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MATERIALS SCIENCE RESEARCH AND DEVELOPMENT

MODELLING AND EXPERIMENTS ON KINETICS OF ATMOSPHERE PURIFICATION BY ARGON PURGING IN A HIGH-TEMPERATURE APPARATUS

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Dorel ANGHELINA, Augustin KARASANGABO

Key words: Ar-purging, contact angle, finite elements method, oxygen decreasing, tracer dispersion, tubular reactor.

Abstract: The objective of this research application was to provide a complex description of oxygen decreasing in a $\varnothing 0.04 \times 0.6$ m high-temperature tubular reactor. As special experiments on steel samples at 1600 °C require an inert atmosphere, the high-purity argon is prior used to rinse the reactor's air volume; this operation is desired short and reproducible in O_2 contents down to 0.005 vol. % or lower. The integrated model described in the paper includes the thermal transfer, fluid flow and mass balance for Ar and oxygen species. This model was solved for time-dependent conditions with the aid of differential equations integrated with FEMLAB. It was found that for Ar flow rates between $1.667 \times 10^{-6} - 3.333 \times 10^{-6}$ Nm³/s, the calculated oxygen variations correspond to those measured with a mass spectrometer. Thus, the rinsing time (hence, called „preparation” time) could be optimised accordingly. All these results were compared also with the mass balance from tracer dispersions models.

ASPECTS OF THE PHOTOCATALYTIC EFFECT OF TiO₂ NANOSTRUCTURES SYNTHETIZED ON SILICON SUBSTRATE

Ana Maria LAZĂR, Ioan CIOBANU, Denis CHAUMONT, Yvon LACROUTE, Remy CHASSAGNON, Luminița

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ANDRONIC, Marco SACILOTTI

Key words: Titanium dioxide, MOCVD, Photocatalytic activity, Methylene blue.

Abstract: The photocatalytic activity of TiO₂ nanostructures were tested in reaction of photodegradation of Methylene Blue (MB). The TiO₂ nanostructures were obtained by MOVCD technique. The morphology of the nanostructures was studied by Scanning Electron Microscopy. EDX and Transmission Electron Microscopy were used to analyze the chemical composition and the physical microstructure of the TiO₂ nanostructures. Photocatalytic experiment was utilized to test the catalytic properties of TiO₂.

THE INFLUENCE OF MOULD DIVIDING ON THE HOT SPOTS POSITIONS AT CASTING SOLIDIFICATION SIMULATION

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Vlad MONESCU, Ioan CIOBANU, Sorin Ioan MUNTEANU, Aurel CRIȘAN

Key words: solidification, casting, simulation, hot spot

Abstract: The paper presents the results of a study regarding the influence of the step of the mesh of mould dividing on the casting solidification simulation. It was verified if the dividing step influences the hot spots positions. It was used a software to simulate 2D solidification using finite differences. The solidification of a part cast in eutectic cast iron was simulated. There were done solidification simulations for meshing the mould with the step $\Delta = 4$ mm. It was established that the mould meshing step don't influence the hot spots positions. The studied cases show that dividing the mould with a step $\Delta=1-4$ mm has a relative reduced influence on the simulated solidification time. Instead, the dividing step of the mould mesh has a great influence on the effective simulation time. So it arrives at the conclusion that at 2D simulation of casting solidification the dividing step of the mould mesh under the value of 2mm isn't convenient because it lead to very great values of the solidification simulation time.

INFLUENCE OF STRUCTURAL STATE ON CAVITATIONAL EROSION OF MARTENSITIC STAINLESS STEEL USED IN CASTING ROTORS OF HYDRAULIC TURBINES

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Ioan PĂDUREAN

Key words: cavitation erosion resistance, martensitic stainless steel, thermal treatment, nitriding, laser quenching, structural state.

Abstract: Samples of the GX4CrNi13-4 stainless steel have been thermally treated and tested under cavitation erosion. There have been obtained modifications of the cavitation resistance dependent on the thermal treatment by use of structural analyses and micro hardness tests the influence of microstructure on the steel cavitation resistance had been stressed out. The thermal treatment of (quenching + high tempering) (Q + T_H), followed by (nitration + low tempering) (N_i + T_L) or by (superficial laser quenching + low tempering) (LQ + T_L) give a high cavitation erosion resistance to martensitic stainless steel.

THIN- WALLED CAVE PATTERNS OF COMPOSITE MATERIALS. STATIC LOAD

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Mihai Alin POP, Diana Elena APOSTU, Alexandru CONSTANTINESCU

Key words: shell-type patterns manufacturing, deformation, composite materials.

Abstract: *New technologies and materials represent always a necessity, determined by dynamical evolution of material goods production. Composites materials are utilized also for shell-type patterns, required for casting moulds manufacturing. In this paper, is trying to determine the deformation size of cave pattern using Microcal Origin 5.0 software, deformation that occur during complex training operation.*

METAL COMPOSITE MATERIALS AND THEIR APPLICATION IN THE TRANSPORT'S FIELD

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Georgeta Emilia MOCUȚA, Mihaela POPESCU, Ioan PĂDUREAN, Remus BELU-NICA

Key words: metal composite materials, centrifugal casting, transports

Abstract: *The paper shows some possible applications of metal composite materials (MCM) in different areas. In the area of construction are for the question joints parts of their structure. This is made some important theoretical considerations to justify the choice of technology for manufacture of metal composite materials (MCM) for parts subject joints using welding technologies.*

RESEARCHES REGARDING THE GROWTH OF CYLINDERS CASINGS FOR AUTOVEHICLES USING THERMOCHEMICAL TREATMENTS

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Dumitru BOT, Ana VETELANU

Key words: cylinder casing, cast iron, wear resistance.

Abstract: *The paper presents some of the metallic materials used for execution shirt cylinder engine vehicles. Also proposed the use of irons alloyed with titanium and application of nitriding thermochemical treatment in nitrogen atmosphere with the added of ammoniac, in order to increase resistance to wear and corrosion.*

ECONOMICAL MANAGEMENT

REQUIREMENTS OF ACCOUNTANCY LAW AND ACHIEVEMENT OF ACCOUNTANCY SERVICES

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Gheorghe V. LEPADATU

Key words: accountancy law, commitment, hard resources, soft resources;

Abstract: *Achievement of interface between need of accountancy services of customers and accountancy services suppliers , represent one of the components of accountancy law .*

THE CURRENT GLOBAL ECONOMIC CRISIS. SPECIFIC POSSIBILITIES FOR APPROACH, UNDER EURO ZONE SPECIFIC CONDITIONS

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Roxana Mihaela CALIMACHI (CHIRIACESCU)

Key Words: globalisation, economic and monetary union, unique market, economic growth.

Abstract: *Possibilities of crisis approach, under Euro zone are analysed, taking into account the utilisation of functional integrationist structures. National packages of budgetary stimulents are also utilised. Under these conditions some states, members of Euro zone already announced the beginning of economic growth.*