

УДК 621.43.068.4

Анализ направлений повышения уровня экологичности двс путем применения внутрицилиндрового катализа / В.А. Хижняк, И.В. Парсаданов // Вісник НТУ «ХПІ». Серія: Транспортне машинобудування. – Х. : НТУ «ХПІ», 2015. – № 43 (1152). – С. 157-160.– Библиогр.: 9 назв. – ISSN 2079-0066.

Рассмотрены основные направления повышения уровня экологичности современных двигателей внутреннего сгорания, наиболее оптимальным и приоритетным из которых является внутрицилиндровый катализ. Проанализированы результаты исследований влияния нанесенных каталитических покрытий в камере сгорания на эффективность повышения уровней экологичности ДВС.

Ключевые слова: экологичность дизеля; токсичность отработанных газов; каталитическое покрытие; внутрицилиндровый катализ

УДК 539.3

Аппроксимация поверхности отклика для использования в процессе параметрического синтеза машиностроительных конструкций / М. А. Чубань // Вісник НТУ «ХПІ». Серія: Транспортне машинобудування. – Х. : НТУ «ХПІ», 2015. – № 43 (1152). – С. 161-164.– Библиогр.: 10 назв. – ISSN 2079-0066.

При оптимизации машиностроительных конструкций возникает задача нахождения функции отклика, устанавливающей связь между диагностическими показателями (напряжения и перемещения, деформация, масса и т. д.) и конструктивными характеристиками. Она обычно решается методом аппроксимации. Рассмотрен метод кусочно-полиномиальной аппроксимации с использованием базисных функций Эрмита. Оценена погрешность метода. Описан и продемонстрирован использующий данный метод подход к построению моделей поверхности отклика в оптимизационных исследованиях объектов машиностроения.

Ключевые слова: аппроксимация, кубические функции Эрмита, поверхность отклика, метод конечных элементов, метод конечных разностей, машиностроительная конструкция, синтез

УДК 629.429.3:621.313

Методика определения рационального скоростного режима движения пригородного электропоезда с синхронными тяговыми двигателями / Б. Г. Любарский // Вісник НТУ «ХПІ». Серія: Транспортне машинобудування. – Х. : НТУ «ХПІ», 2015. – № 43 (1152). – С. 165-168.– Библиогр.: 8 назв. – ISSN 2079-0066.

На текущий момент при разработке и эксплуатации новых типов электропоездов возникает вопрос об определении их рациональных скоростных режимов движения. В работе рассматривается методика, позволяющая определить рациональную максимальную скорость движения электропоезда с синхронными тяговыми двигателями с возбуждением от постоянных магнитов на основании комплексного критерия эффективности. Для рассматриваемого в работе пригородного электропоезда с тяговым электроприводом на основе синхронного тягового двигателя с возбуждением от постоянных магнитов увеличение максимальной скорости движения с 50 до 140 км / ч приводит к росту расхода энергии, что обусловлено ростом сопротивления движению подвижного состава.

Согласно относительного показателя эффективности лучшим решением является применение электропоезда с максимальной скоростью движения.

Ключевые слова: электропоезд, синхронный тяговый электропривод, максимальная скорость движения, оптимальные режимы работы тягового привода, комплексный критерий эффективности.

ABSTRACTS

UDC 629.11(09):623.43(09)

Department of Transport Machinebuilding of NTU “KhPI”: Yesterday, Present-day, Tomorrow (to the fiftieth anniversary of the foundation) / V.V. Epifanov // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv : NTU "KhPI", 2015. – No 43 (1152). – P. 4–7. – ISSN 2079-0066.

In 2015 the Department of Transport Machinebuilding of NTU “KhPI” will celebrate the fiftieth anniversary since its foundation. The facts from the history, present-day and future as well as perspectives of the Department of Transport Machinebuilding are presented.

Keywords: Transport machine building, TM.

UDC 539.3

Investigation of stress-strain state of the corrugated and solid panels with the geometric anisotropy and orthotropic material properties / A. A. Atroshenko // Bulletin of NTU “KhPI”. Series: Transport machine building. – Kharkiv: NTU “KhPI”, 2015. – No 43 (1152). – P. 8–11.– Библиогр.: 11. – ISSN 2079-0066.

The article contains the results of a numerical study of the comparative analysis of the solutions of the two methods of determining the stress-strain state of the corrugated plate and the solid plate with orthotropic material properties. The elastic coefficients of the equivalent anisotropic plate are determined by comparing the stiffness of elements of finite size, allocated and anisotropic corrugated panels. Corrugated panels, corrugated sheets have found wide application in various fields of mechanical engineering, shipbuilding, aviation and others. In particular, these panels are used in metal silos. Usually the panels are thin-walled elements with different corrugation profile. The structure (geometry) of undulation depends stiffness investigated thin panels. When comparing the calculation results with the geometric anisotropy of the plate and the plate with orthotropic material properties, which were investigated in two productions, produced great differences in quality films as well as in quantitative values. On this basis, the applicability of traditional methods of calculation corrugated panels in the form of a solid plate with altered properties of matter at the orthotropic, slightly untrue.

Keywords: corrugated panels, metal silos, orthotropic plate, geometric anisotropy, stress-strain state.

UDC 623.4.01

Methods of providing tactical and technical characteristics of military tracked and wheeled vehicles at the stage of design studies / A.Y. Vasilyev, M.M. Tkachuk, A.J. Tanchenko, A.V. Martynenko // Bulletin of NTU “KhPI”. Series: Transport machine building. – Kharkiv: NTU “KhPI”, 2015. – No 43 (1152). – P. 12-16. – Библиогр.: 12. – ISSN 2079-0066.

This article contains general provisions rational design and modernization of armored vehicles. The question of the need to consider the cumulative effects of factors on the research phase of the project (especially special-purpose machinery). The main trend of modern times is the intensification of the combat use, which leads to an increase in the level of individual factors of defeat, and the expansion of a number of factors that operate together on the same element of military tracked and wheeled vehicles. Accordingly, there is a need to create new, more advanced, adequate and accurate mathematical and numerical models to simulate arising constituent elements of the machine complex set of physical and mechanical processes and states. This is particularly acute question the quality and relevance of computer simulation that allows you to more quickly and economically justify the design and technological parameters of complex systems and their components, to ensure the necessary level of performance characteristics.

Keywords: military tracked and wheeled vehicles, parametric design approach, the cumulative effect of factors, computer modeling of a complex set of processes.

UDC 539.3

Discrete hardening as effective methods of higher working resource elements of the mechanism / O. V. Veretelnik, Y. V. Veretelnik, V. V. Veretelnik // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 17-20. – Bibliogr.: 6. – ISSN 2079-0066.

In work results of the study stress-strain state of structural elements containing the surface after the spent processing - discrete hardening, the example of a thick-walled cylinder loaded with high internal pressure. The study was carried out using the finite element method. In the consideration of the 4-th design models that take into account changes in material properties at discrete hardening and without changes to the elastic-plastic and elastic formulations, respectively. The analysis of the obtained numerical indicators components of the stress-strain state and the factor of safety for design elements.

Keywords: stress-strain state, discrete hardening, thin-walled cylinder, the safety factor, full displacement, full strain, plastic strain, pressure, strength, finite element model.

UDC 629.423:620.179.14

Authentication of mathematical model for the calculation of the car body tilting system loading description / B. M. Gorkunov, G. V. Krivjakin, E. S. Afanasjeva // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 21-24. – Bibliogr.: 7. – ISSN 2079-0066.

A measuring for determination of the car body tilting system scale physical model loading description on the base of vortex-current method of noncontact control of the mechanically-deformed state of ferromagnetic materials cylindrical wares is developed. The comparative analysis of experimental loading description of tilting mechanism and calculation loading description got by a mathematical design is conducted.

Keywords: scale physical model, loading description, tilting system, measuring complex, vortex-current transformer, authentication.

UDC 539.3

The sensitivity of eigen mode of systems with several degrees of freedom to the variation of parameters of the dynamic system / A. V. Grabovskiy, M. A. Tkachuk, M. M. Tkachuk, A. Yu. Tanchenko, I. V. Mazur // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 25-29. – Bibliogr.: 6. – ISSN 2079-0066.

The paper presents a new approach to the study of the sensitivity of the natural frequencies and mode shapes to the variation of parameters of the dynamic system. Eigen modes are determined from the condition of the conditional minimum of Rayleigh function. The relations for determining the changes in natural frequencies and mode shapes at varying inertial stiffness characteristics of the dynamic system. Proposed new relations for the components of the sensitivity using finite differences. This definition of the spectrum of natural vibration frequencies and natural modes is carried out by finite element method.

Keywords: dynamic system, eigen mode, Rayleigh function, sensitivity.

UDC 621.45.038

Optimization of automobile diesel engine techno-economic indicators with using the Harrington's desirability function / V. O. Pyl'ov, O. M. Klymenko, I. M. Shul'ga // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU «KhPI», 2015. – No 43 (1152). – P. 30-32. – Bibliogr.: 13. – ISSN 2079-0066.

Possibilities of complex improving of automobile diesel technical and economic parameters by use of automatic control systems of its thermal state were analyzed. The basis of this research was early obtained results of experimental investigation of diesel 4ChN12/14. Complex improvements in automobile diesel efficiency and toxicity parameters were proposed to implement by optimizing mentioned parameters for each mode of given operation model. To solve the compromise tasks proposed to use the Harrington's desirability function. As the optimized parameters was used the specific fuel consumption, the concentration of particulate matter and nitrogen oxides in the diesel engine exhaust gas. As the controlling factors was used regime parameters (mean effective pressure, engine speed) and adjusting parameters (advance angle of fuel supply, the thermal state of the piston) of the diesel engine. The efficiency of different variants of automatic control systems was evaluated.

Keywords: regulation, the ICE efficiency, smokiness, particulate matter, nitrogen oxides, operating model, optimization.

UDC 621.436

Determination of perspectives and trends of modernization of the T-72: cooling system / V. F. Klimov, A. P. Marchenko, A. Ju. Fedorov // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 33-36. – Bibliogr.: 7. – ISSN 2079-0066.

Based on the analysis of literary sources in the work described and analyzed solve actual task to modernize our armored vehicles on the example of the T-72. Determined power losses diesel power plant in terms of property for tanks of 600 ± 25 kW. Parameters turbine power propulsion diesel 5TDFM in the absence of back pressure in the exhaust manifold. Comparative analysis of cooling and ejecting the fan type. The positive effects of the modernization of the T-72 by replacing regular diesel in diesel 5TDFM domestic production. The recommendations on the use of armored vehicles to modernize our diesel type 5TDF.

Keywords: diesel, power, tank, cooling system, specific volume, heat.

UDC 539.3

The variable mass of elements in vibroimpact systems: models and numerical results / Y. V. Kostenko // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 37-40. – Bibliogr.: 11. – ISSN 2079-0066.

The variable element mass of weight in vibroimpact systems is widespread phenomenon. When bodies masses are proportionate and amount of lost weight is essential, system parameters are changing significantly. It leads to the change of natural frequencies and sometimes to the change of oscillation character. This paper presents the task about influence of variable mass on the character on dynamical processes. Also are presented the comparison of displacements distributions in time for different mass change characters. Additional distributions describes displacements during one and several oscillation periods. The alignment for approach that put amount of lost weight in dependence of dissipative energy is given.

Keywords: vibroimpact machine, dynamical processes, variable mass, the law of mass change, energy dissipation, Runge-Kutta method.

UDC 378.147

Remote and blended learning at the Department of theory and Computer Aided Design mechanisms and machines / G. A. Krotenko, O. I. Zinchenko, O. O. Yakimenko // Bulletin of NTU "KhPI". Series: Transport machine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 41-44. – Bibliogr.: 7. – ISSN 2079-0066.

Talk about problems and advantages of the mixed form of education. Also reviewed some problems clarity when presenting of educational material for students. There have been proposed new methodological developments for distance and blended learning using multimedia systems. The conclusions about the need to introduce new technologies in the educational process.

Keywords: blended learning, multimedia systems, interactive content, mechanism, kinematic scheme.

UDC 614.84

Determination of parameters of the reflecting system of the radial heating for prevention of overheat of surface / M. A. Maksimova, I. P. Grechka // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 45–48. – Bibliogr.: 6. – ISSN 2079-0066.

At development of projects of the radial heating of industrial apartments there is a task that is related to the achievement of the even heating of surface. One of possible ways of realization of such requirement there is a design of motion of thermal backbeams from surfaces that are beatings back characteristics. The decision of direct task of radial heat transfer is considered for achievement of the even heating of surface, by the design of motion of thermal backbeams. Job of the program of design of backbeams performances and their analysis are resulted. The parameters of the vibdival'noy system are set in dependence on the known form of reflector. The prospects of subsequent researches, which are related to planning of the systems of the radial heating after the set requirements, are also considered.

Keywords: caloradiance, uniform heating, reflector, intensity of thermal stream, radiation heating.

UDC 625.282:625.032.

Damping the bodies of vehicles that are equipped with air springs / A.O. Masliew, Y.V. Makarenko, V.G. Masliew // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 59–64. – Bibliogr.: 4. – ISSN 2079-0066.

The possibility of improving damping vibrations pneumatic spring suspension. The influence of certain parameters of the pneumatic spring suspension and gas-thermodynamic phenomena occurring during vibration, the damping of oscillations and amplitude in different modes of air leakage through the throttle, which is set before additional reservoir. Damping coefficients for different modes of air leakage through the throttle. It is proved that the damping quality Pneumatic impact the natural frequency of vibration and damping in air density. Advanced mathematical model that describes the over-spring oscillations of the vehicle on pneumatic springs, allowed to calculate the coefficient of damping vibrations for the vehicle considered. Proved that the pneumatic spring suspension eliminates the hydraulic or other quencher fluctuations by proper election of its parameters.

Keywords: vehicle, air spring, setting the choke, damping, oscillation

UDC 621.43.031

A method of controlling the volumetric feed pump common rail diesel system / I. G. Pozhidacv, A. O. Prohorenko // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 65–68. – Bibliogr.: 13. – ISSN 2079-0066.

Modern diesel engines are equipped with leading manufacturers of systems, fuel accumulator type high-pressure fuel injection 200 ... 250 MPa. As the high pressure fuel pump in such systems is designed to provide a large supply of fuel, then at idle and part-load fuel supply under high pressure will be excessive. This paper presents a method of controlling the volumetric feed injection pump common rail diesel system is based on the change in geometric active stroke of the plunger. Presented flow characteristics of the fuel pump, which is regulated efficiency of said method.

Keywords: high pressure fuel pump, fuel system accumulator, diesel, plunger.

UDC 621.833+621.85

Analysis of contact interaction in gears and chain drives with evolute profiles by finite element method / R. V. Protasov, A. V. Ustinenko, S. V. Andrienko, A. V. Bondarenko, E. M. Ivanov, S. A. Kashuba // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 69–73. – Bibliogr.: 6. – ISSN 2079-0066.

Evolute mesh is realized in a family of teeth profiles for gears and chain drives with convex-concave contact. The article describes the analysis method of the stress-strain state in the evolute mesh by finite element method. It is to create a parametric 3D-model of the gear or chain drive in the software Pro/ENGINEER. A simplified geometric model and finite element model was created in the software ANSYS Workbench. The test calculations and analysis of stress-strain state for gear pair and pair of sprocket-bushing was made. Pictures of contact stress distribution were obtained. It was shown that the accuracy of the results is increased with decreasing size of the finite elements, but the time and computational costs increase significantly. Analysis of the data showed similar results when using the finite element method and based on the solution of the contact theory of Hertz.

Keywords: gear, chain drive, evolute mesh, finite element method, stress-strain state, contact stress.

UDC 621.436

A review of studies of the effect of water-fuel emulsions on the performance of diesel engine / A. V. Savchenko, D. V. Meshkov // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 74–77. – Bibliogr.: 9. – ISSN 2079-0066.

The article presents an analytical review of experimental studies on the effect of application of water-fuel emulsions on environmental, economic and other indicators of diesel: torque, power, emissions of nitrogen oxides, brake specific fuel consumption. The mechanisms of the effects of water-fuel emulsions in the working process of diesel engine were observed. The influence of water content in water-fuel emulsion and advance angle of fuel injection on the performance of diesel were observed.

Keywords: water-fuel emulsion; the working process; the emissions of nitrogen oxides; the microexplosion

UDC 539.3

The features of the use of the modern technology design in creating of the frame of the cabins / N.E. Sergienko, N.A. Tkachuk, A. N. Sergienko, A.Yu.Vasilyev, A.V. Grabowski, V.G. Maydanyuk, M.A. Chuban // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 78–85. – Bibliogr.: 26. – ISSN 2079-0066.

The reducing of terms and cost of the introducing of new designs is the requirement of our time. In this paper a general approach to the rational design of the tractor frame is proposed. As the basis of the research the results of the calculation of stress-strain state by using the finite element method are involved. On the example of the test problems the effect of variants of the design schemes, the schemes of loading, behaviors of the material to the results of calculations is illustrated. The directions for further research are outlined.

Keywords: tractor frame, stress-strain state, solid model, surface model, beam model, material nonlinearity, finite element method.

UDC: 378:159.98

Formation of the necessary professional and general cultural competence in conducting group sessions in the form of a business game / V.I.Serikov, A.V. Ustinenko, A.V. Bondarenko R.V. Protasov // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 86–91. – Bibliogr.: 8. – ISSN 2079-0066.

At the Department of TMM and CAD NTU "KPI" is conducting a series of complementary activities and projects in the form of a business game. This approach allows us to consistently develop and consolidate the competence of the trainees formed. The article describes the options for activities conducted by the authors in the form of a business game. Describes in detail the rules and methods of these classes. The influence of the ongoing studies on the activation of the learning process and cognitive activity of students and the formation of professional competencies in the future.

Keywords: business game, the competence, the intensification of the educational process, interactive forms of employment, creative approach

UDC 621.1:539.3

The department TMM and SAPR: to the fiftieth anniversary of Transport Engineering Faculty / M. A Tkachuk // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 92–106.– Bibliogr.: 6. – ISSN 2079-0066.

The article is dedicated to the questions of history of department "Theory and computer-aided design of mechanisms and machines" of National Technical University "Kharkiv Polytechnic Institute". The landmarks of department's development are described. The row of research works that was executed by a department is illustrated. Scientific collectives and directions of their activity are represented. Some results over researches of complicated mechanical and biomechanical systems are mentioned. Perspective directions of development of educational process and scientific researches are formed for the department.

Keywords: department, theory of mechanisms and machines, computer-aided design, research and development work.

UDC 539.3

Mathematical models of shock-pin cooperation of elements of the mechanical systems / M.M. Tkachuk, A.V. Grabovskiy, N. B. Skripchenko // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 107–115.– Bibliogr.: 37. – ISSN 2079-0066.

Work is sanctified to development, perfection and realization of methods of decision of the constrained task of analysis of the tensely-deformed state taking into account pin cooperation and geometrical synthesis of складнопрофільних elements of machine-building constructions with kinematics generating surfaces and dynamics of the vibroshock systems on the basis of their self-reactance description and integration of calculation models of different level. The new going is worked out fundamentally near the decision of the constrained tasks of geometrical synthesis and analysis of the tensely-deformed state of складнопрофільних bodies, and also self-reactance synthesis and analysis of dynamics of the vibroshock systems. The method of determination of kinematics generating surfaces and creation of скінченноелементних models offers. The new semianalytical variant of method of maximum elements, that differs in the exact, but not approximate, calculation of coefficients of qualificatory equalizations, is worked out.

Keywords: shock-pin cooperation, tensely-deformed state, складнопрофільні machine-building

UDC 621.43:62-192

Development of strengthening methods of most loaded details as a way to increase of technical and performance characteristics of machines / N.A. Tkachuk, S.A. Kravchenko, V.V. Shpakovskiy, N.L. Belov, A.I. Sheyko, V.I. Demidenko, S.S. Dyachenko, E.K. Posvjatenko, V.G. Goncharov // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 116–122.– Bibliogr.: 15. – ISSN 2079-0066.

In this work new concept and methods are proposed based on the set-theoretic approach for resource improving for series of engines and special equipment by creating new technologies to strengthen surfaces of parts. A number of fundamental and applied problems are solved. The concept of generalized parametric modeling of complex mechanical systems under fuzzy criteria, process analysis and synthesis of new technology are worked out. The materials, modes and options for strengthening processes, corunduming and ion bombardment are scientifically grounded with the creation and design and technological solutions in the design and maintenance of engines and units of special equipment.

Keywords: technology of surface strengthening, resource improving, discrete strengthening, corunduming, ion bombardment.

UDC 623.438:539.3

The problem of providing of tactical and technical characteristics for combat armored vehicles: approaches, models and methods / M. A Tkachuk, A. V. Litvinenko, A. V. Grabovskiy, I.V. Cebryuk // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 123–131.– Bibliogr.: 16. – ISSN 2079-0066.

It was solved an actual scientific and practical problem of developing of the theoretical foundations of design and technological support for tactical and technical characteristics of light armored vehicles (LAV) by the study of technical solutions of hulls according to the criteria of security, strength, stiffness, vibro-excitability from the action of complex of damaging factors, which is important for armored tank-building of Ukraine. On the basis of the generalized method of parametric modeling and spread it on the design and technological solutions, a new approach is developed to providing of tactical and technical characteristics of LAV. It consists in interaction and mutual influence of design solutions, technological regimes and manufacturing conditions. For the first time the set of technological factors involved both as a parameter, which determines the level of tactical and technical characteristics and a variable desired one.

Keywords: armored hull, combat armored vehicle, tactical and technical characteristics, design and technological solutions, method of generalized parametric modeling.

UDC 539.3

Influence of the roughness layer on the distribution of the contact pressures between complex bodies / M.M. Tkachuk, N. B. Skripchenko, M. A. Tkachuk, K. D. Nedilko // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 132–139.– Bibliogr.: 14. – ISSN 2079-0066.

The paper contains the results of a numerical investigation of contact pressure between the complex bodies that is setting by surfaces of complex shape and don't have simple analytical description. Influence of Winkler's layer compliance simulating the contact surface roughness is taken into account. Influence of this layer compliance and the gap distribution between the bodies on the distribution of the contact pressures were determined. The method of boundary integral equations is used for determine the contact pressure. Ratio of the boundary element method is used for sampling. In the numerical experiments the influence of the gap distribution between the contact bodies at the contact pressure distribution was investigated. Also the compliance of the elastic layer, simulating the stiffness properties of roughness surface of the contact bodies is varied. The characteristic of distribution of contact pressure and maximum contact pressure dependence of variable parameters were obtained.

Keywords: contact interaction, the method of boundary integral equations, Winkler's layer, complex bodies, contact pressure.

UDC.629.1

Analysis cost power electric starter when starting the engine 3TD-3A / Tokar S.E., Dudko V.V., Kuz'minskii V.A., Katorgin O.M., Serhiienko O.O. // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 140–143.– Bibliogr.: 2. – ISSN 2079-0066.

In the article it was determined the distribution of mechanical power consumed electric starter when starting between the engine, the gearbox input with automatic gearbox and drives connected to it by regular units.

UDC 621.43.016

Prospects for improving the thermal state of parts of the valve diesel unit using a local cooling / A. V. Trynov, V. G. Panchoshniy // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 144–150.– Bibliogr.: 4. – ISSN 2079-0066.

This paper presents the results of the study estimated heat stress state of the exhaust valve diesel tractor in local multiplanimetric cooling valve parts hub. Conducted estimated assessment of the effectiveness of individual options - cooling systems considering lowering the temperature valve and assessment of energy costs on the engine. Mathematical model involves the use of finite element method (FEM).

Keywords: exhaust valve unit, local cooling, heat stress state, energy costs, comparative analysis.

UDC 629.114.2.001

Justification of a choice of the traction electric motor for the two-line electromechanical mechanism of turn for the track laying vehicle / Duong Sy Hiep, D. O. Volontsevich // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 151–156.– Bibliogr.: 6. – ISSN 2079-0066.

The analysis of the main types of electric drives from the point of view of expediency of their use in the two-line electromechanical mechanism of turn of the track laying vehicle is offered. It is known that the specified electric drive works in rigidly non-stationary, repeated and short-term modes, demands exact and smooth regulation of speed. The anchor of the electric motor can rotate opposite to the speed of rotation of a magnetic field aside or exceed value of synchronous speed. The drive at operation tests the considerable short-term overloads in combination with shock overloads on accelerations connected with the movement of the car on a cross-country terrain.

In this regard, the conclusion that for the specified electric drive, it is most expedient to use the three-phase asynchronous electric motor with the power supply frequency converter is drawn.

Keywords: electric drive, electromechanical two-line mechanism of turn of the track laying vehicle, electric motor.

UDC 621.43.068.4

Analysis of the directions of rise in the ice ecological compatability level by the means of application of the in cylinder catalysis / V.O. Khyzhniak, I.V. Parsadanov // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 187–160.– Bibliogr.: 9. – ISSN 2079-0066.

The article deals with main directions of ecological compatibility level of modern ICEs rising, the in-cylinder catalysis is the most optimal and foreground of them. The results of studies of the applied catalytic coatings in the combustion chamber effect on efficiency of ecological compatibility levels of ICE increasing are analyzed.

Keywords: ecological compatibility of a diesel engine; toxicity of exhaust gases; catalytic coating; in-cylinder catalysis

UDC 539.3

The approximation of the response surface for using in the process of the parametric synthesis of the engineering structures/ M.O. Chuban// Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 161–164.– Bibliogr.: 10. – ISSN 2079-0066.

In the process of optimization of engineering constructions the problem of finding the response function, which establishes the connection between the diagnostic indicators (stresses and displacements, strain, weight and so on.) and structural characteristics arises. It is usually solved by approximation. The piecewise polynomial method of approximation with using the Hermite's basic functions is described. The fault of the method was estimated. The approach to building of the models of response surface in optimization of the engineering structures using this method was described and demonstrated.

Keywords: approximation, Hermite's cubic functions, response surface, finite element method, finite difference method, engineering structure, synthesis.

UDC 629.429.3:621.313

Method of determining the efficiency of speeding traffic suburban electric trains with synchronous traction motor / B. H. Lubarsky // Bulletin of NTU "KhPI". Series: Transport mashine building. – Kharkiv: NTU "KhPI", 2015. – No 43 (1152). – P. 165–168.– Bibliogr.: 8. – ISSN 2079-0066.

At the moment in the development and operation of new types of trains question to determine their rational speeds of movement. We consider the methodology to determine the most rational speed of electric trains with synchronous traction motors with excitation from permanent magnets based on complex criteria. For consideration in the suburban electric trains electric traction based on synchronous traction motor with excitation from permanent magnets to increase the maximum speed of 50 to 140 km / h leads to an increase in energy consumption, due to the growth of the resistance movement of rolling stock.

According to relative performance indicator best solution is the use of electric maximum speed.

Keywords: train, synchronous electric traction, maximum speed, optimal modes of traction drive integrated performance criterion.