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A SYSTEM FOR THE RISK ASSESSMENT OF DRILLING OPERATIONS IN OIL AND GAS WELLS

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Abstract

The risks inherent in drilling operations play a significant role, so, their anticipation and mitigation would prevent much loss of time and extra cost. In this paper, a general, hierarchical, structured and flexible drilling operation risk assessment system (DORA) is presented. , The model, which is presented in this paper, is generated from the operator's point of view and is applicable for different wells, ranging from wild cat to re-entry types. The methods used for generating the system, include: interviewing the experts, studying the historical data (the drilling information of phases 6, 7 and 8 of the South Pars gas field), examining questionnaires filled by experts from different oil companies (client, operator, service) and studying 15 general and specialized risk assessment systems (PMBOK, BP Amoco, Schlumberger, US Army, American Bureau of Shipping, Health Safety Executive and Stat Oil). , In order to completely define the risk assessment system, its operation model is developed, the tools and methods for each phase are specified and the inputs and outputs are determined. The developed model has four main phases at the beginning, including preliminary risk analysis, secondary risk analysis and support. The inter-related position of these phases and their sub-phases, with respect to the drilling operation steps, are also specified. , The other main aspects of this system include: identifying secondary, as well as primary, risks, holding workshops with the drilling team to check the results of the system and foreseeing

databases (Risk register and Lesson learned).

Key Words: risk, drilling operation, risk identification, risk assessment, dora.

THE EFFECTS OF LANTHANUM AND NIOBIUM OXIDES ON THE MICROSTRUCTURE AND ELECTRICAL PROPERTIES OF PZT CERAMICS

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Abstract

In this research, the effects of Lanthanum and Niobium oxides on the microstructure and electrical properties of a solid solution of lead Titanate Zirconate Piezoelectric Ceramics were studied in the morphotropic regions, with a composition of Pb1.1(Zr 0.53Ti0.47)O3. Samples were prepared via a conventional ceramic procedure and the Lanthanum oxide content was in the range of 0-3 %. , The results showed that, in the sample with mole 2% Lanthanum oxide, the densification and sintering were improved at 12000C. Although both cations are in the Lantanate group and, usually, therefore, must act as donor type additives, the difference in the atomic radii caused different behavior. It would seem that La is more compatible with the structure and has more solubility. With more La, the second phase was observed, which created some tension. This cannot be compensated for by the tetragonality of the system. Besides which, Lanthanum oxide reduces the grain size distribution of the system. , Regarding the effects of Nd, these effects were started at lower amounts, but, its effect on the density was not significant. The electrical measurements indicated improvements up to mole 2% of the additives and a reduction thereafter.

Key Words: pzt, piezoelectric, La_2O_3, Nd_2O_3, sintering.

INVESTIGATION INTO MELT SPINNING PARAMETERS IN Ni-38Co-8Fe-8Si-2B MAGNETIC ALLOY

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Abstract

Using a Chill Block Melt Spinning (CBMS) apparatus, the effect of melt spinning parameters on the dimensions and appearance of melt-spun Ni-38Co-8Fe-8Si-2B ribbons, was investigated. Four series of melt spinning experiments were carried out under an argon atmosphere, during each of which only one parameter varied while the others were kept constant. The parameters examined included; wheel linear speed, melt ejection pressure, nozzle angle and nozzle orifice diameter. The width of ribbons was found to increase with an increase in nozzle orifice diameter, wheel speed (at low roll speeds), nozzle angle and ejection pressure, whereas, their thickness directly corresponds to the nozzle orifice diameter and ejection pressure and, inversely, to wheel speed and nozzle angle. At high roll linear speeds, the variation of ribbon width with roll speed is not significant. The production of high quality melt-spun ribbons with desirable dimensions demands, not only precise control of each individual parameter within its range, but also consistency among all parameters.

Key Words: magnetic materials, melt spinning, amourphous, rapid solidification, Ni-38Co-8Fe-8Si-2B alloy.

EFFECT OF DEFORMATION STRAIN RATE WITHIN THE INTER-CRITICAL $(\alpha + \gamma)$ REGION ON FERRITE GRAIN REFINEMENT IN MICROALLOYED STEEL

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In the present research, a warm torsion testing technique was carried out on low carbon Nb-Ti microalloyed steel. The schedule was conducted in a two phase ($\alpha + \gamma$) region. The effect of the deformation strain rate on the mechanism of dynamic softening and grain refinement of ferrite during the warm deformation was investigated. The physical processes that occur during deformation were studied by analyzing the true stress-true strain flow curves of ferrite. Examination of the microstructural evolution was carried out by optical microscopy. The mechanism of the equiaxed fine ferrite grains (EFG) formation was investigated by means of high resolution electron back scattered diffraction (EBSD) measurements. This was carried out using a Field Emission Gun Leo Scanning Electron Microscope. Microstructural studies show that equiaxed fine ferrite grains are produced during deformation within the intercritical ($\alpha + \gamma$) region. The EBSD results show that, as the strain rate increases, the percentage of high angle boundaries increases and that of low angle boundaries decreases. It was considered that the dynamical formation of new fine grains was caused by continuous dynamic recrystallization (CDRX) of ferrite. With increasing strain rate, the EFG size of the ferrite reduces and its volume fraction increases. These implied that increasing the strain rate has a positive effect on the CDRX process of ferrite.

Key Words: microalloyed steel, thermomechanical treatment, torsion test, strain rate, ferrite.

HIGH TEMPERATURE MECHANICAL PROPERTIES OF FERRITE-BAINITE DUAL PHASE STEELS

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In this research, high bainite dual phase steels, with different ferrite volume fractions, was produced by the proper heat treatment of AISI 4340 steel. Dual phase steels have been subjected to tension tests at different temperatures, from 25 C° to 500 C°, with different strain rates, in order to investigate the effect of temperature on their mechanical properties. The tensile test data were analysed according to the Hollomon equation and it was found that this steel has two stages of work hardening. The effect of ferrite volume fraction, temperature and strain rate on work hardening exponent, strength coefficient and onset strain of stage II of the work hardening were investigated. Results showed negative strain rate sensivity and peaks in work hardening at intermediate temperatures, which were identified as two manifestations of dynamic strain aging. Also, the work hardening analysis of flow stress data revealed that, in the DSA regime, the onset strain of stage II work hardening was athermal. Finally, variations of these parameters, with differing ferrite volume fractions, were used to rationalize the deformation mechanisms activated at different stages.

Key Words: dual phase steels, ferrite, bainite, work hardenning, strain rate, dynamic strain aging.

NUMERICAL ANALYSIS FOR THE EFFECT OF BEDDING PLANES ON BLAST WAVE PROPAGATION

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Blast wave propagation in a granite rock mass and its interaction with existing discontinuities are simulated and studied by means of UDEC software. For this purpose, a blast shock wave is simplified as a triangular pulse, with the specific maximum pressure of 16.5 GPa and time duration of 0.01 to 0.08msec, which was placed in

a 200 mm diameter blasthole. Results of the numerical analysis along the discontinuity are compared with both field results and the Dowding empirical formulae. A relatively good correlation is observed between numerical analysis results and field data.

Key Words: blast wave propagation, numerical analysis, discontinuity, bedding plane.

DISPLACEMENT BASED BACK ANALYSIS OF SIAH BISHEH PUMPED STORAGE POWERHOUSE CAVERN BY MEANS OF DISTINCT ELEMENT METHOD

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Back analysis is a practical engineering tool to evaluate geomechanical parameters of underground and surface structures, based on field measurements of some key variables such as displacements, strains and stresses. These parameters are necessary for the stability analysis and design of a support system for geostructures. The Siah Bisheh powerhouse cavern is located in a discontinuous media. Considering the block size, pattern and spacing of the discontinuities, a 3 dimensional distinct element analysis was performed. In this study, a displacement based direct back analysis of a powerhouse cavern, on the basis of a univariate optimization algorithm, were applied, and the optimized geomechanical parameters of the powerhouse confining rock masses were obtained. Numerical modeling results are in good agreement with measured displacements using extensometers, which confirm the numerical modeling and back analysis results. Then, the ordinary analysis of a powerhouse cavern under natural conditions, using back analysis results, was done. The results of the analysis show that a powerhouse cavern is stable under natural conditions and the existing support system has a suitable efficiency that could effectively control displacements. Finally, the powerhouse cavern long term stability under a saturated condition was analyzed. Results of the analysis show that, after lower dam impounding, considering the vicinity of the powerhouse cavern to the lower dam reservoir, the pore water pressure and uplift pressure in discontinuities around the powerhouse cavern will rise and tend to the local failure of the powerhouse cavern. To prevent powerhouse failing and guarantee long term stability, a cut off curtain was proposed.

Key Words: back analysis, powerhouse cavern, distinct element method, extensometers, SiahBisheh.

INVESTIGATION INTO THE INHABITATION OF DI-AND TRI-ETANOL AMIN ON THE CORROSION OF STEEL IN CONCRETE ENVIRONMENTS

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The existence of cracks in reinforced concrete and the penetration of corrosive agents increase the risk of pitting attacks in steel rods. In this paper, inhabitation efficiency and the ability to control the pitting by TEA and DEA organic inhibitors by electrochemical measurements, was studied. The results show that TEA in 0.4 % vol. and DEA in 0.2 % vol. are in an optimum inhibition condition. The lower inhabitation efficiency, with

low stability in a double layer in the simulation model for DEA, concluded that this inhibitor can not protect steel from pitting corrosion such as TEA in concrete environments.

Key Words: pitting corrosion, concrete, inhibitor, DEA, TEA.

COMPARISON BETWEEN 2D AND 3D NUMERICAL MODELING OF JOINT SPACING AND ORIENTATION EFFECTS ON TBM CUTTER

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Abstract
The performance of tunnel boring machines (TBM) depends on the cutters efficiency. Geological conditions and rock mass properties can influence the cutters performance. In this study, a numerical modeling, based on the discrete element method, in a 2D and 3D format, has been used to evaluate the effects of joint orientation and spacing on the fragmentation process by a TBM cutter. The considered assumptions were; constant spacing with different orientations and constant orientation with different spacing. Results show that, firstly, the critical orientation is at an angle in the range of 45 to 60 degrees, where there is a good chance to achieve the maximum rate of penetration. Secondly, critical and important joint spacing is 200 mm, where the effect of spacing on critical stress decreases significantly.

Key Words: tunnel boring machine, cutter, joint spacing, dip angle.

EFFECT OF HYDROTHERMAL TEMPERATURE ON THE COMPOSITION AND MORPHOLOGY OF SURFACTANT-ASSISTED HYDROTHERMALLY SYNTHESIZED HYDROXYAPATITE NANO PARTICLES

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Abstract
In this work, Hydroxyapatite nanorods have been successfully synthesized using cationic surfactant Cetyltrimethylammonium bromide (CTAB) and nonionic co-surfactant polyethylene glycol 400 (PEG 400), as regulators of nucleation and crystal growth processes under hydrothermal conditions. The effect of hydrothermal temperature on the composition, morphology and size of HAp particles was studied using X-ray diffraction (XRD), Fourier transform infrared spectrometer (FTIR), and scanning electron microscopy (SEM). Results revealed that the morphology and size of HAp particles could be effectively controlled using the template and co-template actions of CTAB and PEG under hydrothermal conditions. In addition, the temperature of hydrothermal treatment plays an important role in controlling the morphology and size of HAp particles. At 90 °C, plate-like structure and rod-like particles randomly distributed in the sample are produced, and at 120 °C, the resultant shows rod-like particles with a mean aspect ratio of about 8-10. With the increase of hydrothermal temperature to 150 °C, the aspect ratio of rod-like particles increases to 16-20; moreover, the crystallinity of HAp powders enhances. In addition, the phase composition and morphology of HAp nanorods obtained at a higher hydrothermal temperature show higher thermal stability.

Key Words: hydroxyapatite, synthesis, nanorods, surfactant, morphology, hydrothermal temperature.