ABSTRACT AND REFERENCES

ENERGY-SAVING TECHNOLOGIES AND EQUIPMENT

BOILING HEAT TRANSFER ON SMOOTH AND POROUS SURFACES IN THE LIMITTED SPACE (p. 3-6)

Olga Alekseik, Vladimir Kravets

When designing passive cooling systems for radio-electronic and computer equipment based on conventional and miniature heat pipes it is necessary to carry out a preliminary estimation of heat transfer characteristics. For calculating heat transfer capacity of a heat pipe it is necessary to possess information about heat transfer intensity at phase transitions in the zones of heating and condensing.

The results of experimental studies of heat transfer coefficients when boiling on smooth and porous surfaces under conditions of a large and limited volume are given. There is a significant influence of a free space height above the heat transfer surface on a heat removal intensity rate under phase transition. The criterial dependencies, obtained from the analysis and synthesis of experimental data, are given. The given equations allow calculating heat transfer coefficients in relation to geometrical and operational parameters in the range of Reynolds numbers Re=400...2•105 and for free space heights, satisfying the condition of (h/lc)=1...10 for smooth surfaces, as well as in the range of Reynolds numbers from 150 to 3000 for metal-fiber capillary structures 0.7-1.0 mm thick and porosity within the range of 75-85 % of the spaces between the CPS (a capillary porous system) surface and the upper wall from 2 to 20 mm. The error of the obtained result does not exceed 20 %.

Keywords: heat transfer intensity, empirical dependence, boiling, limited volume, porous structure.

References

1. Dunn, P., Reay, D. A.. (1994). Heat pipes. Oxford, England; Tarrytown, N. Y., U.S.A. : Pergamon, 348.
2. Chi, S. W. (1976). Heat pipe theory and practice Hemisphere Pub. Corp, 242.
3. Semena, M. H., Hershuni, A. N., Zaripov, V. K. (1984). Heat pipes with metal-fibrous capillary-porous structures. Kyiv: High school, 215.
4. Pastuszko, R., Poniewski, M., Wojcik, T. (2000). Correlations for boiling in fibrous porous structures. In: Proc. IV Minsk International Seminar “Heat Pipes, Heat Pumps, Refrigerators”, 149-155.
5. Phridrihson, Yu. V. (1995). Influence of pressure and metal-fibrous capillary coating characteristics on boiling heat transfer in large volume. Dissertation. Kyiv: KPI, 16.
6. Alam, M. S. Prasad, L., Gupta, S. C., Agarwal, V. K. (2008). Enhanced boiling of saturated water on copper coated heating tubes. Chemical Engineering and Processing Process Intensification, Vol. 47, Iss. 1, 159-167.
7. Ferret, C., Falk, L., Chenu, A. (2004). Quantification of the water boiling heat transfer in micro-structures by image. Superlattices and Microstructures, 34, 657-668.
8. Shapoval, A. A., Kostornov, A. G. (1999). Influence of the characteristics capabilities of fibrous metal capillary structures on heat transfer in boiling water and acetone. In: Proc. 11th International heat pipe conference. Musashinoshi Tokyo, Japan. Vol. 2 (A11-4), 113-118
9. Alekseik, O. S., Kravets, V. Yu., Kopchevska, I. A. (2012). Heat transfer intensity at boiling on small-size surface. Technology and construction in electronic apparatuses, 1, 49-53.
10. Kravets, V. Yu., Alekseik, O. S. (2012). Boiling Heat-Transfer Intensity on Small-Scale Surface. International Review of Mechanical Ingeneering, 6 (3, A), 479 - 484.
11. Alekseik, O. S., Kravets, V. Yu. (2013). Phisycal model of boiling on porous structure in the limited space Eastern-European Journal of Enterprise Technologies, №4/8 (64), 26-31.

EXERGY CHARACTERISTICS OF BIOGAS POWER UNITS (p. 7-12)

Anton Mazurenko, Alla Denysova, Aleksandr Klymchuk, Ngo Minh Hieu, Pavel Kotov

The technique of an exergy analysis concerning various circuits of biogas units, which allow replacing traditional energy resources and improving environmental conditions, has been presented. The heat balances of biogas units were proposed, and analysis of their effectiveness was made. The comparison of different cycle parameters of various biogas units (i.e. a combustion turbine unit, a combined cycle gas turbine unit with gas discharges into the boiler and a combined cycle gas turbine with a high-temperature vapor generator and a reheating stage) was made, and the comparison of their exergy characteristics was carried out. The exergy analysis has shown that the cycle of biogas CCGT (combined cycle gas turbine) with a reheating stage and using a high-pressure steam generator is the most effective, that can be explained by the fact that the temperature energy proportions of combustion products, accounting for the steam cycle and the gas cycle are approximately equal, comparing to conventional combined cycle gas turbine units.

Keywords: exergy characteristics, biogas unit, high-temperature steam generator, reheating stage.

References

1. Kozhevnikov, N. N. (2004). Economy and management of energy companies. Moscow: Publishing Center «Academy», 432.
2. Law of Ukraine at energy saving: №74/94 , 1.07.1994 (1997). Laws of Ukraine, 7, 281 – 291.
3. Mazurenko, A. S., Denysova, A. E., Ngo Minh Hieu (2013). Economic efficiency of combined-cycle plants at biofuel. Power engineering, economics, technique, ecology (32), 1, 15 –19.
4. Blinova, L. (October 2012). Biogas as an alternative source of energy in APK. Problems of Modern Economics: Materials of II Intern. scientific. conf. Chelyabinsk, 41–44.
5. Denysova, A. E., Ngo, Minh Hieu (2013). Evaluation of the effectiveness of biogas plants. Materials of Intern. scientific. conf. “Cooling in energetic and transport: modern problems and conditioning and cooling”. (2). NUK, 251–256
6. Objedinenie “Alternative technologija” predstavliaet technologiu i ustanovki dlia proizvodstva bioudobreniy i

biogasa. Ustanovki dlia poluchenia bioudobreniy s biogasa. Available at: http://www/biogas.vn.ua
7. Klimchuk, O. A., Ngo, Minh Hieu, Mazurenko, A. S., Denysova, A. E. (2013). Installation of alternative heat supply for academic building of ONPU. Materials of IV Intern. scientific. conference, (2), 92 – 94.
8. Brodianski, V. M. (1973). Exergy method of thermodynamic analysis. Moskow: Energy, 296.
9. Denysova, A. E., Ngo, Minh Hieu (2013). Exergy parametrs of biogas power plants. Works of Odessa polytechnic university. 2 (41), 151–156.
10. Arsenev, L. V., Turuskin, I. A., Bogov, I. A. (1989). Stationary gas turbine power plants. Leningrad USSR: Machinobuilding, 513.

ELECTROMECHANICAL COMPLEX OF THE WIND POWER PLANT FOR THE USE IN UNDERGROUND OPENINGS OF IRON-ORE MINES (p. 13-21)

Oleg Sinchuk, Sergey Boiko

Today, the problem of high-quality power supply to consumers occupies one of the most prominent places in power engineering and electrical engineering. Considering the wind electromechanical complex operation, it is necessary to pay attention to the fact that the wind wheel operation is variable in nature, caused by the stochastic feature of the air flow. Operation of generator, which is a part of the wind electromechanical complex, depends directly on the wind wheel operation nature, therefore, the generator output parameters such as voltage and frequency will vary depending on the air flow speed and, consequently, generator shaft rotation speed. In view of the above features, the issue of output parameters control of wind electromechanical complex is relevant and so there is a need to solve this problem. It is proposed to solve the problem of variable output generator parameters by creating a control system based on microcontroller. Control is proposed to carry out using fuzzy sets, which will allow to take into account changes in the system, caused by the stochastic nature of air flows. Using this control system for wind electromechanical complexes will provide stable and high-quality power supply to consumers.

Keywords: wind electromechanical complex, control law, fuzzy rules, fuzzy controller, knowledge base.

References

1. Energoefektivnist' ta vidnovljuval'ni dzherela energiï. (2007). K.: Ukraïns'ki enciklopedichni znannja, 560.
2. Bojko, S. M., Jalova, A. M., Sinchuk, O. M. (2012). Do pitannja viboru elektrichnogo generatora dlja vitrogenerujuchoï ustanovki z vertikal'noju vissju obertannja v umovah zalizorudnih shaht. Donec'k, 88–89.
3. Sinchuk, O. N., Jakimec, S. M., Shokar'ov D. A., Bojko, S. M., Shherbak, M. A. (UA) (10.06.2013). Pat. UA № 80828MPK F03D 9/00. Sposib roztashuvannja vitroustanovki v dijuchih virobkah shaht. №u201215007 vid 27.12.2012, №11.
4. Sinchuk, O. N., Jakimec, S. M., Bojko, S. M., Shherbak, M. A. (27.12.2012). Pat. UA MPK F03D 3/04, № 808278. Povitrovidbivach dlja vitrovoï energetichnoï ustanovki z vertikal'noju vissju obertannja, №u201215006, 10.06.2013, №11.
5. Sinchuk, O. N., Mihajlichenko, D. A., Bojko, S. M., Shherbak, M. A. (29.04.2013). Pat. UA, MPK H02P9/00, № 84633. Sistema keruvannja asinhronnim generatorom u skladi vitroelektrotehnichnogo kompleksu. №u201305538, 25.10.2013, №20.
6. Moor, G. H. (2004). Beukes, Power point trackers for wind turbines. Electronics Specialist Conference (PESC), 2044–2049.
7. Nakamura, T. S., Morimoto, M., Sanada, Takeda, Y. (2002). Optimum control of ipmsg for wind generation system. Power Conversion Conference (PCC), 3, 1435–1440.
8. Wang, Q., Chang, L.-C. (2004). An intelligent maximum power extraction algorithm for inverter-based variable speed wind turbine systems. IEEE Transactions on Power Electronics, 19, 1242–1249.
9. Koutroulis, E., Kalaitzakis, K. (2006). Design of a maximum power tracking system for wind-energy-conversion applications. IEEE Transactions on Industrial Electronics, 53.
10. Datta, R., Ranganathan, V.-T. (2003). A method of tracking the peak power points for a variable speed wind energy conversion system. IEEE Transactions on Energy Conversion, 18, 163–168.

FOR DETERMINING HEAT-MASS EXCHANGE SURFACE IN CONTACT HEAT RECOVERY UNITS OF DROP TYPE (p. 21-26)

Michail Bezrodny, Mykola Goliyad, Artur Rachinskiy

The paper is dedicated to the development of a procedure for calculating the actual interface values of contact phases in contact gas-liquid units of a drop type. Atomizing liquid into droplets was carried out by means of centrifugal atomizers.

The developed principle motion circuit of liquid drops in a spray pattern of centrifugal atomizer was given in the paper. For determining the total surface of phase contacts, a volume-surface mean diameter of d_{3-2} liquid drops was used. For determining a volume-surface mean diameter of liquid drops, the special experimental studies were carried out. Basing on its results, the generalized dependence for the d_{3-2} value was obtained.

As a result of the theoretical motion analysis of liquid drops in a spray pattern of a centrifugal atomizer and using the experimental data on a volume-surface mean diameter of drops, the procedure of calculating the actual interface of heat-mass exchange processes in the gas-liquid contact units of a drop type was proposed.

The obtained results will be used in further studies of heat-mass exchange processes and the development of a general method of estimating such devices.

Keywords: centrifugal atomizer, volume-surface diameter of drops, contact, heat recovery unit, interface, active zone.

References

1. Lykov, M. V. (1966). Raspilitel'nie syshilki. Moskva, Mashinostroyeniye, 331.
2. Galustov, V. S. (1989). Pryamotochnyye raspylitel'nyye apparaty v teploenergetike. Moskva, Energoatomizdat, 240.
3. Pazhi, D. G. (1984). Osnovy tekhniki raspylivaniya zhidkostey. Moskva, Khimiya, 255.
4. Bezrodny, M. K., Barabash, P. O., Golyad, N. N., Golubev, O. B., Rachins'kiy, A. Yu. (2013). Kontaktniy teploutilízator: patent. na korisnu model' № 78507 Ukraina, MPK F28D 15/00. Bull. № 6. 25.03.2013.
5. Zhovmir, M. M. (2008). Utylizatsiya nyz'kotemperaturnoyi teploty produktiv zhorannya palyv za dopomohoyu teplo-

vykh nasosiv. Prommyshlennaya Teplotekhnika, Vol. 30, № 2, 90 – 98.
6. Tarabanov, M. G. (1974). Teplo- y massoperenos v kamerakh oroshenyya kondytsyonerov s forsunkamy raspylenyya. Uchebnoye posobiye, Krasnoyarsk, Kr.PI., 211.
7. Zusmanovych, L. M. (1967). Orosytel'nye kamery ustanovok yskusstvennoho klymata. Moskva, Mashinostroyeniye, 120.
8. Terekhov, V. I. (2003). Chislennoye issledovaniye gidrodinamiki, teplo- i massoobmena dvukhfaznogo gazoparokapel'nogo potoka v trube. Prikladnaya Mekhanika i Tekhnicheskaya Fizika, Vol. 44, № 1, 108-122.
9. Pakhomov, M. A. (2009). Chislennoye issledovaniye gidrodinamiki i teplomassoobmena v pristennykh i struynykh gazokapel'nykh potokakh. Novosibirsk, ITF SO RAN, 39.
10. Mustafin, R. R. (2010). Matematicheskoye modelirovaniye protsessov teplomassoobmena dvukhfaznykh potokov v dvigatelyakh letatel'nykh apparatov. Ufa, GOU VPO «Ufimskiy GATU», 15.
11. Tumashova, A. V. (2011). Modelirovaniye protsessov teplo- i massoobmena v forsunochnykh orositel'nykh kamerakh. Tomsk, GOU VPO «TGASU», 19.
12. Pakhomov, M. A., Terekhov, V. I. (2013). Second moment closure modeling of flow, turbulence and heat transfer in droplet-laden mist flow in a vertical pipe with sudden expansion. Int. J. of Heat and Mass Transfer, 66, 210-222.
13. Bezrodnyy, M. K. (2011). Gidrodinamika i kontaktnyy teplomassoobmen v nekotorykh gazozhidkostnykh sistemakh. Monografiya, Kiev, NTUU «KPI», 408.
14. Ladyzhenskii, R. M. (1962). Konditsionirovaniye vozdukha. Moskva, Gostorgizdat, 352.
15. Bezrodny, M. K. (2013). Nekotoryye kharakteristiki raspyla tsentrobezhnykh forsunok kontaktnykh utilizatorov otkhodyashchikh gazov kapel'nogo tipa. Prommyshlennaya Teplotekhnika, Vol. 35, № 6, 31 – 38.
16. Khavkin, Yu. I. (1976). Tsentrobezhnyye forsunki. Leningrad, Mashinostroyeniye, 168.
17. Soin, I. V. (1984). Intensifikatsiya teplo- i massoobmena v kamerakh orosheniya tsentral'nykh konditsionerov primenitel'no k politropnym protsessam teplovlazhnostnoy obrabotki vozdukha. Khar'kov, KHISI, 23.
18. Kutataladze, S. S. (1979). Osnovy teorii teploobmena. Moskva, Atomizdat, 416.
19. Bronshteyn, I. N. (1984). Spravochnik po matematike. Moskva, Nauka, 544.
20. Blokh, A. G. (1957). O koeffitsiyentakh raskhoda i uglakh konusnosti fakela. Teploenergetika, 10, 35 – 41.

HEAT TRANSFER OF SINGLE DROP-SHAPED CYLINDERS IN CROSS FLOW (p. 27-31)

Alexandr Terekh, Alexandr Semenyako, Alexandr Rudenko, Vadim Kondratyuk

The paper is devoted to the studies of convective heat transfer for practically unstudied cylinders of a figurine drop-shaped form. The experiments have been carried out in a straight-through wind tunnel of a rectangular cross-section in the variation range of the Reynolds numbers from 4000 to 25000. The method of an electric heating of the surface under investigation has been used wherein the conditions of a constant heat flow density have been enabled over the pipe inner wall. During the experiments, the average convective heat transfer coefficients have been determined. The heat transfer level of the “straight”-form drop-shaped pipe is (20-30) % higher than of the “reverse” form. The obtained data have shown that the drop-shaped pipes have a lower heat transfer intensity compared to the pipes of a circular cross-section. The given results can serve as a basis for further studies related to the optimization of geometric dimensions of the pipes for various heat exchange equipment, possessing a high heat and aerodynamic efficiency.

Keywords: cylinder, profile, drop-shaped, plane-oval, oval, circular, flow, heat transfer, intensity, comparison

References

1. Terekh, A. M., Rudenko, A. I., Zhukova, Yu. V., Semenyako, A. V., Kondratyuk, V. A. (2012). Aerodynamic drag of a single cam shaped tubes and visualization of flow. East-European Journal of advanced technologies, 6/8(60), 63-68.
2. State Standard 8638-57 (1994). Drop shaped steel tubes. Reediting, january 1971, december 1993, Moskow, USSR: Publishing house of standards.
3. Nouri-Borujerdi, A., Lavasani, A. M. (2006). Flow visualization around a non-circular tube. IJE Transactions B: Applications, Vol. 19, No. 1, December 2006, 73-82.
4. Nouri-Borujerdi, A., Lavasani, A. M. (2007). Drag of a single non-circular cylinder. The Eighteenth International Symposium on Transport Phenomena, 27-30 August, Daejeon, KOREA, 2104-2108.
5. Nouri-Borujerdi, A., Lavasani, A. M. (2007). Experimental study of forced convection heat transfer from a cam shaped tube in cross flows. International Journal of Heat and Mass Transfer, 50, 2605-2611.
6. Lavasani, A. M., Bayat, H. (2012). Heat transfer from two cam shaped cylinders in side-by-side arrangement. World Academy of Science, Engineering and Technology, 67, 1215-1218.
7. Lavasani, A. M., Bayat, H. (2012). Flow around two cam shaped cylinders in tandem arrangement. World Academy of Science, Engineering and Technology, 67, 1286-1289.
8. Roach, P. E. (1987). The generatin of nearly isotropic turbulence by means of grids. J. Heat and Fluid Flow, 8(2), 82-92.
9. Zhukauskas, A., Ziugzda, J. (1979). Heat transfer of cylinder in cross flow of fluid. Vilnius, USSR: Mokslas.
10. Dyban, Yu. P, Epik, E. (1985). Heat-mass transfer and hydrodynamic of turbulence flows. Kiev, USSR: Scientific idea.
11. Zhukova, Yu. V., Terekh, A. M., Isaev, S. A., Pis'menyi, E. N. (2011). Mean heat transfer of single oval-shaped cylinder. Extended abstracts of XVIII School-Seminar of Young Scientists and Specialists under supervision of Prof., Acad. of RAS A.I. Leontiev. Problems of gasdynamics, heat and mass transfer in new power technology, May 23-27, Zvenigorod, Moscow, Russia: Publ. House MEI, 61-62.
12. Pis'menyi, E. N., Kondratyuk, V. A., Zhukova, Y. V., Terekh, A. M. (2011). Heat transfer of staggered bundles of flat-oval tubes in cross flow. Eastern-European Journal of Enterprise Technologies, 2/8 (50), 4-8.
13. Dyban, Yu. P., Yushina, L. E. (1982). Heat transfer of cylinder of finite length. Industrial heat engineering, 4(5), 3-8.

IMPROVEMENT OF THE METHOD FOR STARTING CONTROL OF DIRECT-CURRENT TRACTION MOTOR (p. 31-35)

Vladimir Andreychenko, Svetlana Zakurday, Ivan Kostenko

The analysis of methods for rotation speed control of direct-current traction motors with the series and compound excitation is conducted in the paper. The scheme to improve energy efficiency of speed control devices of traction electric motors of public electric transport rolling stock is proposed. The proposed scheme using the increasing DC-DC converter allows to perform a smooth TEM field weakening, improve the shunt coil copper use and

reduce electric power consumption at starting the rolling stock. In this case, weakening the compound excitation TEM field is conducted by changing the current in both series, due to the input converter circuit, and shunt coil. Moreover, current control in the shunt coil, the magnetizing force of which is directed opposite the magnetizing force of the series coil, is performed due to the output converter circuit. The electrical schematic diagram of the test stand and results of studying the proposed field weakening method are proposed.

Keywords: field weakening, DC-DC converter, electrical rolling stock, power, control, speed, transport.

References

1. Efremov, I. S. (1981). Theory and calculation of trolley : Electrical equipment. High school, 248.
2. Tikhmenev, B. N. (1980). Rolling electrified railways. Theory of electrical equipment. Electric circuits and devices. Moscow: Transport, 471.
3. Rotanov, N. A. (1986). Designing control systems of electric rolling stock. Moscow: Transport, 327.
4. Rudenko, V. F., Egorov, M. A., Spiridonov, D. S. (2006). Patent № 2471652 Russian Federatsiya , IPC (2006.01) B60L15/08 Method field weakening locomotive traction motors. The applicant and copyright Open Joint Stock Company "Russian Railways". № 2471652, appl . 20.07.2011, publ. 10.01.2013.
5. Moskalenko, V. V. (1986). Automatic Electric. Energoatomizdat, 416.
6. Koriagina, E. E. (1982). Electrical equipment trams and trolleybuses. Moscow: Transport, 296.
7. Bayryev, L .S. (1986). Electric traction: Urban Surface Transportation. Moscow: Transport , 206.
8. Gavrilov, Y. I. (1986). Subway cars with pulse converters. Moscow: Transport, 229.
9. Kharchenko, V. F., Daleka, W. F., Andriychenko, V. P., Kostenko, I. O. (2006). Patent № 60109 Ukraine, IPC (2006.01) N02R 7/06 Method field weakening mixed excitation traction motor. Zayavnik that pravovlasnik HNAMG. № 60109; appl . 23.11.10, publ . 10.06.2011, Bull. № 11.
10. Melyoshin, V. I. (2005). Transistor converter equipment. Moscow: Tekhnosfera, 632.

DEVELOPMENT OF THE STAND TO RESEARCH ELECTRIC VEHICLE TRACTION SYSTEM WITH SUPERCAPACITORS (p. 36-40)

Nikolai Slipchenko, Mykhailo Gurtovyi

The authors have developed an EV traction system with microcontroller power management, based on feedback on the electric motor current consumption and SC charging rate control. The stand in a scale of 1:5 on the EV power system capacity was developed to evaluate the effectiveness of this system. The research results of electric vehicle (EV) acceleration mode using the combined power supplies, consisting of supercapacitors (SC) and storage battery (STB) were given in the paper.

It was found that SC-based power supply provides the required peak power in the EV power supply system. At the same time, double increase in SC capacity does not give an adequate increase in discharge current. It is shown that the SC with low energy intensity is able to operate in the EV traction system with a small acceleration time.

The proposed microcontroller management system of STB and SC operating modes in the EV traction system provides optimal and operational EM power management. The developed stand allows to increase charging run time.

Keywords: energy, electric vehicle, traction system, energy storage, supercapacitor, storage battery.

References

1. Kuzomin, A. Ya., Gurtovyi, M. Yu., Kirilyuk, A. A., Pismenetsky, V. A., Slipchenko, N. I.; In: Baker, B., Morawietz, L. (2012). Investigation into the traction system of battery-driven vehicle (electric motorcar) with super capacitors. proceedings of the 2nd EEVC, 85-97.
2. Shurygina, V. (2009). Supercapacitors: the sizes are smaller, the power is higher. Electronics: Science, Technology, Business, 7, 10-20.
3. Shuai, L., Corzine K. A., Ferdowsi M. (2007). A new battery/ultracapacitor energy storage system design and its motor drive integration for hybrid electric vehicles. IEEE transactions on vehicular technology, Vol. 56, 4, 1516-1523.
4. Batteries and ultracapacitors for electric hybrid and fuel cell vehicles. Available at: http://www.lifepo4.info/Battery_study/Batteries/Batteries_and_Ultracapacitors_for_Electric_Hybrid_and_Fuel_Cell_Vehicles.pdf/ (accessed 24 September 2013)
5. Maxwell ultracapacitors in electric drives. Available at: http://www.maxwell.com/products/ultracapacitors/docs/200904_whitepaper_electricdrives.pdf/ (accessed 25 September 2013)
6. Balykshov, A. (2005). Ultracapacitors. Electronic Components, 11, 91-97.
7. Innovatsii v sfere elektrohimicheskih kondensatorov (Innovations in the field of electrochemical capacitors). Available at: http://www.community.sk.ru/press/events/april2012/popechitelsky_sovet/p/elton.aspx/ (accessed 24 September 2013)
8. A brief history of supercapacitors by J.Miller. Available at: http://www.cantecsystems.com/ccrdocs/brief-history-of-supercapacitors.pdf/ (accessed 25 September 2013)
9. Kuznetsov, V., Pankina, O., Machkovskaya, N., Shyvalov, E., Vostrikov, I. (2005). Double-layer capacitors (ultracapacitors): working out and production. Components and technologies, 6, 29-34.
10. Saudi, A. (2009). Development of a current control ultracapacitor charger based on digital signal processing. Telkomnika, Vol. 7, 3, 145-150.

DEFINITION OF CAPACITY OF A SHUNTING DIESEL LOCOMOTIVE IN VIEW OF A PLACE OF ITS OPERATION (p. 41-45)

Uriy Sirotenko

The method for determining the capacity of shunting diesel locomotives in view of their operation features, based on using the regression analysis is given in the paper. Herewith, the main objective of the research was to identify new relationships between the factors, which practically are not considered today by current standard indicators. Using modern technical solutions allowed to create a special electronic system (mode-meter), which allowed to quantify the useful operation time of shunting locomotive per a working shift, its loading level by various shunting operations, as well as compare them with the locomotive fuel economy. Based on the regression analysis, simulation of these parameters, which allowed to determine the necessary capacity level of its propulsion system during operation at a specific worksite

was conducted. The significance and importance of coefficients of the obtained regression equation was defined on PC using special software. At that, the obtained function was tested for extremum, and the optimal values of its components were found. Based on the simulation results, universal nomograms for practical definition of the required power of shunting diesel locomotives to perform simple station and hump-export works depending on the volume, capacity utilization factor, time of locomotive useful operation per shift (for station shunting) or shunting stock mass (for hump-export works), as well as fuel consumption per shift were developed.

Keywords: utilization, shunting, capacity, calculation, regression, mode, diesel locomotive, factor, extremum.

References

1. Kazancev, V. P. (1963). Opredelenie prodolzhitel'nosti manevrovyh peredvizhenij i vybor manevrovyh lokomotivov. Trudy MIIT, Vol. 203, 23-58.
2. Babanin, A. B., Sirotenko, Ju. V., Mymrikov I. V. (2009). Uluchshenie perehodnyh rezhimov raboty manevrovyh teplovozov na promezhutochnyh pozicijah. Lokomotiv-inform, 5-6, 4-8.
3. Baranov, N. A. (1965). Osobennosti processa razgona dvuhtaktnogo dizelja s gazoturbinnym nadduvom. Dvigateli vnutrennego sgoranija. M.: NIIinformtjazhmash, Vol. 655, 10, 49-56.
4. Borovoj, N. E. (1962). Vlijanie vesa poezdov na ob'em manevrovoj raboty. TrudyMIIT. M.: Transzheldorizdat, Vol. 1 37, 384.
5. Die Modernisierung des Parks der Diesellokomotiven V100-BR211 (1995). Eisenbahningenieur, 8, 124-126.
6. Peters, J., Catuldi, R. (1995). AC traction gains support in the USA. International Railway Journal, 6, 61-65.
7. Swenson, C. (1993). AC traction locomotives for heavy in North America. Railway Technology International, 4, 77-78.
8. Greenfield, M. (1995). AC traction delivers: new locomotives prove them serves in revenue service. Progressive Railroading, 12, 47-51.
9. Shtern, V. (1997). The new concept of shunting diesel locomotives BR108/109. International Railway Journal, 4, 43-46.
10. Schwerdtfeger, H., Mais, K. (1982). Erprobung einer neuen dieselelektrischen Lokomotive in Drehstromtechnik bei den Zechenbahn und Hafenbetrieben RuhrMitte der RAG. Eisenbahntechnishe Rundschau, 1-2, 83-90.
11. Odincov, L. V. (1947). Voprosy teorii manevrovoj raboty. M.: Transzheldorizdat, 214.
12. Sirotenko, Ju. V., Turchinov, R. V., Zmij, S. A. (2011). Normuvannja ekspluatacijnih harakteristik manevrovih teplovoziv za dopomogoju perenosnogo avtomatizovanogo kompleksu. Harkiv.: UkrDAZT, Vol. 127, 79-83.