

№2(79), 2020

SUMMARIES

KINETIC ENERGY OF RRRRT TYPE SPHERICAL FIVE-BAR HINGED MECHANISM WITH TWO DEGREES OF FREEDOM WITH ONE CLEARANCES IN CONNECTION OF TWO COUPLERS. **N. Davitashvili, N. Keburia.** “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 7-12, (Engl.).

The formula for the kinetic energy of RRRRT type spherical five-bar hinged mechanism with two degrees of freedom with one clearance in the connection of two couplers is stated that gives the possibility to generate differential equations for the additional and main movement of the mechanism. By solving these equations, it reveals the possibility to determine the real laws of motion of the input links with an increase in their accuracy. 1 ill. Bibl. 9. Engl.; sum. in Russian.

KINEMATICS OF A ROBOT-TRAILER SYSTEM WITH MECANUM WHEELS. **K. Zimmermann, I. Zeidis.** “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 13-19, (Engl.).

The equations for kinematic constraints for a mechanical system that consists of a four-wheeled robot with Mecanum wheels and a two-wheeled trailer with conventional wheels are presented. A trailer is attached to the mobile robot by two rigid rods that are connected by a joint. The condition that the wheels roll without slip leads to non-holonomic kinematic constraints. It is shown that the presence of the trailer changes the character of the constraints, the system stops being a Chaplygin system and the respective dynamic equations cannot be applied to it. 5 ill. Bibl. 15. Engl.; sum in Russian.

INVESTIGATION OF THE TRIBOTECHNICAL PROPERTIES OF THE MATERIALS FOR PISTON MACHINES. **V. Bakhshali, F. Qahramanov, E. Aslanov, I. Ismail, A. Bekirova.** “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 21-27, (Engl.).

In the work it is considered tribotechnical parameters of materials depending on sliding speed at the normal temperatures. The relationship of intensity of wear depends on mechanical characteristics of material is determined. It is investigated the tribotechnical characteristics of concrete materials, the diagrams of intensity of friction and wear depending on the sliding speed of plurality tungsten and its alloy are constructed. Results of a research can be useful for developing and operation of themachines and equipment used in the oil and gas industry. 3 ill. Bibl. 17. Engl.; sum in Russian.

SYNTHESIS OF A FOUR-BAR LINKAGE BY A COEFFICIENT OF CHANGE IN AVERAGE SPEED OF AN OUTPUT LINK AND ITS SOFTWARE APPLICATION. **A. Tuleshov, Yu. Drakunov, A. Shadymanova.** “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 29-35, (Engl.).

In this paper, based on the method of blocked zones, we consider a practical method for synthesizing a single-crank-and-rocker mechanism based on a given coefficient of change of an average speed of the slider and the optimal transmission angle to ensure the maximum transfer of force from the input link to the working body (output link). Based on the above method, we developed a dialog design system on PC, made in the visual system Delphi 7, which allows you to determine the parameters of the synthesized four-link hinge mechanism by the optimal pressure angle and conduct kinematic analysis of the movement of the links in the dialog mode. The software package is considered as a tool for designer when designing machines using the four-link mechanism. 4 ill. Bibl. 7. Engl.; sum. in Russian.

EFFECT OF VORTEX MOTION CHARGE ON NON-STATIONARY HEAT TRANSFER IN THE COMBUSTION CHAMBER OF A HYDROGEN DIESEL. **R. Kavtaradze, G. Chilashvili, Rongrong Cheng, Citian Chang** "Problems of Mechanics", Tbilisi, 2020, №2(79), pp. 37-41, (Engl.).

In this article, the problem of the determination of the rotational charge motion intensity value in a hydrogen diesel cylinder is first formulated and solved in order to establish the limits for the heat loads on the main parts (on a piston) of a motor under the hydrogen combustion. 3D Mathematical modeling of local non-stationary heat transfer in the combustion chamber was performed for the experimental single-cylinder hydrogen diesel MAN 24/30.1 ill. Bibl. 9. Engl.; sum. in Russian.

DYNAMIC ANALYSIS OF ECCENTRIC-ROD RADIAL-FORGING MACHINE. **T. Natriashvili, S. Mebonia, G. Sakhvadze, A. Shermazanashvili.** "Problems of Mechanics", Tbilisi, 2020, №2 (79), pp. 43-49, (Engl.).

Dynamic model of eccentric-rod radial forging machine are considered. The formulas for determining of the stiffness and pliability of the elastic shaft of the dynamic model are obtained. The differential equation of motion of the model for the period of idle motion and during forging are composed. By solving these equations, it is established that the elastic moment for the period of idle motion and during forging changes according to the harmonic law, the nature of the elastic moment change at the loading stage is determined by summing two harmonic functions that correspond to forced and free vibrations and the elastic moment will be the greater, the smaller the difference between the frequency of load change and the frequency of natural vibrations of the system. 3 ill. Bibl. 8. Engl.; sum. in Russian.

DEVELOPED MHD FLOWS IN CHANNELS AT EXISTENCE OF POINTED GEOMETRY EXTERNAL MAGNETIC FIELD. **V. Tsutskiridze.** "Problems of Mechanics". Tbilisi, 2020, № 2(79), pp. 51-57, (Engl.).

In the article is considered the flow of a viscous incompressible isotropically conductive fluid in a channel of rectangular cross section. An exact solution of the problem in general form and its limiting case corresponding to the flow in a plane slit are obtained. 1 ill. Bibl. 14. Engl.; sum. In Russian.

STUDYING THE STRESS STATE OF A SURFACE LAYER CHANGING IN FACE MILLING CONDITIONS. **M. Iremadze, A. Khvadagiani.** "Problems of Mechanics". Tbilisi, 2020, № 2(79), pp. 59-65, (Engl.).

The article examines the stress state of a surface layer, which changes in the face milling conditions. Processing of the results of residual stresses using regression analysis allows to obtain the mathematical relationships after face milling of various steel grades as follows: steel ST3, steel 45, steel 1X18H9T, steel 40X, and steel 50XC. 5 ill. Bibl. 5.Engl.: sum.in Russian.

ON DEVELOPMENT OF AGROENGINEERING FIELD OF GEORGIA. **R. Makharoblidze.** "Problems of Mechanics". Tbilisi, 2020, № 2(79), pp. 67-72, (Engl.).

Is justified that at developing mechanized technologies and technical means for mountainous farming, it is necessary to take into account current global trends. In particular, on the plain. as well as on the slopes for reducing the resource capacity of agricultural production can be achieved by combining technological operations using combined, adaptive machines built on the principle of block-modular

design. Due taking into account these conditions, priority areas of research and development, technological work are formed. Bibl. 3. Engl.; sum. in Russian.

MODERNIZED ARROW ELECTRIC MOTOR. N. Mukhigulashvili, M. Chaladze, G. Chaladze. “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 73-77, (Engl.).

Based on the analysis of General data on the failure statistics of SCB devices (signaling centralization blocking) of the Georgian railway, electric drive systems of the arrow type-SP have been used for more than 50 years. Their operation shows that the system leads to a significant increase in the number of damage and malfunction. The upgraded electric drive Arrow works much more reliably and efficiently. Based on the comparison, the corresponding conclusions are drawn. The advantages and disadvantages of each of them are noted. 4 ill. Bibl. 5. Engl.; sum. in Russian.

SOLUTION OF TWO-DIMENSIONAL SPATIAL TASK OF HEAT CONDUCTIVITY NIN THIN-WALLED STRUCTURES BY FINITE ELEMENT METHOD. A. Buksianidze. “Problems of Mechanics”. Tbilisi, 2020, № 2(79), pp. 79-84, (Engl.).

Is developed the methodology for determining two-dimensional temperature fields in multilayer sections of a complex profile using the finite element method based on rectangular finite elements that due application of minimum number of elements in the assembly gives the possibility to construct a flexible scheme for solution of steady and non-steady equations of heat conductivity. The task of propagation of unsteady temperature fields and analysis of stresses caused by pressure and temperature field from the attached technological unit to the cooling flange using a conical adapter has been solved, and programs have been developed for analysis of this unit taking into account steady and non-steady technological modes. 2 il., Bibl. 10. Engl.; sum. in Russian.