Запись 1 из 4

Название: Influence of the Cut Axial Depth on Surface Roughness at High-Speed Milling of Thin-Walled Workpieces

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Источник: SCIENCE & TECHNIQUE **Том:** 20 **Выпуск:** 2 **Стр.:** 127-131 **DOI:** 10.21122/2227-1031-2021-20-2-127-131 **Опубликовано:** 2021

Аннотация: The paper presents the results of research on the dynamics of end milling of thin-walled work-pieces having complex geometric shapes. Since the milling process with shallow depths of cut is characterized by high intermittent cutting, the proportion of regenerative vibrations decreases, and the effect of forced vibrations on the dynamics of the process, on the contrary, increases. The influence of axial depth of cut on the vibrations arising during processing, and roughness of the processed surface have been studied in paper. The experiments have been carried out in a wide range of changes in the spindle speed at different axial cutting depths. Vibrations of a thin-walled work-piece have been recorded with an inductive sensor and recorded in digital form. Then an oscillogram has been used to estimate the amplitude and frequency of oscillations. The profilograms of the machined surface have been analysed. Roughness has been evaluated by the parameter Ra. The results have shown similar relationships for each of the investigated axial cutting depths. The worst cutting conditions have been observed when the natural vibration frequency coincided with the tooth frequency or its harmonics. It is shown that the main cause of vibrations in high-speed milling is forced rather than regenerative vibrations. Increasing the axial depth of cut at the same spindle speed increases the vibration amplitude. However, this does not significantly affect the roughness of the processed surface in cases when it comes to vibration-resistant processing.

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Запись 2 из 4

Название: INCREASING THE EFFICIENCY OF MODELING THE ENERGY CHARACTERISTICS OF NANOCLUSTERS

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Источник: JOURNAL OF PHYSICAL STUDIES **Том:** 25 **Выпуск:** 1 **Номер статьи:** 1001 **DOI:** 10.30970/jps.25.1001 **Опубликовано:** 2021

Аннотация: Context. The paper presents a computational scheme and a number of techniques for increasing the efficiency of mathematical modeling of the energy characteristics of metal clusters with vacancies. The object of the research is the process of calculating wave functions and finding eigenvalues using the Numerov and the shooting methods.
Objective. The objective of the research is to improve the quality of the calculation of the wave functions of electrons in a metal cluster by using optimally selected methods and techniques in the computational scheme, to ensure the adequacy, stability and cost-effectiveness of self-consistent calculations of the energy characteristics of metal clusters by limiting the change in the electrostatic potential within a single iteration, choosing the optimal integration step and data presentation format.
Method. At the modeling stage, to increase the efficiency, the electron Density Functional Theory was used in conjunction with the Kohn-Sham version for the stabilized jellium model taking into account the local density approximation for calculating the energy characteristics of nanoclusters. At the simulation stage, the one-electron wave function was calculated by "stitching" it from two parts at an empirically selected point with normalization before and after the procedure. A number of techniques have been developed to improve the quality of the simulation: calculating the optimal step, limiting changes in the electrostatic profile, managing the resulting data arrays, etc. For calculations on a supercomputer, the distribution between the flows was carried out.
Results. At the modeling stage, economic models of the metal sphere with a vacancy in the center were developed. For the simulation stage, a method of stable two-sided calculation of the wave function using the shooting and the Numerov methods with the optimal step has been developed. The full computational scheme for the simulation is implemented in C ++ for calculation on a PC and on a supercomputer. The simulation results were compared with the ab-initio calculation data and experimental data for Cs, Rb, K, Na, Li, Mg, and Al clusters with and without vacancies (calculation error < 15%).
Conclusions. The developed computational scheme and modeling technique allow increasing the simulation efficiency and obtaining adequate energy characteristics of metal spherical nanoclusters with and without vacancies. Further research might focus on the modification of models and simulation techniques for the study of layered nanoscale systems.

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Запись 3 из 4

Название: IMPLEMENTATION OF THE INDICATOR SYSTEM IN MODELING OF COMPLEX TECHNICAL SYSTEMS

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Источник: RADIO ELECTRONICS COMPUTER SCIENCE CONTROL **Выпуск:** 1 **Стр.:** 117-126 **DOI:** 10.15588/1607-3274-2021-1-12 **Опубликовано:** 2021

Аннотация: Context. The problem of determining the optimal topology of a neuromodel, which is characterized by a high level of logical transparency in modeling complex technical systems, is considered. The object of research is the process of applying an indicator system to simplify and select the topology of neuromodels.
Objective of the work is to develop and use a system of indicators to determine the level of complexity of the modeling problem and gradually select the optimal logically transparent topology of the neuromodel.
Method. A method is proposed for selecting an optimal, logically transparent neural network topology for modeling complex technical systems using a system of corresponding indicators. At the beginning, the method determines the overall level of complexity of the modeling task and, using the obtained estimate, determines the method for further optimization of the neuromodel. Then, using Task data and input data characteristics, the method allows to obtain the most optimal structure of the neural model for further modeling of the system. The method reduces trainingvtime and increases the level of logical transparency of neuromodels, which significantly expands the practical use of such models, without using neuroevolution methods, which may not be justified by resource-intensive tasks.
Results. The developed method is implemented and investigated in solving the problem of modeling the dynamics of pitting processes of steel alloys. Using the developed method made it possible to reduce the training time of the model by 22%, depending on the computing resources used. The method also increased the level of logical transparency of the model by reducing the number of computing nodes by 50%, which also indicates faster and more efficient use of resources.
Conclusions. The conducted experiments confirmed the operability of the proposed mathematical support and allow us to recommend it for use in practice in the design of topologies of neuromodels for further solving modeling, diagnosis and evaluation problems. Prospects for further research may consist in the development of methods for structural optimization of previously synthesized models and the development of new methods for feature selection.

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Запись 4 из 4

Название: Construction Development and Its Impact on the Construction Enterprises Financial Results

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Источник: ESTUDIOS DE ECONOMIA APLICADA **Том:** 39 **Выпуск:** 3 **DOI:** 10.25115/eea.v39i3.4719 **Опубликовано:** 2021

Аннотация: The article aims to monitor the construction development dynamics in Ukraine in recent years and substantiate its impact on the construction enterprises' financial results in general. The existing factors of development of construction in Ukraine are analyzed. The following groups: political, raw, industrial, environmental, consumer, infrastructure and investment, macroeconomic, financial, social, and innovative are identified. The influence of the factors mentioned above on the financial results of construction enterprises activity and the generating factors - income and expenses- is revealed. It was established that construction has become more active in recent years, with the highest residential and non-residential construction rates and the engineering structures construction in 2016, which were observed in Kyiv. Each year, the largest capital investments are characterized by engineering structures, in contrast to residential and non-residential buildings. The maximization of income and cost minimization make for improving the efficiency of the management of construction enterprises, which represents their ultimate goal. The conducted research gives reasons to state the significant role of the country macroeconomic environment in the construction enterprises functioning and the purport of their financial results. Construction development directions in the present conditions, the methodology, and construction enterprise accounting organization are covered.

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