

визуализация потока.

УДК 621.833

Исследование напряжённо-деформированного состояния колеса волновой зубчатой передачи с использованием теорий упругих оболочек / В. Н. Ткаченко // Вісник НТУ «ХП». Серія: Математичне моделювання в техніці та технологіях. – Харків: НТУ «ХП», 2014. – №18 (1061). – С. 191 – 195. Бібліогр.: 2 назв. – ISSN 2222-0631.

Напряжения от изгиба колеса волновой передачи генератором волн можно определить решением задачи об изгибе кольца. Для выяснения влияния длины колеса на его радиальную жёсткость и на напряжения в нормальных к оси плоскостях необходимо применить теории оболочек. Проведенный сравнительный анализ различных теорий даёт предпочтение технической моментной теории оболочек, позволяющей решить поставленную задачу и получить рекомендации для выбора оптимального соотношения длины колеса к его диаметру.

Ключевые слова: волновая передача, напряжения, гибкое колесо, теория оболочек.

УДК 621.646.42

Математическая модель регулятора давления газа / С. А. Шевченко, С. А. Валивахин // Вісник НТУ «ХП». Серія: Математичне моделювання в техніці та технологіях. – Харків: НТУ «ХП», 2014. – №18 (1061). – С. 195 – 209. Бібліогр.: 17 назв. – ISSN 2222-0631.

Представлена математическая модель, описывающая динамику регулятора давления газа с учётом разрыва связей между элементами его подвижной системы. Дискретная модель включает уравнения движения поршней и сжатия газа в полостях регулятора. Модель предназначена для выбора конструктивных параметров системы управления пусковой турбиной жидкостного ракетного двигателя, а также пневматических и гидравлических агрегатов автоматики для аналогичных устройств.

Ключевые слова: регулятор давления газа, отрыв элементов подвижной системы, нелинейная математическая модель, динамические характеристики.

УДК 629.017:681.532.58

Адаптивная система управления торможением автомобиля с перенастраиваемой моделью / С. Н. Шуклинов // Вісник НТУ «ХП». Серія: Математичне моделювання в техніці та технологіях. – Харків: НТУ «ХП», 2014. – №18 (1061). – С. 209 – 215. Бібліогр.: 7 назв. – ISSN 2222-0631.

Предложена структурная схема адаптивной автоматизированной системы управления тормозами автомобиля с перенастраиваемой моделью. Разработан метод определения порогового значения задающего воздействия, по которому определяется момент перенастройки коэффициента эффективности модели. Сформирована статическая характеристика управления торможением перенастраиваемой модели автомобиля.

Ключевые слова: автомобиль, торможение, управление, адаптивная система, перенастраиваемая модель, задающее воздействие, статическая характеристика.

ABSTRACTS

UDC 517.01

On the 80th Anniversary of Gandel Yu.V. / S. V. Dukhopelnykov, V. D. Dushkin, T. S. Polyanskaya // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 3 – 8. Bibliog.: 8 titles. – ISSN 2222-0631.

Several facts on the biography and professional activity of the Kharkov famous scientist and educator Gandel Yu.V., which have never been previously published, are presented.

Key words: Yuriy V. Gandel.

UDC 621.923

Development of a mathematical model for determining the parameters of the abrasive machining by submerged jets / A. A. Andilakhai // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 9 – 16. Bibliog.: 6 titles. – ISSN 2222-0631.

The paper suggests a new mathematical model for determining machining energy consumption given different forms of microcuts: the ones of constant thickness and those with the slice thickness, which increases and decreases in time. It is proved that the lowest energy consumption is achieved when microcutting with slice thickness decreasing in time. This indicates that the method of abrasive machining by submerged jets can be applied most effectively for machining piece edges, removing burrs, and reducing asperities on the treated surfaces of small parts.

Key words: abrasion, cutting process, abrasive grain, slice thickness, cutting force, the energy intensity of treatment.

UDC 004.032.26

A multidimensional cascade neuro-fuzzy system with neuron pool optimization / Ye. V. Bodyanskiy, O. K. Tyshchenko, D. S. Kopaliani // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 17 – 26. Bibliog.: 19 titles. – ISSN 2222-0631.

A new architecture and learning procedures of a multidimensional cascade neuro-fuzzy system with neuron pool optimization in each cascade were proposed. The proposed system differs from the well-known cascade systems in its capability to process multidimensional time series in an online mode, which makes it possible to process non-stationary stochastic and chaotic signals with the required accuracy.

Key words: neural network, neo-fuzzy neuron, computational intelligence, evolving hybrid system.

UDC 74.580.25: 531.8(045/046)

Eliminating indeterminate forms when implementing graphical method for solving kinematical problem in the course of mechanism and machine theory / Ye. O. Vladimirov, D. V. Gavva, P. O. Chikunov // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 26 – 31. Bibliog.: 6 titles. – ISSN 2222-0631.

In this paper we analyze methods for solving the problems in analytical and descriptive geometry concerning the shape and relative position of geometric objects. The unity of analytical and graphical methods is demonstrated by implementing the graphical method for kinematic analysis of a planar mechanism. The unity of the approach for evaluating indeterminate forms is shown for the problem of determining the speed of planar mechanism units. In the case of parallelogram and antiparallelogram mechanisms the analysis is carried out for the position of units for which it is impossible to plan the construction speed. To solve this problem graphically the acceleration plan is constructed, as the acceleration is the derivative of the velocity. Linear and angular velocities of the points of flat mechanisms are defined by constructing the velocity triangle. The clue to solving the problem in question is L'Hopital's rule, according to which the limit of the ratio of two functions that tend to zero can be replaced by the ratio of their derivatives.

Key words: descriptive geometry, analytic geometry, kinematics, elimination of indeterminate forms, L'Hopital's rule.

UDC 620.97

On the influence of air flow on the functioning of a solar collector with a corrugated heat-absorber / O. T. Voznyak, O. M. Pona, S. P. Shapoval // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 32 – 38. Bibliog.: 4 titles. – ISSN 2222-0631.

The issues related to the future ways of energy development escalate more and more each year. The solution of this problem requires significant changes in the global energy balance. An alternative in this field is the use of non-conventional renewable energy sources: energy of the sun. In this paper we investigate the influence of air flow on the energy efficiency of a solar collector. It is important to study how the efficiency of the solar collector changes under the influence of air flow and to define its optimal characteristics. The energy efficiency of a solar collector under the influence of air flow is compared to that of a solar collector with corrugated heat-absorber. The dependence of the energy-efficiency of the solar collector on the velocity and direction of air flow is determined.

Key words: solar collector, solar radiation, air flow, heat transfer coefficient.

UDC 621.822

Distribution of the axial load between the cylindrical rollers of a radial bearing / A. V. Gaydamaka // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 39 – 44. Bibliog.: 5 titles. – ISSN 2222-0631.

The article addresses a method of calculation of the axial load between the cylindrical rollers of a radial bearing. The method was improved by introducing the models for analytical determination of the skew angle of the rings under combined (radial and axial) load taking into account deformations of the bearing ring rims. The calculation results for the axial load distribution between the cylindrical rollers of the radial bearing are presented.

Key words: bearing, rollers, load.

UDC 621.221

Determining technological level of rotational hydraulic unit / I. P. Grechka // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 45 – 52. Bibliog.: 9 titles. – ISSN 2222-0631.

The nomenclature of individual indicators of quality of hydraulic units used for estimating their technological level is proposed. To determine the technological level of a rotational hydraulic unit we suggest a complex criterion of efficiency evaluating constructive and operational indicators of hydraulic machines relative to specific hydroficated machines, namely the dimensionless criterion of efficiency for hydraulic motors. Based on specific indicators of quality and complex criterion the technological level of hydraulic motors of the advanced foreign firms is determined and the type of the hydraulic motor for the rotational hydraulic unit is chosen.

Key words: the rotational hydraulic unit, a technological level, a complex indicator, the hydraulic motor.

UDC 539.01: 621.436

A method of the dynamic strength analysis for a diesel injector locking device / A. L. Grigoriev // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 53 – 58. Bibliog.: 7 titles. – ISSN 2222-0631.

A method of the dynamic calculation of a diesel injector locking device is described. The main features of the method are considering cinematic chain gaps as well as using detailed mathematical model of the injector spring in which the longitudinal, torsion and bending oscillation of the spring coils are taken into account. The general solution of the model can be represented by the Duhamel integrals with Cauchy kernel, which fact is used for developing the method.

Key words: dynamic model, substantial nonlinearity, spring coil oscillations, tangential strain.

UDC 622.691.4

A mathematical model of the dynamics of gas at the final stage of field operation / D. F. Donskoy, M. M. Kutya, S. A. Oleshko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18

(1061). – pp. 59 – 68. Bibliog.: 4 titles. – ISSN 2222-0631.

In the article a mathematical model of the gas production dynamics for fields at the final stage of operation is developed and implemented for practical purposes. The authors also evaluate the effect of forming liquid plugs in the tubing of the well and in the cavity of its pipeline on the modes of the system «well – pipeline – collecting unit».

Key words: a mathematical model, dynamics, gas, field, well, the final stage of development, liquid plugs.

UDC 621.43.068.4

Mathematical model of the hydraulic resistance of a diesel particulate matter filter. Part 1: adjusting coefficient / A. N. Kondratenko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 68 – 80. Bibliog.: 21 titles. – ISSN 2222-0631.

The paper deals with the mathematical model describing hydraulic resistance of a DPF under real operating conditions. The model is based on the flow characteristics of a single module of the DPF filter element obtained experimentally for a constant temperature of fluid, and data of bench tests of autotractor diesel 2Ch10.5/12 equipped with a full-sized DPF. The model also allows taking into account a number of factors that characterize operating conditions of the DPF in the exhaust system of this diesel by introducing respective coefficient. The dependence of these coefficients on the operating and design parameters of diesel 2Ch10.5/12 is experimentally obtained and described using the method of linear regression. In this part of the research we describe the physical meaning and evaluate the adjusting coefficient of this mathematical model, which allows to correlate the results of non-motorized installation studies and those obtained using engine test band, and to take into account the case design type of the DPF filter element module. Using flow characteristics of the exhaust stream, such as mass flow rate per unit area of the inlet section of the module, when designing a DPF allows taking into account the model dimensions of the model and the number of the filter element modules.

Key words: diesel, particulate matter filter, hydraulic resistance, mathematical model.

UDC 621.43.068.4

Mathematical model of the hydraulic resistance of the diesel particulate matter filter. Part 2: temperature coefficient / A. N. Kondratenko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 80 – 89. Bibliog.: 3 titles. – ISSN 2222-0631.

The paper deals with a mathematical model describing hydraulic resistance of a diesel particulate matter filter (DPF) under real operating conditions. The model is based on the flow characteristics of a single module of the DPF filter element obtained experimentally for a constant temperature of fluid, and data of bench tests of autotractor diesel 2Ch10.5/12 equipped with a full-sized DPF. The model also allows taking into account a number of factors that characterize operating conditions of the DPF in exhaust system of this diesel by introducing respective coefficient. The dependence of these coefficients on the operating and design parameters of diesel 2Ch10.5/12 is experimentally obtained and described using the method of linear regression. In this part of the research we describe the physical meaning and evaluate the temperature coefficient of this mathematical model, which allows taking into account changes of the temperature of the exhaust gas at the filter housing inlet by the function of the mean effective pressure of the diesel. Using flow characteristics of the exhaust stream, such as mass flow rate per unit area of the inlet section of the module, when designing a DPF allows taking into account the model dimensions of the model and the number of the filter element modules.

Key words: diesel, particulate filter, hydraulic resistance, mathematical model.

UDC 621.224

Investigation of rotating stall of reverse hydraulic machine pumping mode / Y. M. Kukhtenkov, M.Y. Kukhtenkov, S. A. Ryzhov // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18

(1061). – pp. 89 – 94. Bibliog.: 8 titles. – ISSN 2222-0631.

Experimental studies of rotating stall of reverse hydraulic machines operating in the pumping mode at the head of 200 m is proposed. The number of the stall zones and speed of their rotation is determined. As the supply decreases the rotating stall transforms into a surge. The water passage pressure pulsations between the runner and the distributor reach 25% at the rotating stall and 28% at the surge.

Key words: rotating stall, pressure pulsations, rotor wheel, distributor.

UDC 630*377.4:531.8

Features of logging equipment to be used in areas with a slope. Part 2. Solving practical problems / O. S. Machuga // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 94 – 109. Bibliog.: 10 titles. – ISSN 2222-0631.

Methods for engineering calculations of harvesters' (forest machines) operating characteristics, such as engine power and basic reactions, have been proposed. The methods are based on using the equations of previously developed mathematical model of the mechanism's movement through the area with a slope, combined with the process operations' performance. Test examples of calculations have been considered. The results of the calculations are important for choosing machines, appropriate to operating conditions, and for correction of logging process operations of the mechanisms previously purchased.

Key words: engineering calculation, forest machine, engine power, basic reactions, choosing the machines, correction of logging operations.

UDC 004.94.:621.389.:53.086(045)

Programmable nanoelectronic gates / O. S. Melnyk, N. V. Trokhimenko, O.V. Onyschuk // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 110 – 115. Bibliog.: 5 titles. – ISSN 2222-0631.

The article suggests a quantum dot cellular automaton programmable nanoelectronic gate composed of three simple majority gates. This 7-input gate can be configured into many useful gate structures such as a 4-input AND gate, a 4-input OR gate, a product of sums representation, a sum of products representation, and its variations.

Key words: quantum cellular automata, majority gate, programmable nanoelectronic gate.

UDC 539.3: 517.9

Lambert function in the problem of oscillations of a mathematical pendulum / V. P. Olshanskii, S. V. Olshanskii // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 116 – 119. Bibliog.: 8 titles. – ISSN 2222-0631.

We have made a brief overview of approaches to solving the equation of oscillations of a mathematical pendulum with friction proportional to the square of the velocity. We show that the calculation of the amplitude of damped oscillations of a mathematical pendulum in a medium with quadratic resistance to motion can be performed using a table of the Lambert functions of the negative argument. A version of the approximate solution of the inverse problem of determining the resistance of the medium is proposed.

Key words: mathematical pendulum, oscillations, Lambert function.

UDC 629.7.05

The double-frequency quaternion reference model of a conical type rigid body rotation / Yu. A. Plaksyiy // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 120 – 129. Bibliog.: 7 titles. – ISSN 2222-0631.

An analytical reference model of a rigid body rotation based on multiplicative representation of

the orientation quaternion is proposed. Trajectories in the configuration space, different in the form from the trajectories for models of conical movement and regular precession, are constructed. It is shown that a proper choice of the model parameters provides a sufficiently wide range of movement of the object as a rigid body. The proposed reference model can be used for the error analyses of algorithms for determining the quaternion orientation when designing strapdown inertial orientation systems. The results of the numerical realization of the reference model for different sets of parameters are presented.

Key words: quaternion, orientation, reference model, quasicordinates.

UDC 621.577:621.517

Experimental stand for studying thermo-transformer using jet thermo-compression and its computational model. / M. I. Protsenko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 130 – 137. Bibliog.: 12 titles. – ISSN 2222-0631.

A scheme of an experimental stand of a thermo-transformer using jet thermo-compression working in a heat pump mode on the working substance R134a is described in the article. The basic equations of the thermo-transformer computational model and also the relations for determining the energy efficiency are given. The results of numerical studies of energy efficiency indicators are presented.

Key words: liquid-steam jet compressor, thermotransformer, heat pump mode.

UDC 532.5:519.872:669.187

Modeling electromagnetic and hydrodynamic parameters in a laboratory unit / A. N. Semko, N. N. Vladykina // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 138 – 145. Bibliog.: 11 titles. – ISSN 2222-0631.

The paper deals with modeling of electromagnetic and hydrodynamic processes in a laboratory unit with annular and cylindrical electrodes with liquid tin. The physical and mathematical models, the algorithm and method of numerical solution of the two-dimensional axisymmetric problem using Comsol software package are presented. The numerical results for the distribution of current density, the electromagnetic Lorentz force, the velocity field of melt motion are given.

Key words: modeling of electrovortex flow, liquid conductor, melt motion, the finite element method.

UDC 539.3

Analyzing sensitivity of construction units under dynamic load / E. A. Simson, S. A. Nazarenko, S. I. Marusenko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 146 – 150. Bibliog.: 4 titles. – ISSN 2222-0631.

The sensitivity analysis method is one of the most effective numerical methods for solving mathematical problems, describing states of physical systems with complicated structure. Calculating the derivatives of the most relevant magnitudes (spectrum of frequencies, stresses, etc.) in optimum design of structures allows to estimate the structural response when changes in the design variables are introduced. In this paper mathematical models and computational methods for analyzing sensitive constructions under dynamic load are considered. Based on the current investigations two basic methods of sensitivity analysis are developed. The first one uses an approximation of the problem in a finite-dimensional space. The second one is based on setting the problem in a continuum space, in which the initial differential, integral, or variational equation describing the construction model is defined. To demonstrate the potential of the mathematical apparatus developed the problems of an aerospace construction wing and a diesel block-carter cast are considered.

Key words: sensitivity analysis, spectrum of frequencies, stresses, design variables, mathematical model, dynamics, vibration.

UDC 621.314

Modeling of centrifugal pumps' operating modes / M. I. Sotnyk // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 151 – 161. Bibliog.: 4 titles. – ISSN 2222-0631.

When investigating workflows in hydraulic systems and their units mathematical, field, schematechnical and other modeling methods are widely used. Today there is no universal modeling method that would allow to get instantaneous and integral characteristics of workflows in stationary and transition modes. The authors suggest to apply centrifugal pump workflow modeling method combining field analysis and purely electrical modeling. The main components of this method are electric models of centrifugal pumps, developed by the authors. They take into account structural features of pumps and their operating modes. Modeling of hydraulic systems' operation using electric models of centrifugal pumps allows to get instantaneous and integral characteristics of the workflow. Modeling can be carried out with respect to hydraulic systems, powered by several pumping units operating simultaneously. This schematechnical modeling allows to investigate the workflow not only in stationary mode, but also in transition one. Based on these data the energy-efficient modes of hydraulic systems' operation are determined.

Key words: centrifugal pump, circuit simulation, electric model.

UDC 539.1

On the influence of the material state model on the stress-strain state of a II-shaped construction under the ball impact / A. V. Stepuk, L. V. Avtonomova, S. V. Bondar // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 161 – 166. Bibliog.: 5 titles. – ISSN 2222-0631.

The FEM analysis for a II-shaped thin-walled construction, its strain-stress deformations under center and off-center impact of a solid sphere are presented. Specific details of the dynamic contact problem and their implementation using AVTODYN CAD-FEM software are considered. The influence of the chosen material state models on the values of strain and stress intensities is demonstrated.

Key words: mathematical modeling, impact, material state models, finite element, II-shaped thin-walled construction.

UDC 593.3

Variational structural method for solving flat contact problem in elasticity / Ye. Yu. Tarsis // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 167 – 178. Bibliog.: 6 titles. – ISSN 2222-0631.

This paper proposes a systematic description of a general method of variational and structural formulation of a plane contact problem in elasticity for a homogeneous body having arbitrary geometrical shape. Various boundary conditions with known and unknown contact areas are considered. The variational formulation is based on the Reissner functional. A general method for constructing solutions for the displacements and stresses which exactly satisfy all the boundary and contact conditions using R-functions is set forth. The solution structures obtained allow for specification and modification depending on the particular problem. The significant advantages of the proposed method are the possibility of independent approximation of displacements and stresses and the simplicity of constructing the solution structures. The problem of determining the contact areas is reduced to a sequence of mixed linear problems. The iteration algorithm applied uses two independent criteria. To illustrate a specific implementation of the proposed method a problem for an elastic trapezoid having lower base resting without gap on an absolutely smooth solid surface, lateral sides free from load, and upper base remaining under the pressure of a print is considered. The results of numerical studies are given. Validity and accuracy of the solutions are confirmed by the compliance of integral and local criteria.

Key words: elasticity theory, contact problem, variational formulation, the Reissner functional, the R-function method, determining contact area, print, unilateral restrictions.

UDC 532.57:519.63

Theoretical and experimental study of the model of an exhaust duct for an electric arc furnace / N. S. Timoshenko, A. N. Semko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 178 – 190. Bibliog.: 9 titles. – ISSN 2222-0631.

Investigation of an annular exhaust duct model, which is an integral part of the aspiration system of an electric arc furnace, was conducted. A method of calculation of the exhaust duct parameters was developed. The results of calculation and numerical solution in the application package showed good correspondence to the results of the experiment performed on a model of linear exhaust duct. The proposed design provides uniform gas inflow along the duct, which when used in aspiration system of electric arc furnace will help to reduce and localize dust-gas emissions.

Key words: electric arc furnace, exhaust duct model, aspiration, ventilation theory, flow visualization.

UDC 621.833

Studying stress-deformed state of a wave gear wheel using theories of elastic shells / V. N. Tkachenko // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 191 – 195. Bibliog.: 2 titles. – ISSN 2222-0631.

Bending stresses in a wave gear elastic wheel can be defined by solutions to the ring bending problem. To determine the effect of the wheel length on its radial rigidity and stresses in the planes normal to the axis it is necessary to apply theories of shells. The comparative analysis indicates the advantages of the technical bending theory of shells, which allows solving the problem and getting recommendations for selecting the optimum ratio of the wheel length to its diameter.

Key words: wave gear, stress, elastic wheel, shell theory.

UDC 621.646.42

A mathematical model of the gas pressure regulator / S. A. Shevchenko, S. A. Valivakhin // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 195 – 209. Bibliog.: 17 titles. – ISSN 2222-0631.

A mathematical model describing the dynamics of the gas pressure regulator considering breaking the bonds between the elements of its mobile system. The discrete model includes equations of motion of the pistons and the compression of the gas in the cavities of the regulator. The model is designed to select the design parameters of the control system of the turbine starter fluid pa-ketnogo engine, as well as pneumatic and hydraulic power units for automation analogous devices.

Key words: gas pressure regulator, separation elements of the moving system, nonlinear mathematical model, the dynamic characteristics.

UDC 629.017:681.532.58

Adaptive system of vehicle braking control with readjusting model / S. N. Shuklinov // Bulletin of National Technical University «KhPI» Series: Mathematical modeling in engineering and technologies. – Kharkiv: NTU «KhPI», 2014. – №18 (1061). – pp. 209 – 215. Bibliog.: 7 titles. – ISSN 2222-0631.

A structural scheme of an adaptive automated system of vehicle braking control with a readjusting model is proposed. The method of determining the impact threshold value setting the moment of readjustment of the coefficient of model efficiency is developed.

Key words: vehicle, braking, adaptive system, readjusting model, reference signal, static characteristic.