№1(54), 2014
SUMMARIES

DYNAMIC STUDY OF CRANKS - PISTON MECHANISMS WITH TAKING INTO ACCOUNT THE CLEARANCES IN KINEMATIC PAIRS AND ELASTICITY OF LINKS. **N. Davitashvili, V. Bakhshaliev, V. Abaishvili.** **"**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 5-28, (Engl.).

Is stated the dynamic analysis of the crank-piston mechanisms applied in pumps and compressors for the oil and gas transportation, with taking into account the clearances in kinematic pairs and the elasticity of links. Using known methods of structural mechanics without generation of differential equations in partial derivatives with taking into account the clearances is defined deformation of coupler with distributed masses. Is found reduced stiffness coefficient of mechanism. The mechanism is considered as a two-mass model (motor, mechanism) and is obtained a system of differential equations. To study the vibration process mass model is considered as a system with one degree of freedom. The ways of origin of resonance, its definition and impact of friction forces on the work of mechanism are shown. Due the computer technology is carried out a dynamic analysis of crank- piston mechanism with clearances in kinematic pairs and elasticity of links. Is defined the elastic deformation of rod, depending on the stiffness and crank rpm. Due the comparative analysis of the ideal and real mechanisms are revealed and defined that for reliability and durability of piston mechanisms would be considered not only the optimal values of clearances in kinematic pairs and deformation of links, but also the structural, mechanical and physical -chemical state of materials, loads, kinematics, thermodynamics and lubrication. 16 ill. Bibl. 25. Engl.; sum. in Russian.

OPTIMAL POSITIONING OF A FOUR-BAR LINKAGES ON A KNEE EXTERNAL FIXATOR. **M. Donnici, G. Gatti, P.F. Greco, G. Danieli.** **"**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 29-37, (Engl.).

The paper presents the validation of a methodology for the optimal positioning of a planar mechanical system in order to reproduce knee kinematics in a limited range of motion. Such a mechanism could be effectively used in the design and placement of a moving external fixator for the knee joint articulation in either post-traumatic or pathological treatment and rehabilitation. The purpose is to help patient's recovery through a limited and occasional movement of the articulation without loading the injured area.

In order to validate the actual method, knee kinematics is estimated by measuring flexo-extension on an Endo Leg Flyer with Navi-Robot, a passively self balanced 6 DOF Navigator able to turn into a Robot of our design and construction.

Optimal positioning is obtained via least square methods minimization in which the error function has been evaluated imposing as constraint the possibility of pulling gently the ligament never allowing cartilage compression. 8 ill. Bibl. 24. Engl.; sum. in Russian.

MATHEMATICAL MODELING OF IMPACT INTERACTION PROCESS OF AGRICULTURAL MACHINES WORKING MEMBERS WITH FARM MATERIAL. **R. Makharoblidze, Z. Makharoblidze. "**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 38-42, (Engl.).

With taking into account the rheological properties of farm materials (soil, root and tuber crops, fertilizer, grain, etc.) is modeling the process of impact interaction on them of working bodies of machines. The design formulae of impact deformation and stresses values are derived. As rheological model of material is applied the basic law of linear deformation taking into accounts not only the elastic properties of materials, but also their viscous properties, as well as the propagation velocity of stress and strain. The results of the study would be used at the development of technological processes in agriculture and at calculation of the working bodies of working on the impact principle machines. Bibl. 3. Engl.; sum. in Russian.

REDUCTION OF UNIT FUEL CONSUMPTION AND TOXIC EMISSION IN FISHING FLEET ENGINES. **Oleh Klyus. "**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 43-47, (Engl.).

The results of tests of high speed diesel engines used in fishing boats and vessels was presents. The reduction of unit fuel consumption and exhausts toxic emission was possible by implementing preliminary fuel treatment that takes place directly in the fuel injector containing catalytic material. The catalyst works more effectively when fuel is turbulized in crossing fuel passages made in a part of the injector needle. Preliminary fuel treatment results in the average reduction of unit fuel consumption of those engines by 8%, while toxic emission of carbon and nitrogen oxides drops by 15%. 6 ill. Bibl. 5. Engl.; sum. in Russian.

PROPERTIES OF NOVEL HARD ALLOYS BASED ON BORIDES OF TRANSITION METALS. **A. Khvadagiani, M. Iremadze, D. Robakidze. "**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 48-51, (Engl.).

Are studied mechanical properties of hard alloys obtained on the base of borides of titanium and zirconium. Are studied the dependence of strength and hardness characteristics on the content of binding metal. 3 ill. Bibl. 3. Engl.; sum. in Russian.

ENTROPY PRODUCTION EQUATION FOR THE OPEN SYSTEM AS A THEORETICAL BASIS OF ENERGY GENERATION FROM HEAT ENERGY OF ENVIRONMENT - PHYSICAL FOUNDATIONS OF TORNADO TYPE PHENOMENON. **A. Aptsiauri. "**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 52-57, (Engl.).

In the article is shown that the equation of entropy production that lies at the basis of the entropy permanent growth principle and second law of thermodynamics, not only is not suitable for justification of the second law, but vice versa. It is caused by the fact that, for open and closed systems, this equation gives radically different results. It shows that the theory of Carnot is only a special case and open systems have the ability to generate useful

energy from the heat of the equilibrium space, which is particularly evident in the tornado. Thus, is given the theoretical basis (Ge-Theorem) for obtaining energy by the human from environment. 1 ill. Bibl. 10. Engl.; sum. in Russian.

RESEARCH OF SLIDING OF METAL CONCERNING ROLLS AT CROSS AND SCREW ROLLING. **T. Natriashvili, S. Mebonia, S. Iashvili, A. Gagnidze.** "Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 58-63, (Engl.).

The results of experimental research of influence of the tangential resistance of the mandrel-rod system of the piercing mill of metal sliding on rollrs. The values of the coefficients of tangential and axial sliding at different values of the moment of the tangential resistance of the mandrel-rod system are set up. Formulas are given for quantitative estimation of influence of tangential resistance of the mandrel-rod on the coefficients of tangential and axial sliding. 2 ill. Bibl. 6. Engl.; sum. In Russian

DEVELOPMENT OF CARRYING OUT OF EXPERTIZE AUTOMATED INFORMATION SYSTEM. **A. Katsadze. "**Problems of Mechanics". Tbilisi, 2014, № 1(54), pp. 64-69, (Engl.).

In the article is developed the idea of creation of carrying out automated information system that will be based on well-ordered set of documents and information technologies. On application of computers machinery and communication equipment due that will be realized the information process. Is proved that the efficiency and effectiveness of mentioned system would be provided due informatics, as well as due keeping the forensic tasks respondent principles that are related with information search for the information system, operation of information support system due that occurred functioning of these systems and creation of search - information fund. Bibl. 8. Engl.; sum. in Russian.