

## SUMMARIES

ANALYSIS OF REFERENCES OF THE FRICTION SCIENCE. **N. Davitashvili**. "Problems of Mechanics". Tbilisi, 2021, № 3(84), pp. 7-49, (Engl.).

Are stated: the analysis of development of science on friction in XVI-XVIII centuries as well as in the beginning of XIX century; researches of XX century and tasks of mechanics with consideration of friction; analysis of XX century on molecular theory of friction and on physical processes that accompanies dry friction; influence of various factors on values of friction force and review of works on research of problems of friction in hinged-lever mechanisms. 11 ill. Bibl. 255. Engl.; sum. in Russian.

MODEL-BASED INVESTIGATIONS OF FORCE DETECTION BY MONITORING THE DEFORMATION STATE OF A COMPLIANT MECHANISM. **A. Griebel, S. Henning, S. Griebel, F. Schale, T. Fröhlich, H. Töpfer, L. Zentner**. "Problems of Mechanics". Tbilisi, 2021, № 3(84), pp. 51-62, (Engl.).

A strong, long-lasting pressure on the human skin whose effect is increased by shear forces can lead to the development of a pressure ulcer (decubitus). In order to minimize the risk of pressure ulcers developing, critical forces acting between the body and a sitting or lying surface should be detected and eliminated in time. One possibility for detecting critical forces is the actuation of tactile switches. In this article, miniature tactile switches are integrated into a compliant mechanism using the example of a MAT-F1 mattress spring made by Hartmann Kunststofftechnik GmbH & Co. KG. For this purpose, the deformation behavior of the spring is analyzed by means of non-linear analytical and finite elements method (FEM) calculations and the required tactile switches parameters as well as suitable locations for their placement are determined. A functional model is then built and examined. 10 ill. Bibl. 25. Engl.; sum. in Russian.

RANDOM PRODUCTION FACTORS AND THEIR INFLUENCE ON THE MILLING PROCESS. **M.E. Iremadze, A.I. Khvadagiani**. "Problems of Mechanics". Tbilisi, 2021, № 3(84), pp. 63-68, (Engl.).

The analysis of the influence of random production factors on the milling process was carried out. The variation of the quality characteristics of the machined surface during the face milling is most influenced by the wobbling of the cutter teeth. A new original design of the face-milling cutter was developed. 2 ill. Bibl. 14. Engl.; sum. in Russian.

DEVELOPMENT OF A CAR CHASSIS WITH ON-BOARD GEAR BOXES. **R. Phartskhaladze, M. Sharmiashvili, V. Margvelashvili, S. Mebonia**. "Problems of Mechanics", Tbilisi, 2021, № 3(84), pp. 69-75, (Engl.).

In the article, a new design of the vehicle's on-board transmission is developed. The calculation and preliminary design of the on-board gearboxes of the front and rear axles is carried out. It is shown that gearboxes with a two-thread cylindrical spur gear provide the necessary power in the required dimensions, but high accuracy requirements greatly increase their cost. On-board gearboxes with internal gearing gears meet all the design requirements and meet all the conditions for checking the accuracy of the gearing. 4 ill. Bibl. 12. Engl.; Sum. In Russian.

THE PROSPECT OF USING GAS TURBINES IN HYBRID VEHICLES. **Michael Ben Chaim, Efraim Shmerling, Itsik Sapir.** "Problems of Mechanics", Tbilisi, 2021, № 3(84), pp. 77-83, (Engl.).

The paper is devoted to assessing the prospects of reducing fuel consumption in hybrid vehicles by replacing diesel engines with gas turbines, taking into account the progress recently made in improving the efficiency of the latter. Possible reduction in fuel consumption is estimated separately for three vehicle classes in accordance with their total mass (light, medium and heavy). In each class, different engine power ratings were considered as well. Fuel consumption estimates are obtained for urban driving utilizing a recently proposed model, incorporating specific vehicle parameters. The results indicate that for light vehicles with arbitrary engine power rating and mid-sized vehicles whose engine power does not exceed 50 kW, transition to gas turbines leads to substantial fuel consumption reduction. On the other hand, for heavy hybrid vehicles with engines rated below 50 kW, transition to gas turbines leads to a lower but still significant fuel consumption reduction. 1 ill. Bibl. 21. Engl.; sum. in Russian.

INFLUENCE OF THE BAN ON THE USE OF VEHICLES WITH INTERNAL COMBUSTION ENGINES (ICE) ON ENVIRONMENTAL POLLUTION. **Itsik Sapir, Michael Ben Chaim, Doron Grenberg.** "Problems of Mechanics", Tbilisi, 2021, № 3(84), pp. 85-91, (Engl.).

The article presents a problematic scenario of gasoline price reduction due to successful Electric Vehicle (EV) market penetration. First, we examine the EV and plug-in hybrid (PHEV) market today to find that it is ready to replace ICEs in scenarios of short urban and suburban trips of 150 km. We simulated a 150 km trip in terms of marginal cost of air pollution, assuming gasoline as the sole energy source for all 3 options. We found that even in this hypothetical scenario, a reduction of 62% in air pollution cost is possible, which implies that it is possible to achieve even more significant reduction of air pollution costs by using a less polluting energy source for electric generation of EVs and PHEVs. Finally, we suggest some new regulations for the energy market in order to allow a smooth transition to EVs. 1 ill. Bibl. 7. Engl.; sum. in Russian.

ENERGY STUDY OF PLANT ROOT SYSTEM FRAGMENTATION. **R. Makharoblidze, Z. Makharoblidze.** "Problems of Mechanics". Tbilisi, 2021, № 3(84), pp. 93-96, (Engl.).

As most energy-intensive and time-consuming operation in the technological cycle of agricultural-technical works during the rehabilitation of agricultural lands is considered the realizing the soil from plant roots. To study the process of fragmentation in the soil of the root system of plants, the working process of the cutting body of the unit is considered. The root system fragmentation process is researched taking into account the geometric parameters of the cutting machine and the dynamic characteristics of the unit. Design expressions of the work done on the fragmentation of the plant root system and the consumed capacity are obtained. 1 ill. Bibl. 2. Engl.; sum. in Russian.

STABILITY OF SANDWICH PLATES WITH CUTS AND HOLES. **G. Kipiani, M. Rajczyk, B. Churchelauri.** "Problems of Mechanics". Tbilisi, 2021, № 3(84), pp. 97-103, (Engl.).

On the basis of the theory of thin plates and using elements of the theory of generalized functions, the problem of determining the critical compressive load on a sandwich rectangular plate with a through cut is solved. The method of accounting for a single cut, of limited length, parallel to one of the sides of a rectangular plan, extends to accounting for a rectangular cut or hole, since four cuts can form a closed quadrangular contour, and, therefore, simulate a hole. By different selection of approximating functions, it is also proposed to take into account different types of boundary conditions. 3 ill, Bibl. 10. Engl.; sum. in Russian.