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Keywords*: hybrid intelligent system, neural network, expert system, identification, pattern recognition theory, wavelet transform, eddy current sensor, defects*

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Keywords: *processor, cooling, mathematical modeling, thermal mode control*

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application of the developed mathematical model in optimization of the design and operating modes of the equipment is shown.

Keywords: *resistance electric furnace, regulation, automatic control system, model, temperature*

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Abstract. *The article deals with application of the series of ISO 16610 standards for filtering profile and surface structures. Analysis of the profile morphological filters in line with ISO 16610-41:2015 is presented. Morphological filters are non-linear and robust, and effectively complement the Gaussian filters. Advantages of morphological filters include simple elimination of end effects and absence of necessity for prior elimination of the form component from the profile. Therefore, it is advisable to use them for the analysis of multifunctional surfaces. The variable symmetrical filter in accordance with ISO 16610-49:2015 expands the filtering possibilities. By interchanging opening and closing morphological operations, it is possible to obtain various suppression degrees for profile valleys and peaks. The asymmetric morphological filter is most promising due to its various embedding indices for combinations of opening and closing operations. Currently, the asymmetric morphological filter is not standardized. Therefore, correlation of the embedding indices is so far a challenging issue.*

Keywords: *measurement, surface metrology, roughness, filtration, profile filter, morphological filter*

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Keywords: *rolled products, scale, methods, methods, technology*

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Abstract. *Aluminum and its alloys are most effective in aviation, mechanical engineering and electrical engineering. Effects of beryllium on the anodic behavior of the Al+1,0 % Si alloy in the NaCl electrolyte medium of various concentrations was studied using the potentiostatic method at the potential sweep rate of 2 $mV \cdot s^{1}$. The results of the research show that beryllium additives reduce the rate of anodic corrosion of the parent alloy by 15-20 %.*

Keywords: *Al+1,0 % Si alloy, beryllium, anodic behavior, pitting potentials, repassivation, corrosion rate, corrosion current density*

I.N. Ganiev, M.Ch. Shirinov, N.S. Olimov, N.F. Ibrokhimov

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Abstract. *In the «cooling» mode, the temperature dependence of the heat capacity, heat transfer coefficient and changes in thermodynamic functions (enthalpy, entropy, Gibbs energy) of the AK9 aluminum alloy modified with alkaline earth metals was studied. The research has shown that with an increase in the concentration of the modifying component and temperature, the specific heat capacity, enthalpy, and entropy of the alloys increase, whereas the value of the Gibbs energy decreases. The enthalpy and entropy of the alloys increase in the transition from alloys with calcium to alloys with strontium, and decrease to alloys with barium. The value of the Gibbs energy in this case has an inverse relationship.*

Keywords: *aluminum, AK9 alloy, magnesium, calcium, strontium, barium, heat capacity, thermodynamic functions, enthalpy, entropy, Gibbs energy*

I.V. Zlobina, D.I. Kusnetsov, A.D. Lysov,
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Keywords: *polymer composite materials, ultrasound, low-amplitude loading, strength, ultimate stress, bending, temperature, number of loading cycles*

V.F. Pulin, E.V. Ryzhova, T.Yu. Surinskaya, O.V. Pulin, P.M. Elkin

QUANTUM CHEMICAL STUDIES OF THE DYNAMICS OF BORAZINE AND BORAZOTE COMPOUNDS USED IN THE PRODUCTION OF RESISTANT POLYMERS

Abstract. *It has been for the first time that quantum chemical research into dynamics of borazine and borazote compounds in the anharmonic approximation has been conducted to produce resistant polymers.*

Keywords: *cyclic compounds, anharmonicity, dynamics, borazines, polymers*