16. Chigirinsky, V. Development of dynamic model of transients in mechanical systems using argument-functions / V. Chigirinsky, A. Putnoki // Easten-European Journal of Technologies. Applied mechanics. - 2017. - №3/7(87). - p.11-21.

17. Синекоп, Н. С. Метод R–функций в динамических задачах теории упругости / Н. С. Синекоп, Л. С. Лобанова, Л. А. Пархоменко // Х.: ХГУПТ. – Харьков, 2015. – 95 с.

18. Чигиринский В.В. Метод решения задач теории пластичности с использованием гармонических функций / В.В. Чигиринский // Изв вузов. Черная металлургия. – 2009. – №5. – С. 11–16.

19. Chigirinsky, V. V. Determination of integral characteristics of stress state of the point during plastic deformation in conditions of volume loading [Text] / V. V. Chigirinsky, A. A. Lenok, S. M. Echin // Metallurgical and Mining Industry "International scientific conference. Reliability of technologic equipment" RSTE–2015. – Dnipropetrovs'k, 2015. – №11. – P. 153–163.

FORECASTING OF TECHNICAL CONDITION PARAMETERS FOR COMPLEX ELECTROMECHANICAL SYSTEMS

ZIBOROV Kirill[1], FRANCHUK Vsevolod[1], PROTSIV Vladimir[1], FEDORIACHENKO Serhii[1], PISMENKOVA Tetiana[1] & ADEL Akbarimajd[2]
[1]National Mining University, Dnipro, Ukraine
[2]University of Mohaghegh Ardabili, Ardabil, Iran

Purpose. Estimation of technical condition parameters for complex electromechanical systems.

Methodology. The studies were carried out through consideration of power and kinematic parameters in the nonstationary motion of the wheel, and also through analyzing the interaction of a wheel and a rail on an elementary contact section in the presence of a normal and shear load.

Findings. Determination of the functional connection of the power (tangential reaction) and kinematic (relative slip) parameters in the nonstationary motion of the wheel is the subject of the paper. A mathematical model is proposed for the interaction of a wheel and a rail on an elementary contact section in the presence of a normal and shear load. The influence of the regime parameters of the contacting bodies on the coefficient of the shape with the moving point of contact is considered for interacting bodies. The functional relationship between the power and kinematic parameters is established, which allows predicting the operational properties and solve the problems of the dynamics of the rail transport with a higher degree of accuracy. Knowledge of the processes physics occurring in the contact area of the wheel-rail pair will increase the efficiency of torque transmission in the quasi-stationary mode during vehicle movement.

Keywords: tangential reaction, point of contact, creep, stress

References

1. Protsiv, V.V., Ziborov, K.A., Fedoriachenko, S.A. (2013). On formation of kinematical and dynamical parameters of output elements of the mine vehicles in transient motion, Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (4), 65–70

2. Ziborov, K.A., Protsiv, V.V., Blokhin, S.Ye., Fedoriachenko, S.O. (2014) Applicability of computer simulation while designing mechanical systems of mining rolling stock, Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (6), 55–59.

3. Franchuk, V.P., Ziborov, K.A., Krivda, V.V., Fedoriachenko, S.O. (2017). On wheel rolling along the rail regime with longitudinal load , Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu (3), 62–67

4. Franchuk, V.P., Ziborov, K.A., Krivda, V.V., Fedoriachenko, S.O. (2018). Influence of thermophysical processes on the friction properties of wheel - rail pair in the contact area , Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (2), 46-52.

5. Kolosov, D., Dolgov, O., Kolosov, A., 2013. The stress-strain state of the belt on a drum under compression by flat plates. Annual Scientific-Technical Collection – Mining of Mineral Deposits, pp. 351-357.

6. Belmas, I.V., Kolosov, D.L., Kolosov, A.L., Onyshchenko, S.V., 2018. Stress-strain state of rubber-cable tractive element of tubular shape. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, № 2, pp. 60-69.

7. Kolosov, D., Bilous, O., Tantsura H., Onyshchenko, S., 2018. Stress-strain state of a flat tractive-bearing element of a lifting and transporting machine at operational changes of its parameters. Solid State Phenomena, Vol. 277, pp. 188-201.

8. Ziborov K.A.,Protsiv V.V., Fedoriachenko S.O., Verner I.V. (2016). On Influence Of Design Parameters Of Mining Rail Transport On Safety Indicators, Mechanics, Materials Science & Engineering, (2), 63-70.

9. K.M. Bas, V.V. Kravets, K.A. Ziborov, D.A. Fedoriachenko, V.V. Krivda, S.A. Fedoriachenko, I.O. Kornilenko (2016). Mathematical Models of Hybrid Vehicle Powertrain Performance, Mechanics, Materials Science & Engineering, (7), 154-164.

10. Samusia, V. I., Oksen, Y. I. and Radiuk, M. V., (2013).Heat pumps for mine water waste heat recovery, Annual collection of scientific-technical papers “Mining of mineral deposits”, pp. 153–157. DOI: 10.1201/b16354-27

11. Semrad, K., Cernan, J. and Draganova, K., (2016). Rolling Contact Fatigue Life Evaluation Using Weibull Distribution, Mechanics, Materials Science & Engineering, (3), pp. 28-34.

12. Matsyuk, I. and Shlyahov, E., 2015. The research of plane link complexstructure mechanisms by vector algebra methods, Eastern European Journal of Enterprise Technologies, 3(7), pp. 34-38.

13. Matsyuk, I.M., Morozova, T.I. and Shlyahov, E.M., 2017. Search of variants of assemblies of structural groups in planar linkages. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 2, 65-69.

14. Matsyuk I.N., Shlyahov E.M. and Yehurnov O. I., 2018. Some aspects of synthesis of linkage of complex structures. Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, 3, 57-63.

15. Protsiv, V. V. and Monya, A. G., (2003). Experimental determination of characteristics of clutch of mine locomotive under the braking conditions, Metallurgicheskaya i Gornorudnaya Promyshlennost, (2), 95-97.

16. Salov, V.O., Pismenkova, T.O., (2012). Formation of principles of new generation educational standards , Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu, (6), 130-136.

INFLUENCE OF TANGENTIAL CUTTING FORCE ON A STRESS STATE OF GRINDING INSTRUMENT

TANTSURA Ganna, VINNICHENKO Ye.,
KOVALENKO A. & NAZARENKO O.
Dniprovsk State Technical University, Ukraine

Purpose. Estimation of influence of tangential cutting force on a stress state of grinding instrument.

Methodology. The averaging of mechanical properties of composite material was carried out by Voigt. The studies were carried out through analysis of a grinding wheel stress state for cases of application of concentrated force and a force distributed linearly along the length of a crystal.

Findings. Stress condition of a grinding tool, as a composite of abrasive grains, connected into a single structure by a special jointing material in a case of being subjected to the action of a concentrated tangential cutting force on it is determined. The averaging of mechanical properties of composite material was carried out by Voigt. Analytical expressions of parameters of a stress state of the grinding wheel for cases of application of the concentrated force, the force distributed linearly along the length of a crystal, and the stress from occurrence of the overturning moment as a result of eccentric loading, were obtained in a closed form. Application of the jointing material with higher values of the Poisson's ratio leads to higher maximum stresses in the material for unchanged other quantities. In a general case, the application of the jointing material with higher values of the Poisson's ratio leads to a decrease in endurance of the jointing material and a time decrease until the crystals fall out. Noted phenomenon can be used for timely renewal of cutting edges of the tool. Established stress distributions, analytical dependencies for their determination provide the possibility of predicting the