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FORECASTING OF TECHNICAL CONDITION PARAMETERS FOR COMPLEX ELECTROMECHANICAL SYSTEMS

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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

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

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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