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Yu.Yu. Boldyreva, E.V. Khvorostukhina

DEVELOPMENT OF A SCHEME TRANSLATOR INTO PROMELA LANGUAGE

Abstract. *This paper describes the process of developing a prototype of the web service «Schema2Promela». This tool is a combination of a diagram editor and a translator. It will allow you to create a diagram to a model of a program or other technical system using visual blocks, and translate the created diagram into the Promela language in order to check this diagram with the SPIN tool. In this work we describe the specification of the language, functionality of the schema editor and the main points of the coding of the translator. Particular attention is paid to testing the service and analyzing the results.*

Keywords: *visual programming, visual diagram, schema, model, translator, automata programming, engineering system, SPIN, Promela, verification*

M.A. Ignatiev

AN OVERVIEW OF MACHINE LEARNING METHODS IN IDENTIFYING THE TYPE OF DEFECTS USING AN EDDY CURRENT SIGNAL

Abstract. *The article considers application of machine learning methods developed to solve the problems with identifying the types of defects in the surface layer of bearings by an eddy current signal. Descriptions of classification methods for machine learning are provided.*

Keywords: *eddy current control, monitoring, defect detection, classification problem, machine learning, quality control*

V.V. Mironov, A.Yu. Godlevsky,

D.A. Kuznetsov, R.S. Pakhtusov, A.S. Zaitsev

APPLICATION OF ACOUSTIC TOMOGRAPHY IN DEFINING LINEAR DIMENSIONS OF THE OUTLET OF THE BRANCH PIPE OF TEE WELDED JOINTS IN THE MAIN GAS PIPELINE

Abstract. *It is stated that since 1946, in the course of construction of the majority gas pipelines in Russia, all the necessary requirements relating the route for unhindered passage of in-line flaw detectors were not provided, and installation of tee welded joints was carried out without proper control of the branch outlet into the main line. A method for identifying linear dimensions of the outlet of the branch pipe of tee welded joints into the main gas pipeline using ultrasonic flaw detectors based on the principle of acoustic tomography and an algorithm for its practical implementation that allows automation of the process is proposed and experimentally verified.*

Keywords: *direct insertion, tee welded joint, acoustic tomography, diagnostic automation*

E.M. Samoylova

ADAPTING THE ASPECTS OF THE SYSTEM APPROACH TO THE CONDITIONS OF INTEGRATED PRODUCTION

Abstract. *The paper considers adaptation of aspects of the system approach to the conditions of integrated production, taking into account the basic concepts of the general theory of systems and development of aspects and principles of the classical system approach in combination with the basic concepts of component integration, which allows for qualitative transformations within each element of the system aimed at the final transformation into the integrated system approach.*

Keywords: *system approach, adaptation, intelligent technologies, integrated production, technological system*

E.V. Zakharova, A.V. Korolev

MATHEMATICAL MODELING THE EFFECTS OF THE CONTACT ANGLE OF A BEARING ON THE STATIC LOAD CAPACITY

Abstract. *A mathematical model has been developed that confirms significant dependence of load distribution between rolling elements in a thrust-radial bearing and existence of a value of the contact angle at which the load on the balls is minimal. This model allows to determine the minimum loading on the balls under the given operating conditions of the bearing and, consequently, ensure its maximum static load capacity and efficiency.*

Keywords: *contact angle, thrust-radial bearing, static load capacity, integration*

O.P. Reshetnikova, B.M. Iznairov,
A.N. Vasin, S.V. Novokshonova

CAD OPERATIONS RELATING CENTERLESS GRINDING OF SPHERICAL PARTS DURING PRODUCTION PREPARATION AND PLANNING

Abstract. *The paper describes the CAD developed for operation of the centerless grinding of spherical parts. The presented program is designed using the Python programming language; therefore, technologically the items will be launched into series manufacturing in the automated mode.*

Keywords: *CAD, sphere, centerless grinding, precision, mass production*

I.N. Ganiev, F. Kholmurodov, A.G. Safarov, F.R. Odinaev

THERMOPHYSICAL PROPERTIES AND THERMODYNAMIC FUNCTIONS OF AJ4.5 ALUMINUM ALLOY WITH TIN, LEAD AND BISMUTH

Abstract. *The paper presents the results of a study of thermophysical properties and thermodynamic functions of aluminum alloy AJ4,5 with tin, lead and bismuth in the «cooling» mode. It is shown that building aluminum alloy AJ4,5 with tin, lead and bismuth reduces its heat capacity and thermodynamic functions. With increasing the concentration of*

alloying components and temperature, the specific heat capacity, enthalpy and entropy of the alloys increase, whereas the Gibbs energy value decreases.

Keywords: *aluminum alloy AJ4,5, tin, bismuth, lead, specific heat capacity, heat transfer coefficient, thermodynamic functions*

M.E. Sirojidinov, I.N. Ganiev, J.H. Sharipov, Z.R. Obidov

EFFECT OF INDIUM ADDITIVES ON THE ANODE BEHAVIOR OF Zn55Al ALLOY IN AN ACIDIC MEDIUM

Abstract. *The article is devoted to the potentiostatical research into effects of indium alloying additives on anodic behavior of the Zn55Al alloy in the acidic medium of various concentrations. It is shown that corrosion-electrochemical potentials of corrosion, pitting and repassivation of alloys shift towards the positive values in the HCl electrolyte medium. It is found that the indium alloying additives within the range of 0,01÷0,1 wt.% double anodic stability of the Zn55Al alloy by reducing its corrosion rate. The developed tailored compositions of new alloys can be used as anode-based protective coatings to improve the corrosion resistance of steel works, work pieces and facility systems.*

Keywords: *Zn55Al alloy with indium, potentiostatical method, acid medium, corrosion rate, anodic behavior*

A.A. Shevchenko, E.V. Tretyachenko, O.Yu. Rastegaev, N.O. Morozova, A.V. Gorokhovskii

ADSORPTION AND PHOTOCATALYTIC PROPERTIES OF THE $SrAl_2O_4$: Eu,Dy LUMINOPHORE IN THE METHYLENE VIOLET AQUEOUS SOLUTIONS

Abstract. *The research deals with the kinetics and interaction mechanism of aqueous solutions of cationic dyes with the mixture of $SrAl_2O_4$: Eu, Dy oxide used as a luminophore for photocatalytic water purification. It is shown that in the photoexcited state the given luminophore significantly reduces its adsorption properties, which should be taken into account when choosing a technology for its application in the composition of photocatalysts.*

Keywords: *phosphors, cationic dyes, adsorption-desorption equilibrium, photocatalysis*