F512. Available: http://digilentinc.com/Products/ Detail.cfm?NavPath=2, 892,894 & Prod = CHIPKIT-MAX32
10. PIC24FJ64GA004. Available: http://www.microchip.com/wwwproducts/ Devices.aspx?

ORGANIZATIONAL KNOWLEDGE MANAGEMENT FRAMEWORK WITHIN THE SYSTEM CONTEXT

page 18-20

This article deals with application of the system approach in organizational knowledge management, and some results of the research in this field. The objective of the research is the development of holistic knowledge management framework. With this purpose the main organizational stems with time division have been developed. The organizational key elements which are involved in knowledge management processes have been defined. This article reviews the main organizational elements and their relationship within the system context, which are necessary for effective organizational management. The developed framework can assist management to understand the true nature of the relationships which exist between the organization and knowledge management processes, and to exploit them for the success of the organization. The results of the research can be used by managers for effective knowledge management in different fields, including decision-making process, innovative development and working strategy build-up.

Keywords: knowledge, system, knowledge management, strategic management, system thinking

References

1. Marinicheva, M. (2009). Upravlenie znaniyami na 100%. Putevoditel dlya praktikov. Moskva: Alpina Business Books, 230.
2. Rastogi, P. N. (2002). Knowledge Management and Intellectual Capital as a Paradigm of Value Creation. Human Systems Management, V. 21, I. 4, 229-240
3. Bushuev, S., Bushueva, N., Babaev I., and others. (2010). Kreativnue tehnologii v upralenii proektami i programmami. Kyiv: Sammit kniga, 768.
4. Kohut, B., Zander, U. (2004). Znaniya firmu, kombinacionnye sposobnosty i perlikaciya tehnologii. Russion management journal, T2, № 1, 121-140.
5. Alavi, M., Leidner, D. E. (2001). Review: Knowledge Management and Knowledge Management System: Conceptual foundations and research issues. MIS Quarterly, 25 (1), 107-136.
6. Martin, B. (2000). Knowledge Management within the context of management: An evolving relationship. Singapore Management Review, 22 (2), 17-36.
7. Rubenstein-Montano, B. et al. (2001). A systems thinking framework for knowledge management. Decision Support Systems, 31 (1), 5.
8. In: Bushueva, S. D. (2009). Rukovodstvo po upravleniyu innovacionnymi proektami i programmami P2M. Translation from English. Tom 1, version 1.2. Kyiv, Nauk.svit, 173.
9. Symon, G. (2000). Information and Communication Technologies and the Network Organization: A Critical Analysis. Journal of Occupational & Organizational Psychology, 73 (4).
10. Nonaka, I., Takeuchi, H. (1995). The Knowledge Creating Company. How Japanese companies create innovation advancing and development. New York: Oxford University Press, 304.

INFLUENCE OF CARRIER FREQUENCY INSTABILITY ON PERFOMANCE CHARACTERISTICS OF RADIO-TECHNICAL SYSTEMS

page 20-22

The issues related to signal processing in radio-technical systems are considered in the paper. The elements of the radio-

technical systems, in particular driving oscillators, do not provide the ideal stability and consistency of parameters with time that causes nonstationarity of processed signals and leads to the losses in the signal-to-noise ratio with respect to the calculated values. As a result of these losses, the performance characteristics of radio-technical systems are degraded. It is important to estimate the value of resulting losses and to consider possible methods of their reduction. The main purpose of the research is to analyze energy losses of the signal at its accumulation in the receiving device of the radio-technical system. The simulation modeling method and statistical processing of results were used during the research. The research results can be used in the development and modernization of the radio-technical systems of information transmission and extraction, in particular long-haul systems.

Keywords: radio-technical system, digital signal processing, non-stationary signals

References

1. Tihonov, V. I., Harisov, V. N. (2004). Statisticheskiy analiz i sintez ra-diotehnicheskih ustroystv i system [Statistical analysis and synthesis of a radioelec-tronic devices and systems]. M.: Radio i Svyaz, 608.
2. Tihonov, V. I. (1966). Statisticheskaya radiotehnika [Statistical radio-electronics]. M.: Sovetskoe radio, 678.
3. Akimov, P. S. et.al; In: Kolosov, A. A. (1989). Obnaruzhenie signalov [Signal detection]. M.: Radio i Svyaz, 224.
4. Baskakov, S. I. (2005). Radiotechnicheskie cepi i signaly [Radioelectronic circuits and signals]. M.:Vyshaya shkola, 462.
5. Falkovich, S. E. (1970). Ocenka parametrov signala [Signal parameter estimation]. M.:Sov.Radio, 336.
6. Shirman, Ya. D. (1970). Teoreticheskie osnovy radiolokacii [Theoretical foundations of radiolocation]. M.: Sov.radio, 560.
7. Sklyar, B. (2003). Cifrovaya svyaz. Teoreticheskie osnovy i prakticheskoye primenenie [Digital communications. Theoretical foundations and practical aspects]. M.: Vilyams, 1104p.
8. Lytvyn-Popovych, A. I. (2012). Obnaruzhenie signalov v usloviyah apriornoy parametricheskoy neopredelennosti [Signal detection in a priori uncertainty conditions]. Radiotekhnika, vol.168, 16-21.
9. Lytvyn-Popovych, A. I. (2012). Obnaruzhenie i izmerenie parametrov signalov v parallelnyh sistemah obrabotki [Signal detection and parameter estimation in parallel processing systems]. Radiotekhnika, vol.170, 125-131.
10. Lytvyn-Popovych, A. I. (2011). Obrabotka radiolokazionnyh signalov v parallelnyh vychislitelnyh sistemah [Radar signal processing in parallel computing systems]. Radiotekhnika, vol.166, 165-172.

PRACTICAL METHOD OF OPTIMAL CONTROL DETERMINATION

page 22-24

The use of the direct method of determining the optimization parameters in automatic control systems is considered, and some results of researches in this area are given in the paper. The main objective of the study is to obtain an information base for the evaluation of research results in the field of optimal control and the possibility of objective selection of optimization criteria, relying on actual data of researches. The results of practical application of the theoretical developments in the field of optimal control are very modest. It is largely connected with the inability to verify in practice the results of using this or that theory, related to the implementation of optimal control principles. The method for objective evaluation of theoretical and practical works in the field of optimal control is considered in the paper. This method allows assessing the appropriateness of the selection of optimal control criterion, which should bring control to the mode, providing the maximization of the added value. The research results can be used by experts, designing control systems, as well as researchers, developing the optimal control criteria. In fact, the proposed approach allows ensuring an objective assessment of scientific and practical solutions in the field of optimal control in manufacturing processes of product conversion, transport systems and inventory-control systems.

Keywords: optimal control, control system, process operation.

References

1. Konyukhovskii, P. V. (2000). Mathematical methods of operations research in economics. St. Petersburg: Piter, 208.
2. Churakov, E. P. (1987). Optimal and adaptive systems. M.: Energoatomizdat, 256.
3. Lutsenko, I. A., Guzov, E. S. (2007). Formation mechanism of resource problems in the effective management of technological processes. Eastern-European Journal Of Enterprise Technologies, 1(2(25)), 112-116.
4. Wear process equipment. Available: http://delo-do.com.ua/step2/step2-5.html. Last accessed 17.12.2011.
5. Lutsenko, I. A. (2004). Effective management of technology. Krivoy Rog: Vidavnichy Dim, 152.
6. Lutsenko, I. A. (2012). Fundamentals of the theory of efficiency. Canada, Altaspera Publishing & Literary Agency Inc. 65.
7. Agent model. Available: http://www.delo-do.com.ua/step1/step1-2.html. Last accessed 12.09.2012.
8. Determine the energy consumption of the product. Available: http://delo-do.com.ua/step2/step2-4.html. Last accessed 16.01.2012.
9. Valuation input technology products. Available: http://delo-do.com.ua/step2/step2-6.html. Last accessed 23.01.2012.
10. Technology direct evaluation of the effectiveness of management processes. Available: http://delo-do.com.ua/step2/step2-8.html. Last accessed 25.01.2012.

INFORMATION TECHNOLOGIES FOR DATA PROCESSING SYSTEMS DESIGN AT THE SURFACE QUALITY CONTROL

page 25-27

Some of the main indicators of the surface quality are geometrical features, the differentiation criterion of which is the relation of the step S to the full roughness height R. At S/R over 1000, macro-roughness (form deviation), defined by manufacturing tolerance is analyzed; at S/R=50...1000 – undulation, and at S/R less than 50 - roughness. In the design of multichannel and multifunction adaptive systems of experimental data processing with integrated software programmable measuring channels of profile ordinates of surface roughness of extended aviation products, it is preferable to use analog contact inductive sensors, which are the most resistant to overload shocks and the influence of external magnetic fields. Such systems allow estimating the roughness parameter Ra not only for standard samples, but also for simple non-linear surfaces, the section of which in the measurement plane is represented as a basic straight line.

Formally, the problem of external design of the adaptive control system can be reduced to solving three statistic measuring problems. It is shown that information technologies for control systems design, using the generalized accuracy concept, which is characterized by considering the set of measurement accuracy indicators, reliability, noise immunity and electromagnetic compatibility can be applied in the systems design for on-line calculation of statistic surface quality parameters - rough-

ness, and dynamic parameters - undulation, in manufacturing extended products of aerospace engineering.

Keywords: information technologies, roughness, undulation, unified channel for roughness profile ordinates measurement.

References

1. Bratuhin, A. G. (2008). Rossijskaja jenciklopedija. CALS. Aviacionno-kosmicheskoe mashinostroenie. M.: OAO NIC ASK.
2. Miroshnichenko, I. V. (2012). Ob odnom sposobe klassifikacii statisticheskih izmeritel'nyh zadach. Matematichne ta komp`juterne modeljuvannja, Vip. 7, 132-139
3. Reklejtis, G., Rejvindran, A., Rjegsdejl, S. (1986). Optimizacija v tehnike. Translation from English. V 2-h kn. M.: Mir, 349.
4. Kornienko, G. I. (1985). Perspektivy razvitija i primenenija problemno-orientirovannyh CVK dlja obrabotki dannyh naturnyh ispytanij. Postroenie avtomatizirovannyh sistem obrabotki jeksperimental'nyh dannyh. Kiev: IK AN USSR, 3-5.
5. Keisler, G., Chen, Ch. (1977). Teoriia modelei. M.: Mir, 616.
6. Norenkov, I. P., Kuz'mik, P. K. (2002). Informacionnaia podderzhka naukoiomkih izdelii (CALS-tehnologii). M.: Izd. MVTU im. N. Ye. Baumana, 45-50.
7. Detling, V. S., Kartunov, C., Miroshnichenko, I. V. (2007). Information-logical model error of random statistical characteristics measurements. International scientific conference, Gabrovo, 23-24 Nov 2007, 322-327
8. Ponomarenko, V. K., Miroshnichenko, V. S. (1973). Povyshenie tochnosti vychisleniia momentov vysokih poriadkov sluchainyh processov s ogranichennym diapazonom znachenii. Trudy IV Vsesoiuznoi Shkoly-seminara po statisticheskoi gidroakustike. Novosibirsk, 38-40.
9. Ponomarenko, V. K., Miroshnichenko, V. S. (1971). Vybor parametrov izmeritelei chislovyh harakteristik sluchainyh processov. Izv. VUZ SSSR, razd. Radioielektronika, XVI, 7.
10. Detling, V. S., Zinchenko, V. P., Miroshnichenko, I. V. (2006). Informaciino-vimirjuval›na sistema zabezpechennia iakosti shorstkosti poverhni. Visnik Cherkas›kogo Derzhavnogo tehnologichnogo universitetu, Specvipusk, 135-137.

METHODOLOGICAL BASES OF MANAGEMENT OF TECHNOLOGICAL COMPLEXES UNDER UNCERTAINTY

page 27-29

Application of strategic and operational management methods for continuous technological complexes in different industries (chemical, petroleum, food) is considered in the paper. The purpose of the study is to develop methodological bases of management of continuous technological complexes, which operate at long time intervals under uncertainty. Such industries as food, chemical, petroleum are characterized by the complexity of technological process, variability of performance indicators, dependence on the influence of environmental factors. The combined application of strategic and operational management methods for technological complexes under uncertainty that allows to ensure the representation of management processes with the necessary level of detail, and promote strategic decision-making under conditions of incomplete and inaccurate initial information is considered in the paper. The given method takes into account the nature of actions of technological complex elements and environment, technological complex uncertainty, solution of difficult-formalized management problems of continuous technological complex, environmental uncertainty conditions. The method, proposed by the author, is recommended for using in the development of automated control systems for continuous technological complexes, including at the enterprises and corporations of the sugar industry. The research results can be also applied in decision-support systems for the sugar industry enterprises.

Keywords: technological complex, uncertainty, operational management, strategic management.

References

1. In: Bushueva, S. D. Russian translation. (2009). Guidelines for management of innovative projects and programs. V.1, Version 1.2. K.: Nauk. svit, 173.
2. In: Bolshakov, A. A. (2006). Intelektyalnie sistemi ypravleniya organizacionno-technicheskimi sistemami. M.: Goryachaya liniya. Telekom, 160.
3. Stoilova, K. (2006). Prediction neiteraktivnye coordination in hierarchical systems. Automation and Remote Control, 4, 137-151.
4. Parsheva, E. A. (2001). Adaptive decentralized control of multivariable objects. Automation and Remote Control, 2, 135-148.
5. Ladanyuk, A. P., Shumigay, D. A., Boyko, R. O. (2013). Case coordinating subsystems of technological systems of continuous type. Control and Informatics, 4, 117-122.
6. Kuznetsov, O. P., Kylinich, A. A., Markov, A. V.; In: Abramov, N. A. Ginsberg, K. S., Novikov, D. A. (2006). Analysis influences the management of semistructured situations based on cognitive maps. The human factor in management. M.: KomKniga, 313-344.
7. Pospelov, D. A. (1986). Case Management: Theory and Practice. Moscow: Nauka, Ch. Ed. Sci. lit., 288.
8. Prokopenko, T. O. (2013). A comprehensive model of strategic management of organizational and technical systems under uncertainty. Visnik of the Lviv State University of zhyttyediyalnsti, 7, 55-60.
9. Borisov, V. V., Zernov, M. M. (2009). Implementation of the situational approach based on fuzzy hierarchical opportunistic event- network. Artificial Intelligence and Decision Making, 1, 18-30.
10. Lega, U. G., Prokopenko, T. O. (2013). Thus information technology strategic management of organizational and technical systems. Visnik ChDTU, 1, 11-14.

REDUCING THE ENERGY CONSUMPTION OF DISTRIBUTED COMPUTER SYSTEMS WITH ENERGY-RESTRICED MEASUREMENT MODULES

page 29-31

Development and growth of the electronics that use microcontrollers in different sites of application systems, such as distributed information-measuring systems, cause the search for more effective solutions to reduce energy consumption as well as modules usually consume from autonomous energy sources. In the article the problem of reducing the energy consumption of distributed computer systems with energy-restriced measurement modules based on microcontrollers through optimal scaling CPU frequency measurement of the module is considered. A mathematical model of this system was created, which considers energy restrictions of systems. For power optimization algorithm was used EDF. Performance of the system was experimentally verified on the basis of the measuring unit , which consists of selected piezoceramic element TsTS-19 , Microstick for dsPIC33F Development Board the controller , Raspberry Pi Model B.

Keywords: distributed systems, energy-restriced measuring module, power consuption, dynamic performance management.

References

1. Musiyenko, M. P (2006). Teoreticheskiye osnovy, metody i sredstva strukturno-energosilovogo preobrazovaniya na osnove

polielektrodnykh p'yezokeramicheskikh elementov dlya sistem upravleniya: dis. ... doktora tekh. nauk: 05.13.05. Cherkassy, 455.
2. Kim, J.-K., Siegel, H. J., Maciejewski, A. A., Eigenmann, R. (2008). Dynamic resource management in energy constrained heterogeneous computing systems using voltage scaling. IEEE Trans. on Parallel and Distrib. Syst., 19(11), 1445–1457.
3. Bumagin, A., Gladkova, Ye., Gondar', A., Kulyas, M., Rutkevich, A., Steshenko, V., Tayleb, M., Shishkin, G. (2009). Metody snizheniya energopotrebleniya v strogo samosinkhronnykh mikroprotsessornykh skhemakh. Elektronnyy zhurnal komponenty i tekhnologii. Available: http://kite.ru/assets/files/pdf/2009_09_109.pdf. Last accessed 02.04.2012.
4. Kim, K. H., Buyya, R., Kimm, J. (2007). Power Aware Scheduling of Bag-of-Tasks Applications with Deadline Constraints on DVS-enabled Clusters. Proceedings of the 7th IEEE International Symposium on Cluster Computing and the Grid, 541–548.
5. Belous, A. I., Murashko, I. A., Syakersky, V. S. (2008). Metody minimizatsii energopotrebleniya pri proyektirovanii KMOP BIS. Technology and design in electronic equipment, 2, 39-44.
6. Manukhin, S. V., Sukhonos, M. I. (2013). Algoritmy optimizatsii energopotrebleniya i povysheniya effektivnosti protsessorov s masshtabirovaniyem chastoty i napryazheniya geterogennogo klastera. Trudy Mezhdunarodnoy konferentsii «Parallel'nyye i raspredelennyye vychislitel'nyye sistemy" PDCS 2013, 209-217.
7. Pering, T., Bird, T., Brodersen, R. (1998). The simulation and evaluation of dynamic voltage scaling algorithms. ISLPED 1998, 76-81.
8. Huang, S., Feng, W. (2009). Energy-Efficient Cluster Computing via Accurate Workload Characterization. Proc. CCGRID'09 Proceedings of the 2009 9th IEEE/ACM International Symposium on Cluster Computing and the Grid, 68–75.
9. Diduk, V. A., Kovalenko, A. V., Petlovanyy, P. V., Dyadyushenko, A. A., Tomenko, V. I., Musiyenko, M. P. (2011). Razrabotka polisensornykh geterogennykh besprovodnykh pozharno-okhrannykh system. Pozhezhna bezpeka: teoríya í praktika, 8, 28–32.
10. Opisaniye Raspberry Pi. (2012). Raspberry Pi v Rossii. Available: http://kit-e.ru/assets/files/pdf/2009_09_109.pdf.

DESIGN PROCEDURE FOR INFO-COMMUNICATION SYSTEM WITH THE MAXIMUM THROUGHPUT

page 32-34

The problem of self–similarity in various areas of science and technology has interested researchers for a long time. Packet losses result in an additional network traffic and, finally, "congestions". At high–speed of data transfer packet losses, expressed in portions of a per cent, lead to considerable information losses. It has been shown in numerous papers devoted to the research of network traffic that the abovementioned phenomena are related to the properties of the traffic self–similarity which is mainly caused by the TCP protocol behaviour. However to date models have not been offered which adequately describe the behaviour of the communication networks of information systems and which allow to apply the whole arsenal of classic methods of analyzing nonlinear dynamic systems. The paper suggests a new approach to analyzing the communication network behaviour of information systems with TCP protocol – considering them as nonlinear dynamic systems manifesting chaotic properties at certain values of parameters. Phase portrait of the system under study are built, Lyapunov exponents for different values of the main system parameters are calculated. Recommendations on designing and operating high-speed optical communication networks of information systems are suggested.

Keywords: self-similarity, network traffic, chaos, packet loss, quality of service, TCP/IP.

References

1. Willinger, W., Taqqu, M. S., Erramilli, A.; In: Kelly, F. P., Zachary, S., Ziedins, I. (1996). A bibliographical guide to self-similar traffic and performance modeling for modern high-speed networks. Stochastic Networks: Theory and Applications (Oxford), Royal Statistical Society Lecture Notes Series, 4, 339-366.
2. Mandelbrot, B. B. (1965). Self-similar error clusters in communications systems and the concept of conditional systems and the concept of conditional stationarity. IEEE Transactions on Communications Technology, COM, 13, 71-90.
3. Leland, W. E., Taqqu, M. S., Willinger, W., Wilson, D. V. (1994). On the self-similarnature of ethernet traffic. IEEE/ACM Transactions of Networking, 2(1), 1-15.
4. Floys, S. (1995). Simulator tests. Available: http://www-nrg.ee.lbl.gov/.
5. Zhu, C., Yang, O. W. W., Aweya, J., Oullete, M., Montuno, D. Y. (2002). A comparison of active queue management algorithms using the OPNET Modeler. IEEE Communication Magazine, 40(6), 158-167.
6. Veres, A., Boda, V. (2000). The chaotic nature of TCP congestion control. Proc. IEEE INFOCOM, 79-88.
7. Paxson, V., Floyd, S. (1995). Wide-Area Traffic: The Failure of Poisson Modeling. IEEE/ACM Transactions on Networking, Vol. 3, 226-244.
8. Karpukhin, A. V. (2009). Matematicheskoe modelirovanie haoticheskih yavlenii v visokoskorostnih setevih informacionnih sistemah s protokolom TCP. Sistemi obrobki informacii, 4(78), 64-69.
9. Cho, H., Karpukhin, A., Kudryavtsev, I., Borisov, A., Gritsiv, D. (2013). Computer Simulation of Chaotic Phenomena in High-Speed Communication Networks. Journal of Korean Institute of Information Technology, Vol. 11, 113-122.
10. Hegger, R., Kantz, H., Schreiber, T. The package of TISEAN programs and concomitant documentation. Available: http://www.mpipks-dresden.mpg.de/~tisean/.
11. Hegger, R., Kantz, H., Schreiber, T. (1999). Practical implementation of nonlinear time series methods: The TISEAN package. CHAOS 9, 413.
12. Simulator NS-3 and concomitant documentation. Available: http://nsnam.org.

THE DESIGN FEATURES OF PIEZOGRAVIMETER OF AUTOMATED AVIATION GRAVIMETRIC SYSTEM

page 34-36

The new piezogravimeter of automated aviation gravimetric system for measuring the gravity acceleration, which has higher accuracy (1mGal) than the known today (2-10 mGal) is proposed in the paper. Its design is given, and the design features are pointed out: piezoelement material, its geometrical sizes and shape, presence of hermetic enclosure, insulators, shape and material of the inertial mass and so on. The motion equation of the aviation gravimetric system with piezogravimeter was determined. The analysis of this equation was conducted, and components of the automated aviation gravimetric system were identified. It was established that piezogravimeter due to its design serves as the sensing element of the automated aviation gravimetric system, and the low-pass filter, eliminating the effect of the anomaly of gravity acceleration of high-frequency noise on the output signal.

Keywords: aviation gravimetric system, piezogravimete, gravity acceleration.

References

1. Bezvesil'na, O. M. (2007). Aviatsiini hravimetrychni systemy ta hravimetry: monohrafiia. Zhytomyr: ZhDTU, 604.
2. Bezvesyl'naia, E. N., Tkachuk, A. H. (2013). Sovremennye avyatsyonnye hravymetry. IX Miedzynarodowej naukowi-

praktycznej konferencji « Aktualne problemy Nowoczesnych nauk – 2013 «. Peremyshl›, 88-89.
3. Bezvesil›na, O. M., Tkachuk, A. H. (2013). P'iezoelektrychnyi hravimetr aviatsiinoi hravimetrychnoi systemy: monohrafiia. Zhytomyr: ZhDTU, 36-38.
4. Bezvesil›na, O. M., Tkachuk, A. H. (2013). Fizychni pryntsypy roboty p'iezoelektrychnoho hravimetra aviatsiinoi hravimetrychnoi systemy. Visnyk Inzhenernoi akademii Ukrainy, 2, 18-21.
5. Bezvesil›na, O. M., Tkachuk, A. H. (2013). Strukturna skhema peretvorennia vkhidnoho syhnalu chutlyvym elementom p'iezoelektrychnoho hravimetra aviatsiinoi hravimetrychnoi systemy. Tekhnolohichni kompleksy, 1(7), 43-50.
6. Bezvesil›na, O. M. Tkachuk, A. H. (2013). Aviatsiinyi hravimetrychnyi kompleks dlia vymiriuvan› anomalii pryskorennia syly tiazhinnia. NPK on-line konferentsiia prysviachena Dniu nauky. Zhytomyr, 88-89.
7. Bezvesilnaya, E. N., Tkachuk, A. G., Kozko, K. S. (2013). Gravimeter of aviation gravimetric system. The advanced science journal (USA), 8, 41-46.
8. Bezvesilnaya, E. N., Tkachuk, A. G., Kozko, K. S. (2013). Gravimeter Output Filtering. XV International PhD Workshop OWD 2013, 33, 306-309.
9. Bezvesil›na, O. M., Tkachuk, A. G. (2012). Fil›tratsiia vykhidnoho syhnalu p'iezohravimetra aviatsiinoi hravimetrychnoi systemy. Visnyk Inzhenernoi akademii Ukrainy, 3-4, 91-94.
10. Bezvesil›na, O. M., Ostapchuk, A. A., Tkachenko, S. S. (2010). Hravimetry ta ikh vystavka: monohrafiia. Zhytomyr: ZhDTU, 307.

SIMULATION OF HEPATITIS B EPIDEMIC PROCESS USING INTELLIGENT AGENTS

page 36-38

The use of intelligent agents in the simulation of the hepatitis B epidemic process is considered in the paper, and preliminary simulation results are given. The main purpose of the research is to develop methods, models and create the applied information technology on their basis for disease spread simulation with the possibility of taking into account available anti-epidemic measures. Prediction of the epidemic situation is of great importance both from the point of view of the national health state as a whole, and for economic reasons. The use of simulation multi-agent modeling as the most appropriate method for the simulation of the complex epidemic process is considered in the paper. The proposed structure of intelligent agent allows to reduce the behavior uniformity of the modeled population for the more detailed reflection of the studied process. The developed model allows predicting the epidemic situation in society, taking into account the intensity of spread and introduced means for the incidence rate reduction. The research results can be applied by epidemiological supervision centers to determine the reasonable level of introduction of disease control measures.

Keywords: multi-agent approach, fuzzy inference, epidemic process, hepatitis B.

References

1. Ammosov, A. D. (2006). Hepatit B. Novosibirsk: Vector-Best.
2. Ivashkin, V. T. (2002). Bolezni pecheni i zhelchevivodyashih putey. Moscow: Publishing house «M-Vesti».
3. Vyun, V. I., Eremenko, T. K., Kuzmenko, Yu. A. (2011). Ob odnom podhode k prognozirovaniyu epidemiologicheskoy obstanovki po grippu-ORVI s ispolzovaniem vremennih ryadov. Matematicheskie mashini i sistemi, 2, 131-136.
4. Chumachenko, T. O., Kovalenko, O. S., Chumachenko, D. I. (2011). Modelyuvannya epidemichnogo procesu virusnogo gepatitu B. Medicina syogodni i zavtra, 53, 145-149.
5. Ashihmin, V. N., Gitman, M. B., Keller, I. E.; In: Trusov, P. V. (2004). Vvedenie v matematicheskoe modelirovanie. Moscow: Logos.
6. Tovstik, A. V. (2012). Development of hepatitis B epidemic process multiagent simulation environment. Technology Audit And Production Reserves, 6(4(8)), 43-44.
7. Zadeh, L. A. (1975). Ponyatie lingvisticheskoy peremennoy i ee primenenie k prinyatiyu priblijennih resheniy. Moscow: Mir.
8. Tovstik, A. V. (2012). Multiagentniy podhod k razrabotke ekspertnih sistem. Sistemi obrabotki informacii, 9, 215-218.
9. Chernishev, Yu. K., Chumachenko, D. I., Tovstik, A.V. (2013). Development of intelligent agents for simulating of hepatitits B epidemic process, Proceedings of 20th Zittau Fuzzy Colloquium 2013, 161-168.
10. Jang, J.-S. R., Sun, C.-T., Mizutani, E. (1997). Neuro-Fuzzy and Soft Computing. A Computational Approach to Learning and Machine Intelligence. Upper Saddle River, N.J.: Prentice Hall, Inc.
11. Kovalenko, O. S. (2012). Proyavi epidemichnogo procesu gepatitu B v umovah provedennya vakcinoprofilaktiki. Dissertation Abstract. Kiyv.

MATHEMATICAL MODELING - APPLIED ASPECTS

SIMULATION OF ACCIDENTS AND THEIR LIQUIDATION IN ERGATIC SYSTEMS

page 39-40

A "Man-machine-environment" system with safeguard subsystem is considered. It is subjected to either classic or unstable flow of events natural or man-made disasters with various densities. The process of liquidation the accident in all these models runs in several stages with different intensities each. These phases can be repeated in the case of "multi-catastrophes". In the presented Markovian model probability of changes in health of an operator is found using the principle of maximizing the information entropy – the so called "second law of synergetics". The average temperature of the human's body is suggested as health criterion, and its maximal probability is found. In spite of the system is open, the computational experiments show that such approach may be used. It fits the conditions of practice. The stability time of the process and the value of changing the dynamic model to stationary one are estimated. The safety criterion of situation that is the ratio of the average time between failures and mean time of recovery is introduced and investigated.

Keywords: Markov chain, Kolmogorov equations, maximum entropy

References

1. Arnold, V. I. (2000). «Hard» and «soft» mathematical models. Moscow MCCME, 32.
2. Wentzel, E. S. (1972). Operations research. Moscow: Soviet Radio, 552.
3. Khinchin, A. I.; Gnedenko, B. V. (1963). Works on the mathematical theory of queuing systems. Moscow: Fizmatgiz, 236.
4. Haken, H. (2005). Information and Self-Organization. Moscow: KomKniga, 248.
5. Al Azawi, R. J. (2012). An approach to modeling human-machine systems recovery in critical situations. 16th International Youth Forum «Electronics and youth in XXI century», 17 - 19April, 2012, 131-132.

6. Al Azawi, R. J. (2012). Markovian Approach To Man-Machine-Environment Systems. Radio Engineering, 170, 14-18.
7. Al Azawi, R. J. (2013). Modeling human-machine system recovery in critical situations with life and death processes. Radio Engineering.
8. Naumeyko, I. V., Sova, A. V. (2012). Computational Markov models for ergatic system. Sat Nauch.Trud. 5th Anniversary of the International Scientific Conference «Functional Nano electronics» Kharkiv-Crimea, 236-239.
9. Jaynes, E. T.; In: Levine, R. D., Tribus, M. (1978). Where do we stand on maximum entropy? The Maximum Entropy Formalism. Cambridge, Mass.: MIT Press.
10. Jaynes, E. T.; In: Ray Smith, C., Grandy, W. T. Jr. (1985). Where do we go from here? Maximum-Entropy and Bayesian Methods in Inverse Problems. D. Reidel Publishing Company, 21-58.

MODELING OF PLANAR NETWORKS BASED ON THE FRACTIONAL-RATIONAL ISOTROPIC CURVES

page 41-43

Application of the theory of isotropic curves in the construction of planar networks with specific properties for using in various applied problems is considered in the paper. The main objective is to develop a new method for constructing planar orthogonal and isothermal coordinate networks, based on the isotropic fractional-rational n-th order curves. Modeling of isotropic fractional-rational curves, based on the isotropic sides of the characteristic polygons is considered in the paper. The conditions for the position of the reference points are given. It is proved that the weight value does not affect the construction of the isotropic curve. The ratio for the construction of such networks using the conformal mapping is obtained. It is proved that the parametric partial derivatives will satisfy the Cauchy-Riemann equations. The method was developed for further use in surface modeling in three-dimensional space.

Keywords: fractional-rational curve, isotropic curve, Bezier curve, orthogonal network, isothermal network.

References

1. Kartan, E. (1963). Teoriya konechnih neprerivnih grupp i dife ferenzialnaya geometriya, izlogenie metodom podvignogo repera. Izdatelstvo Moskovskogo universiteta, 366.
2. Sachs, H. (1990). Isotrope Geometrie des Raumes. Vieweg, Braunschweig/Wiesbaden, 317.
3. Wang, Z., Pei, D., Chen, L., Kong, L., Han, Q. (2012). Singularities of Focal Surfaces of Null Cartan Curves in Minkowski 3-Space. Publishing Corporation Abstract and Applied Analysis, 20.
4. Blaschke, W. (1929). Vorlesungen uber Differentialgeometrie. Springer, Heidelberg. Vol. 3, 230.
5. Dziuba, V. (2008). Konstruiuvannia i peretvorennia poverkhon iz zberezhenniam linii kryvyny. KNUBA, 21.
6. Pylypaka, S., Korovina, I. (2008). Konstruiuvannia minimalnoi poverkhni hvyntovym rukhom prostorovoi kryvoi. Prykladna heometriia ta inzhenerna hrafika, 39, 30-36.
7. Ausheva, N. (2011). Izotropni bahatokutnyky izotropnykh kryvykh Bez`ie. Prykladna heometriia ta inzhenerna hrafika, 88, 57-61.
8. Ausheva, N. (2011). Modeliuvannia minimalnykh poverkhon Bez`ie. Prykladna heometriia ta inzhenerna hrafika, 50, 105-109.
9. Ausheva, N., Demchyshyn, A. (2013). Vyznachennia sim'i minimalnykh poverkhon z napriamnoiu kryvoiu Bez`ie na bazi protsesora SIMD-arkhitektury. Prykladna heometriia ta inzhenerna hrafika, 57, 10-16.
10. Shoman, O. (2007). Paralelni mnozhyny v heometr. modeliuvanni yavyshch i protsesiv. Kharkiv: NTU «KhPI», 288.

THE ANALYSIS OF METHODOLOGICAL ERRORS IN AVIATION GRAVIMETRIC SYSTEM

Page 44-46

The paper proposes to use the aviation gravimetric system, the sensing element of which is gravimeter, to measure gravity acceleration anomalies. The motion equation of the aviation gravimetric system, which includes the presence of additional amendments, neglect of which leads to significant measurement errors of gravity acceleration anomalies, was determined. The analysis of the motion equation of the aviation gravimetric system was conducted, and its functional diagram was determined. The analysis of methodological errors in the aviation gravimetric system, in case of random motion of the base, was carried out. The sensitivity changes of the output signal of the aviation gravimetric system to measurement errors of the aircraft motion parameters: velocity and vertical acceleration of the aircraft, latitude, altitude, were studied. The requirements for the measurement accuracy of the aircraft basic motion parameters were defined.

Keywords: aviation gravimetric system, measurement error.

References

1. Bezvesil'na, O. M. (2007). Aviatsiini hravimetrichni sistemi ta hravimetri: monohrafiia. Zhitomir: ZhDTU, 604.
2. Bezvesilnaya, E. N., Tkachuk, A. G., Kozko, K. S. (2013). System for airborne gravimetry. European Applied Sciences (Germany), 5(2), 37–39.
3. Bezvesil'na, O. M., Tkachuk, A. H. (2013). Avtomatizovanii aviatsiinii hravimetrichnii kompleks dlia vimiriuvan› anomalii priskorennia sili tiazhinnia. KhKh MK z avtomatichnoho upravlinnia, prisviachena 100-richchiu z dnia narodzhennia akademika NANU O. H. Ivakhnenka "Avtomatika-2013". Mikolaiv, 267-268.
4. Bezvesilnaya, E. N., Tkachuk, A. H., Kozko, K. S. (2013). Gravimeter of aviation gravimetric system. The advanced science journal (USA), 8, 41-46.
5. Bezvesil'na, O. M., Tkachuk, A. H. (2013). P'єzoelektrichnii hravimetr aviatsiinoi hravimetrichnoi sistemi: monohrafiia. Zhitomir: ZhDTU, 240.
6. Bezvesil'na, O. M., Koval›, A. V., Hura, Ye. V. (2011). Orhanizatsiia aviatsiinikh hravimetrichnikh vimiriuvan› z vikoristanniam aviatsiinoi hravimetrichnoi sistemi. Visnik ZhDTU : tekhnichni nauki, 4, 45-52.
7. Bezvesil'na, O. M., Koval›, A. V., Hura, Ye. V. (2012). Modelirovanie vliianiia parametrov vozmushchenii na rabotu hiroskopicheskoho hravimetra aviatsionnoi hravimetricheskoi sistemy. Elektronnoe modelirovannie, 2, 113-123.
8. Bezvesil'na, O. M. (2012). Vikoristannia neironnoi merezhi u kompleksi orientatsii i navihatsiї aviatsiinoi hravimetrichnoi sistemi. Visnik inzhenernoi akademii Ukraini, 2, 46–53.
9. Bezvesil'na, O. M., Larin, V. Yu., Chichikalo, N. I., Fedorov, Ye. Ye., Dobrzhans'kii, O. O. (2011). Peretvoriuiuchi pristroi priladiv. Tekhnolohichni vimiriuvannia ta priladi: Pidruchnik. Zhitomir: ZhDTU, 542.
10. Bezvesil'na, O. M., Ostapchuk, A. A., Tkachenko, S. S. (2010). Hravimetry ta ikh vystavka: монohrafiia, Zhytomyr: ZhDTU, 307.

USE OF NUMERICAL-ANALYTIC METHOD FOR MODEL CONSTRUCTION AND ANALYSIS OF NONLINEAR DYNAMICAL SYSTEMS

page 46-48

This paper proposes a model of a nonlinear mathematical pendulum for use in mathematical modeling of TCP connections in the infocomm systems. Application of numerical- analytical

approach using the Krylov-Bogoliubov-Mitropolsky method for solving nonlinear differential equations of the pendulum allows you to apply qualitative methods for analysis of the oscillatory dynamical systems behavior in the phase plane.

The proposed approach allows us to study differential equations considered when the value of the parameter included in them in a wide range. Thus for small values of the parameter asymptotic method can be applied for solution , whereas for large values numerical methods should be used. This parameter is in this case the so-called order parameter.

Keywords: model, the pendulum, numerical-analytical, dynamic system, the TCP connection, the order parameter.

References

1. Yalovega, G. I., Loza, Yu. Kh., Karpukhin, A. V., Slipchenko, N. I. (1985). Proektirovanie chastotnogo elementa na osnove avtogeneratora. Radiotechnika, 75, 144-147.
2. Mitropolskiy, Yu. A., Molchanov, A. A. (1981). Mashinnii analiz nelineinich resonansnich cepei. Kyiv: Nauk. Dumka, 238.
3. Karpukhin, A. V., Loza, Yu. Kh., Yalovega, G. I. (1983). Matematicheskoe modelirovanie i proektirovanie integralnih chastotnih elementov na osnove nelineinih rezonansnih cepei. Avtomatizacia proektirovania elektronnoi apparatury, 2, 53–56.
4. Molchanov, A. A. (1967). Ob asimptoticheskih metodah teorii kolebanii v nekotorih zadachah nelineinoi radiotechniki. Radiophisika, T. 10, № 7, 987-998.
5. Andronov, A. A., Leontovich, E. A., Gordon, I. I., Maier, A. G. (1966). Kachesvennaya teoria dinamicheskih sistem. M.: Nauka, 568.
6. Bogolubov, N. N., Mitropolskiy, Yu. A. (1963). Asimptoticheskie metodi v teorii nelineinih kolebanii. M.: Fizmatgiz, 412.
7. Karpukhin, A. V. (2009). Matematicheskoe modelirovanie haoticheskih yavlenii v visokoskorostnih setevih informacionnih sistemah s protokolom TCP. Sistemi obrobki informacii, 4(78), 64-69.
8. Karpukhin, A. V., Machekhin, Yu. P. (2008). Analiz povedenia informacionnih sistem s bolshoi nelineinostyu. Materiali mezdunar. nauch. konf. ISDMCI'2008, T. 3, 192.
9. Karpukhin, A. V. ,Kirichenko, L. O., Machekhin, Yu. P, Radivilova, T. A. (2008). Matemeticheskoe modelirovanie silnonelineinih informacionnih sistem. Materiali 1-i mezdunarodnoi nauchn. konf. «Electronnaya komponentnaya baza. Sostoyanie i perspektivi razvitiya, 346.
10. Karpukhin, A. V., Kobzev, V. G., Tkachenko, A. A. (2013). Haoticheskie rezimi raboti setei s TCP protokolom. Trudi III mezdunarodnoi nauchno-prakticheskoi konferencii «Fisiko-tehnologicheskie probltmi radiotechnicheskih ustroistv, sredstv telekommunikacii, nono- i mikroelektroniki, 80-81.

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The problem of the optimization of the actual operating modes of gas transportation systems (GTS) on a given interval of time [0 - T] is discussed. It is shown that the solution of the problem is possible only in the class of stochastic models of quasi-stationary regime of transport and natural gas distribution in the GTS. The stochastic model of quasi-stationary nonizotermic mode of transport and natural gas distribution in the GTS with numerous linear sections (LS) and many shop compressor stations is performed. An effective method of reduction of order of the resulting system ensuring the fulfilment of the conditions of solvability of the deterministic equivalent of a stochastic system of equations is proposed. The stochastic formulation of the problem of optimization of the actual operating modes of the GTS in the form of a multicriterion problem of nonlinear stochastic programming M-type with line-by-line statistics and probability limitations of M - and P-type is given. The solution of the problem [9] allows to receive optimum energy plan of work of the GTS on a time interval [0 - T], which has restricted resistant predicted stochastic perturbations.

Keywords: gas transmission system, quasistationary mode, stochastic models, methods of optimization.

References

1. Evdokimov, A. G., Dubrovskij, V. V., Tevjashev, A. D. (1979). Potokoraspredelenie v inzhenernyh setjah. M. : Strojizdat.
2. Evdokimov, A. G., Tevjashev, A. D. (1980). Operativnoe upravlenie potokoraspredeleniem v inzhenernyh setjah. Har'kov: Vishha shkola.
3. Sardanashvili, S. A. (2005). Raschetnye metody i algoritmy (truboprovodnyj transport gaza). M. : FGUP «Neft' i gaz» RGU nefti i gaza im. I. M. Gubkina, 577.
4. In: Tevjashev, A. D. (2004). Truboprovodnye sistemy jenergetiki. Upravlenie razvitiem i funkcionirovaiem. Novosibirsk: Nauka. Sib. otd-nie, 330-322.
5. Normy tehnologicheskogo proektirovanija magistral'nyh gazoprovodov. (2004). Otkrytoe akcionernoe obshhestvo GazProm, Obshhestvo s ogranichennoj otvetstvennost'ju «Nauchno-issledovatel'skij institut prirodnyh gazov i gazovyh tehnologij » VNIIGAZ. Moskva.
6. Merenkov, A. P., Sepnova, E. V., Sumarokov, S. V. and others. (1992). Matematicheskoe modelirovanie i optimizacija sistem, teplo-, vodo-, nefte- i gazopotreblenija. Novosibirsk: V.O. «Nauka», 406.
7. Volkov, I. K., Zuev, S. M., Uvjatkova, G. M. (1999). Sluchajnye process. M.: MGTU im. N. Je. Baumana, 448.
8. Novickij, N. N., Suharev, M. G., Tevjashev, A. D. and others. (2010). Truboprovodnye sistemy jenergetiki: matematicheskoe modelirovanie i optimizacija. Novosibirsk: Nauka, 419.
9. Tevjashev, A. D., Vikhodtsev, E. N., Schelkalin, V. N., Ignatova, Y. V. (2011). Information-analytical system of forecasting of processes of consumption of natural gas in the gas transportation system of Ukraine. Radioelektronika I informatika, ,(54)3 98-92.
10. Tevjashev, A. D., Tevjasheva, 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.