

**HUMIC ACIDS FROM OXIDIZED COALS:
CAPILLARY ZONE ELECTROPHORESIS AND MASS-SPECTROMETRY STUDY**
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Abstract

Humic acids from open-air and laboratory oxidized bituminous coals (under various temperatures) were prepared and characterized. For the comparison, lignite and oxidized lignite (oxihumolite) were examined as well. All samples were analyzed by capillary zone electrophoresis (CZE) and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF). For the CZE separation of humic acids (HAs), the borate-Tris-EDTA (pH=8.3) and borate- β -cyclodextrine (pH=9.6) electrolytes were used.

The samples of humic acids were prepared by their dissolution in sodium hydroxide solutions. All CZE electropherograms are typical by a huge non-resolved peak (hump) which contains a lot of migrating humic acids. The ageing effect of HAs, brought about their self-assembling processes, was observed as a prolongation of hump migration times in both electrolyte systems. However, after 30 days a very good reproducibility of electropherograms was obtained. In the borate-Tris-EDTA electrolyte the migration times of HAs relate to their metal (Pb) binding capacities. The broadening of the CZE humps of HAs, isolated from laboratory oxidized bituminous coal, corresponds to their thermal decomposition during coal oxidation. Their shorter migration times were registered in the more alkaline borate- β -cyclodextrine electrolyte probably due to the further dissociation of HAs hydroxyl groups. In this electrolyte, the electrophoretic mobilities of HAs, isolated from lignite and oxidized lignite, were significantly retarded likely due to the formation of inclusion complexes with β -cyclodextrine.

By using the mass spectra of HAs isolated from laboratory and naturally oxidized coal it was found that the intensities of mass spectra lines are dependant on the temperature and amount of oxygen. The higher degree of this alteration, the lower intensities of lines from 680 to 920 m/z and the higher intensities of lines from 250 to 450 m/z were observed.

On the basis of obtained results electrophoretic and mass spectra measurements were found to be useful for the study of changes in chemical structure of HAs owing to their oxidation and thermal treatment.

KEYWORDS: Humic acids, oxidized coal, capillary electrophoresis, mass spectrometry

STRUCTURE CHARACTERISATION OF HIGHLY FILLED EPOXY POLYMER CONCRETES

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Abstract

Highly filled particle composites, based on sand and epoxy binder, can be used as sound-absorbing materials. Experimentally determined densities may be employed in determining the content of the separate components, i.e. of sand, binder and pores.

KEYWORDS: polymer concretes, sand, epoxy binders

THE IMMOBILIZATION OF SOLUBLE METAL SALTS

The Analysis and Microscopy of the Si-Al Condensed System with Nickel Waste

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Abstract

This laboratory's investigation is focused on the disposal of the waste materials from different industrial sources. The presented work focused on the stabilization of Ni-solution in siloxo-sialate network explores the location of this toxic metal's ions in the solid samples obtained. The analyses of the Ni-ion's concentration and distribution are based on the detection through the voltmeter-stripping method. The results show the possibility of the inhibition and immobilization of a toxic waste material from the electro-plating plant even with a high content of nickel by using sol-gel reactions of kaolinitic aluminasilicates. A further detailed electron microscopy with a chemical elements' analysis (WDX) describes the possible structural configuration.

KEYWORDS: sol - gel, condensed system, wastes, siloxo-sialate network

INTERPRETATION OF LEVELLING MEASUREMENTS IN THE AREA OF THE PŘÍBRAM URANIUM DEPOSIT AFTER TERMINATION OF MINING

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Abstract

In spite of its exceptional extent, the deep mining in the Příbram area had just only little effects on the landscape, which were practically insignificant, e.g., in comparison with the impact of the deep mining in Ostrava region. Although the mining operations in the area of the local uranium – poly-metallic deposit was terminated more than twelve years ago, one has to take into account that its after-effects will have to be monitored and, if necessary, dealt with during several future decades. Areas of subsidence may be included among topical or only potential hazards to the environment and inhabitants in connection with the uranium industry in the Příbram area.

If the underground exploitation operations have been conducted so that the loosening processes, accompanied by gradual or sudden caving in of empty cavities due to the destruction of the surrounding rock massif, may reach the surface, the surface is in danger of subsidence. Such area is designated as a subsidence area and all building, forestry or agricultural activities are prohibited there. In the area of the Příbram deposit, a total of 9 subsidence areas have been designed, and their monitoring is the subject of this paper. The work, described in this paper, was carried out as part of the Project “Targeted Research of the Academy of Sciences of the Czech Republic” number S 3086005.

KEYWORDS: Příbram uranium deposit, environmental effects of deep mining, mining induced surface deformations, levelling measurements

REPEATED LEVELLING IN THE MAYRAU MINE AREA USING UNDERMINING INFLUENCE THEORIES

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Abstract

During the 1970's the extraction of coal approached the shaft-pillar of the Mayrau Mine, and it became necessary to check the effects of the mining on the mine objects. Consequently, a local levelling net, which was extended into the area of the Vinařice Penitentiary at the beginning of the 1990's, was set up in the area of the mine at the beginning of the 1970's. The periodic levelling of the original net had been repeated since 1975 at approximately five-year intervals. Since 1992, when the extraction of coal began in the shaft-pillar of the Mayrau Mine, the original and extended net was levelled at yearly intervals. This levelling served to check the increased hazard of damage to surface objects of the mine and the Penitentiary. The minefield of the Mayrau Mine is now no longer being exploited, because mining was irreversibly terminated in 1997. However, the repeated levelling of the net as a whole continued until 2002, its purpose being to document the surface after-effects of undermining. All the results of this levelling have been reported in this paper. Their analysis was carried out with a view to the shape of the subsidence basin created as a result of the mining operations, and conclusions were drawn with regard to possible hazard to surface objects. The gist of the conclusions drawn is in the comparison of the conducted levelling with the theoretical principles of undermining effects and in finding the most suitable theoretical model as a convenient tool for future study of subsidence in the Kladno District.

The work, described in this paper, was carried out as part of the Project "Targeted Research of the Academy of Sciences of the Czech Republic" number S 3086005.

KEYWORDS: levelling, shaft-pillar, theoretical model

ANALYSIS OF REPEATED GPS OBSERVATIONS

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Abstract

GPS data observed on the DOPNUL network were processed by the software SKI 2.3 (a product of the LEICA company) and by the software Trimble Geomatics Office (a product of the Trimble Navigation Ltd). The DOPNUL stations were monitored in 2 sessions on 16 points of the network. The 1st session took place at spring 2001, it was observed twice 6 hours. The 2nd session took place at autumn 2001, it was also observed twice 6 hours. The results compared by means of (a) transformations parameters and (b) residuals from Helmert 6- and 7- element 3D transformations will be discussed.

KEYWORDS: GPS, DOPNUL network, SKI 2.3, Trimble Geomatics Office

RELOCATION OF EARTHQUAKES IN WEST BOHEMIAN/VOGTLAND SUBREGIONS LAZY, KLINGENTHAL AND PLESNÁ USING THE MASTER EVENT METHOD

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Abstract

The Master event location method (MEM) is used to relocate the earthquakes that occurred in the subregions Lazy, Klingenthal and Plesná of the West Bohemian/Vogtland earthquake swarms region during the second half of the 1990's as recorded by the seismic network Webnet. The crustal velocity in each of these subregions is modeled by a homogeneous layer, representative for the given subregion in the frame of 1-D models. The relocation in the subregion Lazy confirms the distribution of hypocenters obtained by the grid search (GS) location i.e. their division into two separated groups that might reveal the position of two almost vertical faults. These faults are in general agreement with faults shown on the geological map of this area. The relocated clusters of hypocenters in subregions Klingenthal and Plesná are almost identical with the corresponding GS location.

KEYWORDS: West Bohemian/Vogtland earthquake swarm subregions Lazy, Klingenthal and Plesná, seismic network Webnet, Master event location

A COMPARISON OF PHYSICAL AND MECHANICAL CHARACTERISTICS OF KOLA SUPERDEEP BOREHOLE CORE SAMPLES AND THEIR SURFACE ANALOGUES

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Abstract

The article presents experimentally determined physical and mechanical properties and elastic anisotropy of three core samples of metamorphic rocks (gneisses), which were drilled out and lifted from depths of 6849 – 8411 m of the Kola Superdeep Borehole (SD-3) and their surface analogues. Acoustopolariscopic measurements of parameters of anisotropy of samples were carried out in the Geological Institute of the Kola Science Centre of RAS, Apatity. Particle density, bulk density, porosity, simple compressive strength, modulus of deformation, Young's modulus of elasticity and Poisson's ratio were determined in the Institute of Rock Structure and Mechanics of AS CR, Prague. Laboratory tests known from rock mechanics were used for this purpose. From the results obtained, differences in physical properties between samples from SD-3 and the surface are evident.

KEYWORDS: Kola Superdeep Borehole, laboratory tests, physical and mechanical properties

DEVELOPMENT OF CONICAL PROBE FOR STRESS MEASUREMENT BY BOREHOLE OVERCORING METHOD

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Abstract

We have been engaged in the stress measurement in rock massif by the hydrofracturing method. This method enables measurement of stress in plane normal to the axis of bore, when one of the principal stresses parallel to the axis is assumed. But, in complex geo – mechanical conditions connected with the geology and mining action, the parallelism of the principal stress to the axis of borehole can not be assumed with certainty. That is why we decided to develop a device making the determination of the total state of stress tensor possible.

In design we started from experiences of K.Sugawara and Y.Obara that have been using the compact conical borehole overcoring system CCBO. Conical shape of the strain gauge probe CCBO makes the fixation of the probe in borehole easy and makes the measurement of stress in independent directions possible.

In this paper the principle of the measuring method and developmental sample of the apparatus, the objective of which is making the continual measurement of stress in course of overcoring possible, is described.

KEYWORDS: stress measurement, stress tensor, overcoring, CCBO, field measurement, design of equipment, strain gauges, optical communication

LAND USE PLANNING AND SEISMIC HAZARDS OF THE PROPOSED ASWAN NEW CITY AREA, EGYPT

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Abstract

Land use planning has been used only recently as a method to mitigate losses due to earthquake hazard. The most fundamental approach in land use planning is to simply avoid proposing development on lands that have seismic hazard and subsurface structures. This approach is most applicable in raw land situations where land values are comparatively low. The magnetic methods are applied for detection the subsurface structures. The seismic hazard represented by peak ground acceleration and characteristic of site period at selected 19 sites in the study area were evaluated and represented by a contour maps. The structures deduced from applying the trend analysis method to the RTP magnetic map indicate that there are two sets of fault trends. The major trends are the N-S directions and the minor trends are the E-W direction. The maximum acceleration has its minimum value of about 36 gal at the central eastern part and the maximum of about 64 gal at the southern part of the studied area. The computed natural period has its minimum value of about 0.8 sec at the southern part of the area, while the maximum value is about 4.2 sec at the northwestern part of the area. Recommendations for land-use planning policies relative to structural trend map, ground shaking and characteristic of site period were considered.

KEYWORDS: Land use, hazard, Aswan city, Faults, Ground Motion, Site period

SEISMIC PROFILES FOR ATTENUATION ACCELERATION MEASUREMENT

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Abstract

The information about new seismic profiles is given. The Profile I was built near the N-S direction and it links the seismic source zone in Vienna basin and mining induced seismic events zone Lubin. The seismographs dislocated along this Profile had operated since July 2003. The Profile II has approximately the NW-SE direction and it links the Vienna basin source zone and the Vogtland zone of earthquake swarms. The main purpose of both profiles is to collect seismograms of events originating in mentioned zones and to derive authentic acceleration attenuation relations for seismic waves, propagating through the Bohemian massif. These relations are necessary input data for earthquake hazard assessment.

KEYWORDS: seismic profile, source zone, acceleration, attenuation, response spectra