

N^o4(53), 2013

SUMMARIES

DYNAMICS OF AN ELECTRICAL WINDOW REGULATOR SYSTEM **Xin Zhao, Sergey Petkun, Igor Zeidis, Klaus Zimmermann** "Problems of Mechanics". Tbilisi, 2013, 4(53), pp. 7-14, (Engl.).

A window regulator is the mechanism carrying out the function of opening and closing window glass in vehicle door. It is a vivid example of a mechatronic system, because it consists of mechanical components, electrical drive, electronic hardware, software and algorithms. As technical and commercial requests increases, its development method seeks for advancement, with a focus on improved understanding of the dynamic behaviour. In this paper, the transition process from start-up to the stationary state is studied. At first, a mechanical model is built. The model and the analysing process are valid for two cases. In one case, the friction force depends on the relative velocity of the elements of the system. In the second case, the friction force depends on the absolute velocity of one element. With the method of averaging, the two cases are processed respectively to obtain an analytical formula of the stationary amplitude of oscillations and the velocity of the center of mass. To prove the correctness, the exact and averaged systems are numerically computed and the stationary amplitude from the numerical solution is compared to an analytical formula, with the same typical parameter values from a real window regulator systems. In both cases, the values from two results are equal to each other. In the end, mechanical interpretations of the results are discussed. 4 ill. Bibl. 5. Engl.; sum. in Russian.

RESEARCH INFLUENCE OF OPERATIONAL CHARACTERISTICS ON KINEMATICS AND DYNAMICS OF CRANK-PISTON MECHANISMS. **N. Davitashvili, S. Bliadze, V. Abaishvili, A. Janelidze.** "Problems of Mechanics". Tbilisi, 2013, 4(53), pp. 15-61, (Engl.).

The investigation of operational characteristics influence on the kinematics and dynamics parameters of crank- piston mechanism is stated. For the full dynamic analysis of real mechanism is carried out the study of influence of friction, clearance, deterioration, impact, cracking and deformation on the mechanism. The results obtained in theoretical researches and by computer technology, represents the reference materials, based on that is carried out the comparative analysis of kinematic and dynamic parameters of ideal and real mechanisms. Is defined the character of all operational characteristics on mechanism elements motion, on change of reaction forces in the kinematic pairs and on the law of the crank motion. Is defined that to maintain the constant angular velocity of the crank of mechanism and reduce the reaction forces in kinematic pairs, it is necessary depending on the reaction forces in pairs to define and determine the magnitude of optimal clearance that provide reliable and long-term operation of crank- piston mechanisms as well as piston machines. 26 ill. Bibl. 9. Engl.; sum. in Russian.

DYNAMICS OF CUTTING-GRINDING AND HARVESTING UNIT OF PLANT MATERIA **R. Makharoblidze, Z. Makharoblidze** "Problems of Mechanics". Tbilisi, 2013, 4 (53), pp. 62- (Engl.).

On the case of combined unit for simultaneous cutting, grinding and harvesting of plant material is researched the dynamics of transition processes with taking into account the gradually adding the mass of grinded plant material in the hopper of experimental machine. Is derived the design formula of change of travel velocity with consideration of tractor engine and technological machine's parameters due gradual adding of plant material mass in the hopper. 1 ill., Bibl. 3. Engl.; sum. in Russian.

ON STRUCTURAL ANALYSIS AND SYNTHESIS OF TRANSFORMABLE SYSTEMS WITH REGULAR ELEMENTS. **V. Gogilashvili, Sh. Tserodze, M. Sanikidze, O. Tusishvili, M. Nikoladze, L. Filipenko, A. Tsiklauri.** "Problems of Mechanics". Tbilisi, 2013, 4(53), pp. 68-75, (Engl.).

In the work is considered tasks of structural analysis and synthesis of transformable systems with regular elements in interrelation with position function. With taking into account the constructive features is presented rational structural schemes using a variety of regular structural elements. 9 ill. Bibl. 4. Engl.; sum. in Russian.

METHODICAL FRAMEWORK OF VIBRO-SIMULATORS' APPLICATION AND ASSESSMENT CRITERIA FOR VIBROSTIMULATION PARAMETERS' ADEQUACY. **M. Tsulaia.** "Problems of Mechanics". Tbilisi, 2013, 4(53), pp. 76-81, (Engl.)

Present article provides description of test desk for study of local vibration effect influence to the human body and determines vibration parameters for effective assessment of adequacy of vibro-simulators utilized in action. 7 ill., Bibl. 3, Engl., sum. in Russian.

ON ISSUE OF PARAMETRIC SYNTHESIS OF VESSEL COURSE CONTROL SYSTEM. **T. Mchedlishvili, R. Diasamidze, I. Romanadze, T. Diasamidze.** “Problems of Mechanics”. Tbilisi, 2013, 4 (53), pp. 82-86, (Engl.).

In the previous works had considered a general scheme of synthesis procedures of follower-up rudder control system with taking into account the elasticity of mechanical part of drive, in that the synthesis of the inner contour with rigid links in the given design diagram is analyzed in general terms.

In the present work is considered a detailed diagram of the system's inner contour synthesis by the given transients processes, as well as are obtained initial dependencies for the subsequent implementation of parametric synthesis in the whole course control system. Bibl. 4. Engl.; sum. in Russian.

THE PRESENT AND LONG-TERM TECHNICAL PROBLEMS OF EXPLOITATION OF TECHNOLOGICALLY ADVANCED DIRECT INJECTION DIESEL SYSTEMS. **S. Olszowski.** “Problems of Mechanics”. Tbilisi, 2013, 4(53), pp. 87-92, (Engl.).

The work discusses both present day and long-term technical problems of exploitation of technologically advanced Common Rail diesel oil direct injection systems in terms of their functionality and the natural environment protection. The article covers theoretical studies as well as practical solutions of complex questions of technical exploitation of new generation of injecting systems. Electronic Diesel Control system together with co-operation of classified CR injectors and particular matter filter, ecological-exploitation problems, control parameters and statistic faults. Issues mentioned are an important aspect of a future every-day life, taking into consideration the fact that, according to statistic data, while presenting hitherto tempo of transportation development in 2020 the amount of cars in the world will reach 1.2 billion, which is twice more than now. 1 ill. Bibl. 10. Engl.; sum. in Russian.

DIAGRAMS OF STIFFNESS CHARACTERISTICS IN CROSS-SECTIONS OF DEPLOYABLE PANTOGRAPH SYSTEM IN TRANSFORMATION PROCESS. **Sh. Tserodze, N. Tsignadze, O. Tusishvili, M. Nikoladze, A. Chaphodze, N. Medzmariashvili, A. Gudushauri.** “Problems of Mechanics”. Tbilisi, 2013, 4(53), pp. 93-98, (Engl.).

The application of pantograph type force ring in antenna engineering is rather topical. This is stipulated by their natural synchronization and high stiffness. The especially topical is their application for space satellite complexes, in that rather high are requirements for stiffness of structure. In our case is possible the application of additional v-rods due that is possible the final stressing/locking of system.

In the article are presented diagrams of change of moments of inertia in cross-sections of space reflector pantograph type force ring in developing process. 7 ill. Bibl. 4. Engl.; sum. in Russian.

METHOD OF ANALYSIS OF THREE-LAYERED PLATES WITH ANCHOR LINKS BETWEEN LAYERS ON STABILITY AND DEFORMABILITY. **G. Kipiani, A. Okroshidze.** “Problems of Mechanics”. Tbilisi, 2013, 4(53), pp. 99-103, (Engl.).

Grounded on the applied analytical method with application of various functions are solved tasks on mode of deformation of three-layered panels with discrete, ribbed and anchor ties, are considered discrete arrangement of ribs. The whole three-layered panel is considered as integrated system with discontinuous parameters as ribs. The applied method is specified for various variants of boundary conditions, for taking into account the local stresses concentration due impact of point ties and reinforcement bar for consideration of arbitrary modes of external loading. Bibl. 6. Engl.; sum. in Russian.

IMPROVEMENT OF TECHNOLOGICAL PROCESS OF FREIGHT CARS RUNNING PARTS REPAIR FOR CARRIAGE'S ASSEMBLY WORKSHOP CONTINUOUS OPERATION. **A. Sharvashidze, M. Paturashvili, Z. Paturashvili, D. Gogishvili.** “Problems of Mechanics”. Tbilisi, 2013, 4(53), pp. 104-107, (Engl.).

The issues of improvement of technological process of freight carriages bogies in depot are considered. Is developed the scheme and technological schedule of freight carriages bogies repair from continuous providing of operation of power carriages assembly workshop with four flow-line - conveyor lines specialized on one type of freight carriages – boxcar, barrel, gondola car, flatcar. 2 ill. Bibl. 4. Engl.; sum. in Russian.