

## SUMMARIES

DYNAMIC RESEARCH OF CRANK-PISTON MECHANISMS WITH CLEARANCES IN KINEMATIC PAIRS AND ELASTICITY OF LINKS WITH CONCENTRATED MASSES. **N. Davitashvili, V. Bakhshaliev, V. Abaishvili.** “Problems of Mechanics”. Tbilisi. 2014, № 4(57), pp. 5-22, (Engl.).

In order for revealing of operational characteristics (clearance, deformation) on reliability and durability of mechanisms and machines in the paper is stated dynamic analysis of crank-piston mechanism with clearances in kinematic pairs and elasticity of links with concentrated masses. For full experimental research of operational characteristics of crank-piston mechanism due computer engineering on the first stage is studied mechanism with rigid links and concentrated masses and clearances. Then, by definition of compliance coefficients and deformation of coupler, the mass of that is concentrated in the three points, is compiled the dynamic model of system and are determined all desired parameters. The comparative analysis of ideal and real mechanisms is carried out. Is shown that for elastic links is necessary to select according stiffness that promotes to produce of mechanisms and machines the structural elements of that will be operated reliably and durably. 11 ill. Bibl. 5. Engl.; sum. in Russian.

MECHANICS OF ACTUATORS BASED ON MAGNETIC HYBRID MATERIALS WITH APPLICATIONS FOR ROBOTICS, FLUID CONTROL AND SENSOR TECHNOLOGY. **K. Zimmermann, I. Zeidis, V. Böhm, T. Kaufhold, T. Volkova, M. Krautz, A. Waske, M. Schrödner, J. Popp, M. Kästner, C. Spieler.** “Problems of Mechanics”. Tbilisi. 2014, № 4(57), pp. 23-41, (Engl.).

Magnetic hybrid materials have characteristics which enable engineers, natural and medical scientists to solve problems in technology and medicine with new approaches. The basic requirement for the development of this new kind of problem solution is a deep understanding of the interaction between the magnetic field and the mechanical characteristics of this smart material. Beginning with the characterization of the nanoparticle and the magneto-mechanical properties of the smart material the paper deals with the mechanics of new actuators, sensor systems and mechanisms for fluid control using magneto-sensitive material. All the mentioned innovations are developed by a model-based design followed by analytical investigations and/or numerical analyses. 18 ill. Bibl. 34. Engl.; Sum. in Russian.

NEW CONSTRUCTIONS OF LIGHTWEIGHT DEPLOYABLE REFLECTORS. **E. Medzmariashvili, N. Tsignadze, G. Bedukadze, M. Janikashvili, O. Tusishvili, L. Philipenko, N. Medzmariashvili, A. Jakhua, J. Santiago-Prowald, C. Manganot, K. Van't Klooster, H. Baier, L. Datashvili, L. Scialino.** “Problems of Mechanics”. Tbilisi. 2014, № 4(57), pp. 42-50, (Engl.).

Creation of large size, lightweight, rigid and precision reflectors is the problem that still remains in the field of space antennas. In recent years, a voluminous work has been being conducted jointly by the European Space Agency, Munich Technical University and Georgian Technical University aiming at finding out a new structural design. The structures of the rings having a new design circular double pantograph, conical V-fold bars, unfolding springs and electrical motors, and of the flexible, geometrically unchangeable center have been elaborated and theoretically and experimentally studied within the scope of the work. The researches and tests revealed pros and cons of the new constructions. In their entirety, the structures are rigid, precision, lightweight and are capable of controlling and managing the transforming processes. 14 ill. Bibl. 5. Engl.; sum. in Russian.

STABILITY OF RUBBER EDGE OF TEA-PLUCKING MACHINE FINGER AT COLLISION WITH A TEA SPROUT. **R. Makharoblidze, Z. Makharoblidze.** “Problems of Mechanics”. Tbilisi, 2014, № 4 (57), pp. 51-56, (Engl.).

Is obtained the condition of stability of the rubber finger edge and condition under which the rate of finger deflection increase will be maximal. Are derived design formulae of flexibility critical values, the length of half-wave and time from the load application before intensive buckling origination. Are indicates the ways of further improvement of the parameters of tea-plucking machine working body. Bibl. 7. Engl.; sum. in Russian.

CONFLICT CLASSICAL MECHANICS LAWS AT ROTATION AND THEORETICAL ISSUES OF GRAVITATIONAL ENGINE WORK. **A. Aptsiauri**. “Problems of Mechanics”. Tbilisi, 2014, № 4(57), pp. 57-64, (Engl.).

In this paper, based on analysis of the fundamental laws of mechanics, is shown that at the periodic, asymmetric rotation of a body in the gravitational forces, between the laws of conservation of energy and moments there is a clear conflict that can not be solved, if the gravitational fields does not affects with the other energy fields (vacuum energy or electromagnetic field). Consequently, are presented two schematic diagrams of installations that must continuously generate usable energy from the environment. 4 ill. Bibl. 4. Engl.; sum. in Russian.

DEVELOPMENT OF NEW DESIGN BEARER FOR FREIGHT CAR 18-100 MODEL BOGIE. **A. Sharvashidze, D. Gogishvili, K. Sharvashidze, M. Paturashvili**. “Problems of Mechanics”. Tbilisi, 2014, № 4(57), pp. 65-70, (Engl.).

In the article is stated developed new structure of horizontal bearer of two-axle bogie model 18-100 of gauge railways of 1520 mm. The bearer represents the box with two longitudinally arranged balls. The balls are performing only rotational motion related to axes of spatial coordinate system OXYZ at contact with bearer of freight car body. At touching occurs the rolling friction that virtually eliminates jamming of body on bogie at diagonal fitting on the bearers. For more smooth motion of carriage is proposed the presented structure with elastomer. Are defined the friction forces and movement forces drive moment on balls at touching with bearers of freight car. 2 ill. Bibl. 9. Engl.; sum. in Russian.

DIAGNOSIS OF FRONTWHEEL-DRIVE CAR TRANSVERSAL STABILITY. **M. Tevzadze, Z. Chkhartishvili, F. Mshvildadze**. “Problems of Mechanics”. Tbilisi, 2014, № 4(57), pp. 71-77, (Engl.).

Based on studies of car behaviour and stability, it has been determined that transversal stability should be considered as a multifactor one that means that among forceful and kinematic factors influencing the system “car-driver-road”, we should select those main ones, which have a significant impact on transversal stability. To this end, we have determined the dependences of car side slip and lateral movement on the movement speed and wheel-to-road adhesion coefficient during the movement of car in running-away and brake-applied mode on turn. There is developed the assessment method for the impact of dynamic characteristics of tire and suspension bracket on car transversal stability. 4 ill. Bibl. 3. Engl.; sum. in Russian.

POLYMER COMPOSITES WITH GRADIENT OF ELECTRIC AND MAGNETIC PROPERTIES. **J. Aneli, L. Nadareishvili, A. Akhalkatsi, M. Bolotashvili, G. Basilaia**. “Problems of Mechanics”. Tbilisi, 2014, № 4(57), pp. 78-84, (Engl.).

The character of variations of the local electric resistance of film polymer composites on the basis of polyvinyl alcohol with graphite powder from one side and the magnetic susceptibility of the same polymer with nickel nano-particles from another one have been studied. It is established that the changes of these parameters essentially depends on both initial shape of the films and on direction of their orientation. It is concluded that the films of gradiently anisotropic polymer composites may be used in electronics. 7 ill. Bibl. 7. Engl.; sum. in Russian.