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About constructing a nonlinear model for optimization of physical-mechanical parameters for the mode of hardening complex metal coatings

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Developmental methods for hardening the working surface of cutting machines presume complex physics-chemical processes (PCP). These are still the issues in formalization/processing the respective mathematical models. We considered the con-ceptions in development of tribological problems. Hence the issue of forming the function of metal coating physics-mechanical properties for the mode of hardening is solved in this context. Deter-mined are the strong analytical interpretations of the interconnected conditions, which define an optimal mode of the PCP given by nonlinear constraints providing adequacy of the PCP model to the data of tribological tests. So, the problem is solved for multicriterial identification (by the least squares method (LSM)) of coordinates of covariant tensors in the PCP equation as a multidimensional regression with a minimum tensor norm. So a nonlinear multidimensional regression-tensor model is constructed and investigated to the end of grounding (necessary and sufficient conditions are implied) of an optimal mul-tifactor physics-chemical process of hard-ening metal coatings. A robust-adaptive strategy of rational forming the goal func-tion of physics-mechanical quality of metal working is proposed. The results obtained may form a methodological ground in constructing the systems of computer-aided design, technologies of hardening surfaces of complex composite fabricated metal products of the basis of complex tribological tests.

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