Summaries

IRENA BAGIŃSKA

***In Situ* Methods of Soil Ground Investigation on the Basis of Eurocode 7** · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper deals with new investigation procedures introduced in Eurocode 7. The idea of Eurocode Program as well as general characteristic of both Eurocode 7 parts is presented in the paper. The problems of planning, documentation as well as identification and investigation of soil ground by in situ methods are considered. The procedure of determination of design values of geotechnical properties is described. Some differences and similarities to other PN-EN codes already put into force are illustrated. The actual state of implementation of standard specifications EN and EN-ISO regarding in situ investigation is also presented.

Keywords: *geotechnical engineering , in situ investigation, Eurocode 7*

PRZEMYSŁAW BARAN, EUGENIUSZ ZAWISZA, AGATA SZYMACHA

A Trial of Verification Strength Parameters of Colliery Spoils Using Limit Stress State Method · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The subject of the paper is verification strength parameters of colliery spoils. Angle of internal friction and cohesion have been obtain using a middle-size shear box apparatus as well as back analysis in conjunction with a laboratory model test. The strength parameters obtained from laboratory tests and calculations have been use in limit stress state analysis. The analysis has enabled to obtain a shape of slope and position of slip surface in limit state for two pairs of strength parameters. A comparison between the shapes calculated and the shape from model test, revealed the value of cohesion obtained using the shear box apparatus is half overstate.

Keywords*: colliery spoils, limit stress state, strength parameters, model tests*

ANDRZEJ BATOG, MACIEJ HAWRYSZ

The Optimization of the Protection Area Width for the Open Pit Mines · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents the examples of protection area width optimization for the open pit mines for some engineering structures situated in contiguity of the open pit. The possibility of deposit exploitation from the part of protective pillars of power lines and aerial masts was demonstrated. The slope stability during exploitation and at final stage of open pit will be retained. The presented problem is particularly essential for the sand and gravel pits, which deposits are becoming exhausted.

Keywords: *surface mining, slope stability*

JERZY BAUER, JANUSZ KOZUBAL, WOJCIECH PUŁA, MAREK WYJADŁOWSKI

Displacement Analysis of Laterally Loaded Piles Embedded in a Three-Dimensional Linearly-Elastic Random Medium · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents a probabilistic modelling of displacements of a foundation pile. The pile is subjected to lateral loading implemented in the pile's head. The pile is embedded in a layered linearly-elastic random medium. The

loading is considered as a random variable. The probabilistic approach to this problem as a three-dimensional one constitutes a new result in comparison with other earlier published. The base of the solution is the three-dimensional modelling by the finite element method. A series of results can be obtained under various values of elastic characteristics of the medium under consideration. Next by a non-linear regression procedure a response surface is obtained. To get the final response surface an iterative algorithm has been applied. The final response surface allows a reliability analysis. The failure criterion is an exceeding of an allowable displacements threshold by deformed pile's head. By numerical examples a vital effect of the random variability of the lateral force as well as random variability of the elastic modulus of the upper layer has been demonstrated.

Keywords: foundation pile, response surface, reliability index

WŁODZIMIERZ BRZĄKAŁA, JULIEN BLANC

Discussion and Calibration of the Meyerhof Hypothesis · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The Meyerhof hypothesis deals with the bearing capacity of eccentrically loaded shallow foundations. It uses an effective foundation width thus addresses the bearing capacity calculation to the one for centrally loaded strip foundations of the reduced width. Testing elasto-plastic analyses based on the PLAXIS® code confirm good accuracy of such a simplification. In the second part, the paper focuses on partial safety factors proposed by the Eurocode EC7. A special attention is also paid to the role of random eccentricity. Making use of the Hasofer-Lind calibration, it is found that the values of partial safety factors proposed by EC7 are reasonable.

Keywords: shallow foundation, bearing capacity, eccentric loading, partial safety factors

MAREK CAŁA, MICHAŁ KOWALSKI, MICHAŁ BETLEJ

Application of "Automatic Resoning" in FLAC V 6.0 Code for Analysis of Slope Failure Process · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This paper shows the possibilities of using *automatic rezoning* function for analysis of evolution of landslide process in slope. Conventional slope stability analysis produces only the value of factor of safety and it's restricted potential failure surface location. The landslide evolution process or final geometry of stabilized landslide are not concerned. In order to analyse evolution of landslide, the large strain mode should be applied. That results in large distortions of grid. It doesn't allow problem solving after some cycles due to bad zone geometry. In order to continue solving, some actual parameters like stresses, velocities, displacements etc. must be remapped to form old distorted grid into new, more regular one. After series of these remaps, in continuous solving process, full evolution of landslide process may investigated, what was shown in this paper on chosen examples.

Keywords: numerical calculations, slope stability

MIECZYSŁAW CHALFEN, DANIEL GARLIKOWSKI, TADEUSZ MOLSKI, HENRYK ORZESZYNA

Groundwater Conditions on Dam Foreground of "Przeworno" Reservoir · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Damming up water in Przeworno reservoir cause an appearance unfavorable groundwater conditions on dam foreground. Water pressure lines in weak permeable ground there are near a ground surface. A mathematical model was used to research an influence of system wells and hydro geological window located in axle of drainage ditch on groundwater level decreasing on dam foreground. Multivariate filtration calculations enable estimation works efficiency witch may be performed to improve unfavorable conditions.

Keywords: reservoir, mathematical model, groundwater level

ANDRZEJ CHROST, KRZYSZTOF JANICKI, BEATA KOSZULAŃSKA, ŁUKASZ KRYWULT

The Use of the Innovative Measurements Technology in Slope Stability Monitoring of the "Żelazny Most" Waste Plant · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper describes the elements of the geotechnical monitoring system installed at "Żelazny Most" waste plant from 2007 to 2008. Special attention was paid at technologies previously not used in Poland. The authors present

installation of deep inclinometers and fully-grouted method installed piezometers containing vibrating wire water pressure sensors. Innovative technology of integrated installation of inclinometer and pressure sensors in single borehole was also presented.

ANDRZEJ DOMONIK, ARTUR DZIEDZIC, AGNIESZKA JARZĄBKIEWICZ,
DOMINIK ŁUKASIAK, PAWEŁ ŁUKASZEWSKI, JOANNA PIENIŃSKA

Integrated System of Acquisition, Processing and Visualization of Geomechanical Data — Geomechanical Database · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This paper describes basic informations about The Geomechanical Database created and implemented at Department of Geomechanics, University of Warsaw. Database includes almost 200000 parametric records and a lot of descriptive and graphic information of rocks from different regions of Poland. The data were obtained from our own investigations during the last number of years. The main purpose of this project was to order, systematize and integrate information about geomechanical properties of rocs in order to enable fast access to data. At the database design stage, explicitly placed in geospace the "rock object" is treated as rock resource and it is the fundamental element of database. In result of this the data have their own geographic coordinates according to GIS assumptions, which enable to create multilayer data sets. Searching engine applied in database allows to obtain the results of queries as diagrams, tables which can be presented in comparison with various rock classifications. The Geomechanical Database has an open access and it can be reached at www.geomechanika.pl. This site contains searching engine with six query criterions and the results are presented in 4 reports.

JAN DRZEWIECKI

Probability of Destruction of Mine Working as a Result of Seismic Events · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The article illustrates a method to calculate probability of destruction of mine working resulting from influence of seismic events. The basis of calculation are seismic energy of dynamic events' located in the front of coalface and range of destruction areas around of mine working. A program has been elaborated in The Central Mining Institute which enables determining range of areas with given probability of mine working destruction. The results from such calculations can be used for correcting mine workings localizations and elaborating adequate preventive treatment techniques for obtained hazard levels. Also an example of calculations for exploitation of a coal seam 750 meters below ground has been given.

ZENON DUDA, JOANNA HYDZIK

Mining and Conservation Protective Works in Monumental Mining Workings in "Zejście Kalwaria" on Sobieski Level in Salt Mine "Bochnia" · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Workings complex "Zejście Kalwaria" is located in eastern part of Salt Mine "Bochnia" and connects levels: I-st Danielowiec nad IV-th August. For the sake of historical and geological function, this workings was enclosed of conservation protect. "Zejście Kalwaria" will be included to Touristic Route after reconstruction. The subject of this work is analysis of conservation and protects works in workings on Sobieski level, which are under reconstruction at this moment. This section includes galleries Reichetzer V and Sobieski towards crossing with gallery Anguła. This paper describes reconstruction continuation, which first stage, was presented in XII-th International Symposium "Geotechnics 2008".

BARBARA DUTKA, JAN WALASZCZYK, MIROSŁAW WIERZBICKI

Estimation of the Coal Seam Methane Pressure on the Base of the Methane Content and Sorption Properties of the Coal from the "Krupiński" Hard Coal Mine · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The coal seam methane pressure seems to be a main parameter which is necessary for evaluating the probability of occurrence of some hazards in hard coal mine industry. An in situ measurement of this parameter is very difficult, so it was necessary to find an indirect method of such measurements. The laboratory method is generally based on the shape of the isotherm of the total methane content in the examined coal. The coal for the laboratory tests should be collected from a place in a coal bed where the methane content is well known. The paper presents an application of the worked out method to the estimation of the coal seam methane pressure level in the coal mine "Krupiński".

Keywords: methane content, sorption isotherm, coal seam methane pressure

KRYSTYNA DZIDOWSKA, OLGIERD PUŁA

Geotechnical Conditions and Soil Quality in Postindustrial Area and Town and Countury Planning · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents an assessment of the geotechnical conditions and the soil quality in a rezoned industrial land destined for housing development. The rigid-flexible condition of the cohesive soil and the medium-compacted and compacted condition of the sand soil and of the un compacted embankments has been found to be an advantageous geotechnical factor. Also the depth at which the uppermost aquifer occurs is advantageous. In addition, the area is not flooded with water during floods. Disadvantageous, however, is the occurrence of contaminated man-made fills and locally contaminated natural soil in situ. The soils are contaminated with petrol total, mineral oil total, copper and lead and locally also with nickel and mercury. Due to the contamination of the made ground the latter fail to meet the housing development land and locally industrial land soil quality standards, down to a depth of as much as 4 m. Made ground would be dangerous to the environment. The existing geoenvironmental conditions indicate the necessity for reclamation of the land. Considering their final destination, the potential and actual environmental hazard which the extracted made ground pose should be assessed by determining the leachability of the heavy metals and prtrol total and mineral oil total.

Keywords: geotechnical conditions, soil, pollution

LIDIA FEDOROWICZ, MARTA KADELA

The Material-Degradation Model Applied for the Laminar Road's Pavement — Subsoil System · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Road's pavement construction resistance is the ability of failure-free working and taking the trust of traffic load during the specific period of time. In the paper resistance of the road structure co-operating with subsoil to the reaction D impact means such value of D_o of this impact whose exceeding will result in exceeding of specified limit state. This approach to analysis of the mechanistic type allows separation of the particular zones of the road-subsoil system and applying the elastic-plastic model with material stiffness degradation for faultless work all roads' pavement construction evolution. Model applied in this work — elastic-plastic with material degradation — is known in literature as the Barcelona Model and is implemented to commercial packed MES ABAQUS. Analyses performed in this work are registration of the arising degradation process — measured through a level non-decreasing component of degradation d_t.

Keywords: elasto-plastic-damage material model, Construction resistance, failure-free working

WŁODZIMIERZ FIGIEL, EWA KAWALEC-LATAŁA

Aspects of the Interpretation of Acoustic Pseudoimpedance Images of Rock Formations · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Safety and reliability of energy system are one of the most important issues in dynamic development of states and unions (EU). Rock salt deposits with homogeneous inner structure and horizontal or semi-horizontal layering may be excellent sites for localisation of underground hydrocarbon reservoirs. Calculations of seismic section inversion leads to approximation of distribution of acoustic impedance. Data of that acoustic impedance distribution are the basis for image generation and visual interpretation of rock formation structure. Detection of inhomogeneity of

lithology-phacial structure of seam-like salt deposits may be recognised on the basis of proper image interpretation of acoustic pseudoimpedance section. In the paper, authors propose context and adaptive transformation of images as a way of increasing effectiveness of image interpretation simulated by INWERS system. The paper introduces the algorithms of visual transformation and analysis of results to define quality of rock section structure interpretation. The paper presents the author's suggestion regarding necessity of setting up a gauge of used transformation on the images as a method to measure interpretation easiness of seismology section. The goal of the study is to develop applications of image transformation tools to inhomogeneity detection of lithology-phacial structure of seam-like salt deposits.

Keywords: acoustic pseudoimpedance, visual interpretation, analysing and imges processing, median filters, Wiener's filters, synthetic section, hydrocarbon reservoir, salt deposits

LUCYNA FLORKOWSKA

Numerical Modelling the Influence of Mining Deformations of Subsoil on Group of Buildings in the Urban High-Density Housing · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The prediction of the influence of subsoil deformations on the condition of a building system is of great importance as, among other things, it helps prevent mining damages. Results of the numerical modelling influence of the underground mining on the buildings in the high-density housing were introduced at work. Recognizing the possibility of calculating stress and strain state on the base of standard geodetic measurements and numerical simulation was the purpose of this the work. Although the applied numerical model was simplest model, results of experiment showed themselves very much interesting.

Keywords: mining damages in buildings, numerical model ling, FEM

ANDRZEJ GALINSKI

An Example Analysis of Relationship Between Geo-parameters of Deposit Rock and Surrounding One Regarding Chosen Zones of LGOM Mines · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Application of multi regression method for determination of relationships between geo-parameter values of seams and surrounding rocks was described in the paper. Data were taken from LGOM mine files. By means of regression method a specific functions were established. Calculations were carried out for seam, roof and floor rocks of "Rudna" and "Lubin" mines.

Keywords: rock mass mechancs, investigations of geomechanical properties of rocks, statistical investigations

STEFAN GAŁCZYŃSKI

Some Examples of Tunnels Stability in the Light of Accommodation Theory · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Problem of stability of the tunnel excavations is analyzed in the paper. This problem is shown in the light of their natural or technical accommodation to the new state of stress. The geological conditions and geoengineering works were taken into account as well. Especially there are discussed the railway tunnels in Lower Silesia.

Keywords: geoengineering, tunnels stability, accommodation theory

STEFAN GAŁCZYŃSKI, ANDRZEJ WOJTASZEK

Theoretical Analysis of Shakedown Mechanism of Tunnels Stability · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The theoretical aspect of the shakedown mechanism of stability of tunnel excavations is considered in the paper. There are discussed some factors decide of the natural or technical shakedown mechanism. Some models (schemes) of the degraded bearing systems are given.

Keywords: rock-mass mechanics, accommodation theory, bearing system

GRAŻYNA GASZYŃSKA-FREIWALD

Deformation Propertys of Laminae Clay Soils · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Clay-slates from Carpathian flysh are ekspansive soils. This property is weaken strength parameters and have an effect on landslides form. Swelling size of clay-slates is influenced by inclination of laminae. The inclination of laminae is a anisotropy of this soils.

Keywords*: clay-slates, swelling, inclination of laminae, anisotropy*

JAN GASZYŃSKI

The Mixed Initial-Boundary Value Problem of Thermo-Consolidations Theory Initial Problem · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents solution of the system of equations for consolidation of porous medium where pores are filled by a low compressible liquid. The skeleton stress, pore pressure and field temperature are coupled. The solution of an mixed initial-boundary value problem for an axis — symmetric strain state for the consolidating half-space has been analyzed.

Keywords: *soil, consolidation, temperature*

ADRIAN GOŁDA, TADEUSZ GĘBIŚ, GRZEGORZ ŚLADOWSKI, MIROSŁAW MOSZKO

Seismic Activity in the Conditions of Low Strength Rock Formations, Based on Coal Mine "Ziemowit" · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

High seismic activity on Coal Mine "Ziemowit", occurred at the beginning of the eighties, was a big surprise for a mining science. Mining seismicity has been connected with exploitation of coal seams 207, 208 and 209 — łaziskie series. Theory, that low strength rock formations cannot generate high energetic tremors (106–107 J and more) has been verified by the reality. Since that time a Geophysics Station on Coal Mine „Ziemowit" has recorded more than 1300 such tremors. In this paper level of seismic activity and rockburst hazard in Coal Mine „Ziemowit" is presented. Changes in the way of calculating rockburst hazard were presented and further studies of mine tremors phenomena were considered. Issues described in this paper were presented on the 14th European Meeting of Environmental and Engineering Geophysics of the Near Surface Geoscience Division of European Association of Geoscientists & Engineers.

Keywords: *rockburst hazard, seismic activity, mining edges, liability to rockburst, tremors mechanism*

MONIKA GWOŹDŹ-LASOŃ

Simple Numerical Models of Reinforced Subsoil Used as a Easy Way to Chose Optimal Reinforced System · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper considers the issue of numerical modeling the reinforced subsoil. Based on a number of numerical simulations results the author presents an instruction who to built a simple numerical model of reinforced subsoil by gravel-columns or piles. The paper constitutes an attempt to summaries and generalize earlier research which involved FEM numeric procedures and the Z_Soil package, and utilized an elastic-plastic model of a ground medium. The simple numerical model of reinforced subsoil can be used to estimate the influence of the load bearing capacity, reflecting the local geotechnical properties of the ground on the market value of this estate.

Keywords: *FEM, numerical analysis and simulations, reinforced subsoil, numerical models of reinforced subsoil, economical aspect of soil reinforced systems*

JANUSZ JANKOWSKI, BRONISŁAW PAWSZOK

The Rockburst Hazard During Longwall 8 Mining in the Seam 510, Bottom Layer in the "Bobrek-Centrum" Colliery · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The article presents the formation of the real rockburst hazard condition and scope of applied active rockburst prevention on the longwall 8 located in the north-eastern part of the Mining Area "Bytom-Centrum I", "Bobrek-Centrum"

Colliery, in the safety pillar of the town Bytom. The seam 510 in the panel of longwall 8 occurs at the depth of 550–730 m, with the inclination 5–110 towards south-west; the seam thickness amounts to: 9.0–9.7 m. During longwall 8 mining in the seam 510 occurred periods with enhanced seismic activity. On account of the rockburst hazard formation, two essentially differing periods of longwall 8 mining can be distinguished: from longwall operation start till the end of September 2007 and from October 2007 till the present moment, i.e. till 7 December 2008. The finally worked out active rockburst prevention in the form of shock and camouflet blasting in the seam, torpedo blasting in the roof and high-pressure water injection into the seam coal solid as well as technical limitations (daily advance up to 2.1 m and longwall height up to 2.3 m) allowed to continue longwall 8 mining in the seam 510. In consequence the majority of strong tremors was provoked by active rockburst prevention, mainly camouflet blasting as well as camouflet and preconditioning. High efficiency indicates also the method of high-pressure water injection into the seam coal solid. The long period (up to 25 hours) of maintaining of water pressure, knocks, destressing and tremors as well as seismoacoustics emission increase, occurring during the water injection on longwall 8 in the seam 510, prove the efficiency of this method.

Keywords: active rockburst prevention, preconditioning, torpedo blasting, high-pressure water injection

KRZYSZTOF JOCHYMCZYK, WACŁAW M. ZUBEREK

Displacements of the Central Part of the Upper Silesia Coal Basin Measured by GPS Method · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The seismological study carried out in the area of the Upper Silesia Coal Basin shows the close connection between strong tremors and geological structure. In this region tectonic stresses can be intensified by other stresses which have occurred owing to mining exploitation. To obtain the most valuable information on this relation leading to its plausible interpretation, it seems to be purposeful and advisable to apply geodynamical investigation. However, such a kind of investigation belongs to a long-term one, and its interpretation is relatively difficult owing to the fact that the area is under the intensive mining exploitation resulting in large dislocation and mining damage. That is why the geodynamical investigation in such troublesome region, despite the use of a high-tech GPS method, should be additionally developed by making detailed geological inspection and seismological research. Moreover, a geological survey should be done with great accuracy in the region of mining activity because it plays a key role in a complex interpretation based on obtained data. In the paper preliminary results of GPS measurements taken from 8 survey points are presented. The survey points were located meridionally in the north and central part of the USCB between Świerklaniec town and Mikołów town.

Keywords: GPS, geodynamics, mining, exploitation, displacement, neotectonics

JÓZEF KABIESZ, RENATA PATYŃSKA

Investigation of the Range and Intensity of Fracture Zones around the Passageway Galleries · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

In the Carboniferous stratified rock mass there occur discontinuity systems coupled to its lithologic structure and the structural features of rocks. The formation of an opening causes the cracks to part, which frequently leads to the essential degradation of the rock mass strength parameters around the opening. Changes in the rock mass properties around the excavation can be of the highest importance to the selection of its proper support, as well to the assessment of maintenance requirements, hazards occurring in its vicinity, rock mass imperviousness, etc. The problem of the fracture distribution around excavations has been confined to the characteristic of natural fractures. The rock fracture distribution has been investigated and assessed based on the *in situ* performed studies of endoscopic bore-holes and on the aerometric measurements. From the obtained results of the analysis and the existing rock mass classifications, the fracture characteristics of the surroundings of the excavations under study are presented and, for example, the rock mass imperviousness classification needed for their use in the formation of underground storage facilities to store gases and liquids is given.

Keywords: mining, rock mass, fracture system

JANUSZ KACZMAREK

Comprehensive Investigation of Lateral Earth Pressure Coefficient Based on Laboratory Measurements of Friction Resistance · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

An apparatus for estimation of lateral earth pressure coefficient is presented. Details of the apparatus as well as method of measurement are discussed. Three different schemes of sample loading in the apparatus are considered.

The first one, called as standard one, takes into account the friction forces acting on a top surface and side surface in circumferential direction. The second loading scheme, called as extended one, takes into account the friction forces acting on sample side surface in the vertical direction, in addition. The third loading scheme, considered as the generalized one, includes also the ballast of the apparatus cylinder. The three different types of loading schemes lead to different final forms of equations enabling for determination of lateral earth pressure coefficient. It is noted that the values of lateral earth coefficient determined are, however, almost the same, independently of the loading scheme used for consideration.

Keywords: soil properties, lateral earth pressure coefficient, laboratory investigations

JANUSZ KACZMAREK

Bearing Capacity of Hydrotechnical Tunnel Support in "Żelazny Most" Tailings Dam · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

In the paper a problem of estimation of bearing capacity of industrial hydrotechnical tunnel is discussed. The results of tunnel state exploration after twenty years of its use are published. The strength results for concrete samples taken from examination well bored in tailings dam are presented. Method of measuring of pipe wall thickness with ultrasound technique, together with basic ways of controlling the results obtained with the method, is also described. The problem of designing of massive underground structure linings for different strength criteria is discussed. Stress state solutions for elastic-perfectly plastic model with Coulomb-Mohr yield function and non-associated flow rule are considered. Problems of non-uniqueness of solution, singularities on plasticity surface and some other model contradictions are clearly pointed out. The results of numerical solutions of tunnel support bearing capacity for assumed different models of concrete behavior, i.e. elastic, elastic-perfectly plastic and elastic-brittle, are presented. The value of critical ordinate of dam's top at which the tunnel support reaches bearing capasity is estimated.

Keywords: hydrotechnical tunnel, concrete tunnel liner, in situ investigation, evaluation of liners

MAREK KAWA, MATYLDA TANKIEWICZ

Application of Microstructural Strength Criterion to Assessment of Slope Protection in Varve Clay · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Application of anisotropic strength criterion to the problem of slope protection assessment is presented in the paper. Criterion used for analysis is a conjunction of anisotropic Pariseau criterion and critical plane equation. A simplified procedure of identification for varve clay is presented. The boundary-value problem is solved using FLAC environment together with author's numerical implemented of criterion. Results in form of displacement vector fields and graph of axial force in anchor tie depending on stratification angle show strong influence of soil strength anisotropy on the solution of the problem.

Keywords: strength anisotropy, slope protection, varve clay

PIOTR KIJEWSKI, JAN LIS

Impact of Mine Brines on Mechanical Properties of Rocks in Copper Mines · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

There are different mining conditions resulting from the properties of rock-mass in the copper deposit. The new feature is the presence of brines with salt content increasing with the depth of ore. The paper presents the results of investigations on the impact of mine brines on basic strength and properties properties of select varieties of sandstones and carbonate rocks.

Keywords: geomechanical properties, laboratory investigations

MILOSLAV KOPECKÝ

Expected Geotechnical Problems on Expressway R4 in East Slovakia · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Today Slovakia has experienced an unprecedented boom in preparation and construction of road network, especially preparation and following construction of expressways and highways. Among the projects under design

in the Eastern Slovakia an important task is also N-S interconnection by an expressway R4 from the border with Poland to the border with Hungary. The section proposed at the Slovak territory will attain a total length of 108 km. Engineering geological investigations for most of the R4 expressways sections is already done and the sections are prepared for constructions. The investigations were performed for selection of the best variant for construction and it proved that the expected geotechnical problems will be limiting for the construction. However, the greatest risk comes from the landslide occurrence, especially in the zone of the outer flysch zone, through which the northern part of the R4 leads. The article presents in detail one selected variant of R4 expressway, where the landslides played the most important role for the selection as well as the occurrence of mineral springs which could be threatened. Recently, from the whole R4 expressway only by-pass road around Svidník is under construction, where in some places with landslide occurrences the expressway objects were threatened.

Keywords: engineering-geological investigation, expressway, landslides

JÓZEF KOSZELA, KAZIMIERZ GRABAS, JÜRGEN HARTSCH

Application of the GIS Methods for Identification, to Catalog and Assessment of Hazard to the Environment Caused by Uranium Mine Facilities · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The legacy of the liquidated uranium mine industry and its surface activity are mining damage and abandoned objects, hazardous to the environment. To date, the basic obstacle, which prevented remediation of such mine grounds, was lack of complex profile of particular objects and risks related. The paper presents methods for application of the Geographic Information Systems (GIS) for identification, to catalog and for assessment of hazard to the environment caused by uranium mine facilities and mining damage. The methods were implemented in five place, in three districts of SW Poland. Apart from the tools specific for GIS, there were utilized German experience. Moreover, it was pointed out that the data may be effectively used for geotechnical intervention, being an important part of the terrain remediation process.

Keywords: uranium mine industry, mining damage, mine facilities, hazard, GIS

EWA KOSZELA-MAREK

Characteristics of Nacl Solutions Compressibility Changes under High Hydrostatic Pressures · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents results of changes in compressibility of water and salt NaCl solutions of concentrations 5, 10, 20 g/dm^3 under high hydrostatic pressure from 50 up to 400 MPa in 21ºC. Special apparatus was used by compressibility researches — the high-pressure research position. Compressibility for NaCl water solutions evolved non-linearly. A clear relation appeared between changes in the volume of NaCl solutions, and the size of operating pressure. Relation is also visible between compressibility and the size of concentration of the researched solution. The biggest change in volume (8.96%) appeared by the solution with the smallest concentration (5 g/dm^3), under the biggest pressure (400 MPa). The smallest change in volume (1.62%) was noted for solution with the biggest concentration (20 g/dm^3), under the smallest pressure (50 MPa).

Keywords: compressibility, salt solutions, high hydrostatic pressures

EWA KOZIELSKA-SROKA, MAGDALENA CHĘĆ

Properties of Bottom Sediments of Czorsztyn Reservoir in The Aspect of Their Usability for Earth Structures · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The subject of the paper is the problem of landforming of Czorsztyn Reservoir and transformation of abrasion slopes soils granulation resulting from washing out of fine particles, as vell as accumulation of bottom seoliments. An attempt of poiting up the possibility of using the bottom sediments for sealing of earth hydraulic structures and for insulation diaphragms of waste deposits has undertahen.

Keywords: bottom sediment, reservoir, geotechnical properties

MIROSŁAW LASKOWSKI, ROMAN FEDORCZAK, ARKADIUSZ ANDERKO

Exploitation of Copper Ore in Conditions of Cavern Dolomite Occurrence on the Roof Of Excavation on Example of G-12/7 Field of KGHM Polska Miedź SA "RUDNA" Mine · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents, on example of G-12/7 field, mine experiences in copper ore exploitation in complicated geological conditions, connected with low endurance parameters cavern dolomite occurrence on the roof of excavations.

Keywords: exploitation of copper ore deposit, excavation collapse hazard, prevention, cavern dolomite

MARIAN ŁUPIEŻOWIEC, JERZY SĘKOWSKI

The Influence of the Dynamic Consolidation of the Subsoil on Deformation the Surrouding Ground · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

In paper possibilities of mining lands development in Upper Silesia are presented. Subsoil of described lands is an embankment compound with waste rock. One of the most efficient methods of the subsoil strengthening is dynamic Menard's consolidation, which is suitable especially for non-homogeneous and loose soils. Besides compaction of soil layers, this strengthening causes the harmful waves propagation and the deformation of the surrounding lands. As an example it presented the construction of the housing estate "Oak Terraces" in Katowice. It presented technological parameters of used dynamic consolidation and measurement results of settlements of the surrounding ground and buildings existing on them.

Keywords: waste rock, dynamic consolidation, deformation land

DARIUSZ ŁYDŻBA, ADRIAN RÓŻAŃSKI

Statistical Characterization of Geometrical Measures of Random Microstructures: Definitions, Properties and Applications · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper deals with statistical analysis of random two-phase heterogeneous media. The *n*-point probability and the *lineal-path* functions are considered. Both correlation functions are calculated using algorithm based on Monte Carlo simulations. Three different types of random microstructures are studied. Basing on numerical results, some properties of these correlation functions are presented as well as an example of their application.

Keywords: correlation function, random media, n-point probability, lineal-path function

JANUSZ MADEJ, MONIKA ŁÓJ, SŁAWOMIR PORZUCEK

Gravity Modelling of Loosening Zone in Metamorphic Rock over Hole · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This paper presents the possibility of use of the microgravity method to recognize loosing zone over the hole hollowed in metamorphic rocks. Against a background of development of microgravity method there are presented an description of research method. This method consist in interpretation of microgravity observation over the well-known hole The interpretation is conducted by gravity modelling. Achieving results proved the diversity view of density changes over this hole.

Keywords: geophysics, microgravity, geomechanics

AGNIESZKA MAJ

Stress, Strain and Convergence at Various Depths of Salt Mines, the Modeling Study for the Gallery in Salt Rock Mass · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper presents the influence of depth on stresses and strains around the gallery in salt rock mass. The method of taking the values of initial stresses corresponding to the state of stress in salt rock mass for analyses is described. The distributions of stress, strain and convergence of gallery are calculated for elastic-viscous medium using Finite

Element Method. The results of this paper may be used for recognition of the stress conditions in salt rock mass and estimation of viscous properties of rock mass on the basis of the convergence measurements at various depths.

MARIAN MARSCHALKO, LUBOMÍR TŘESLÍN, MATEJ FUKA

Possible Impact of Current and Former Mining Activities on a Research Locality in the Ostrava – Karviná District · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The paper deals with a study of black coal underground mining activity impact (working district of Poruba and Lazy) on the locality on which current activity of ground morphology change is manifested, which was earlier attributed to the manifestations of older slope deformation. However, the method of geotechnical monitoring using the method of precise inclinometry combined with isocatabase maps in chronological order, ground deformation parameters and geophysical measuring proved the connection of this activity with the existence of discontinuous deformations formed due to undermining in the Ostrava – Karviná District, a significant mining region in the north-east of the Czech Republic. Localization of inclinometric measuring on holes in the active part as well as in near vicinity was important, which in case of inclination of both holes is evidence of undermining impact. During the monitored period dilatation of the ground surface occurred, which shows on a discontinuous deformation in the convex part of the subsidence trough slope. This fact probably causes changes in the state of stress from undermining, which may influence the formation of those phenomena. The application of such a methodology proved as optimal and can be recommended for other purposes in relation to undermining impacts.

AURELIA MODL, JAROSŁAW RYBAK

Low-Strain Integrity Testing of Driven Piles · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This work addresses the possibility of the implementation of non-destructive testing (NDT) in the diagnostics of pre-cast concrete piles. At present, numerous techniques are available in order to test the piles from the point of view of both their load capacity and also their quality. The testing of the pile integrity and length by means of *Low-strain* methods has the advantage of being simple, cheap and quick. The only possible difficulty may occur during the analysis of the results, especially as far as the velocity of wave propagation, as well as the ambiguity of the signals received, is concerned. Undoubtedly, however, the possibility to control the conformity of an executed piling with its design is the main reason why the presented method should become commonly used.

ANDRZEJ NIEROBISZ, ANDRZEJ KOTYRBA, GRZEGORZ MERTA

Stability Assessment of the Szachownica I Cave Roof · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

It the paper, chosen results of investigations were presented of cave Szachownica I roof fracturing realised with the help of introscope camera and georadar. The roof stability assessment was performed on the basis of analytical formulas.

SEBASTIAN OLESIAK

Application SWS Probe in Measurement of Miocene Krakowieckie Clay · Kwartalnik Górnictwo i Geoinży-nieria · z. 1, 2009

Polish Standard PN-B-04452:2002 which concerns field measurement with application of (among others) Swedish Weight Sounding (SWS) probe gives an interpretation of results only for non cohesive soils. Scarcity of results interpretation for non-cohesive soils to some extent disqualifies this tool for estimation of strength parameters of those soils. Geotechnical textbooks provide some information about interpretation of results of measurements with

SWS probe. However interpretations published there for cohesive soils are different than the once observed by the author. Present paper shows a proposal of interpretation of SWS probe measurement results for Miocene krakowieckie clay. The paper can be a base for future, full interpretation of cohesive soils measurement with application of SWS probe and can be useful during works on project of new Polish Standard.

MAGDALENA OSŁAWSKA, WOJCIECH PUŁA

Stability of Anchored Walls Embedded in Cohesive Soils by Variationl Method · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This paper presents a solution of an anchored retaining wall problem using an approach of classical variational calculus, that allows the three equilibrium equations to be taken into account. The problem is formulated as an isoperimetric problem of variational calculus and a closed-form solution of Euler's equations is found. Unfortunately, in general case, extremes of the functionals involved in the problem under consideration can not be found in an analytical way. In this circumstances a crucial point was establishing of bounds for the domain of the investigations of the functional maxima. Next, based on bounds derived, a numerical procedure for finding maxima has been worked out. The problem in the case of cohesionless soil has been solved by an earlier paper of the second author. Now the solution has been extended for the case of cohesive soils. In order to obtain a reasonable solution a new numerical algorithm has been elaborated. Finally a numerical analysis for the case of wall embedded in a cohesive soil has been carried out. An important finding is that the classical Coulomb's wedge method, which ignores the moment equilibrium equation, is an unconservative approach and hence provides an unsafe solution for the anchor force.

JOANNA PIECZYŃSKA, WOJCIECH PUŁA

Application the Random Finite Element Method to Analysis of Strip Footingbearing Capacity Random Variability Factor · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Accepting specified soil properties to a designing process plays a vital role in safety of foundations. Taking this problem into consideration the authors tried to analyse bearing capacity predictions, involving random soil properties, by the random finite element method (RFEM). The analysis has been confined itself to a strip surface footing on the weightless cohesive subsoil. The soil properties have been modeled by lognormal cohesion random field and specially selected friction angle random field of bounded distributions. The numerical computations have been carried out by the finite element method in conjunction with Monte Carlo simulations. They have resulted by the first two statistical moments of bearing capacity. Moreover this analysis have shown the importance of the correlation length values as well as its changes in horizontal and vertical direction on bearing capacity predictions. At the end the authors try to relate to the worst case of correlation length to which bearing capacity is the lowest.

SŁAWOMIR PORZUCEK

Microgravity Survey Seated over Shallow Old Adits Drifted in Sandstone · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Shallow underground exploitation of mineral and rock resources has left behind shallow-seated workings that often are made accessible to tourists. Therefore the crucial matter is to determine the stability of the underground workings. Geomechanics research and modeling are applied to solving the problem. This paper presents the use of the microgravity method to recognize density distribution in the rockmass overlying old mining workings. Results of investigations made over three adits drifted in the Istebna sandstones. Rock slackness zones were discovered over two galleries. As a result of the gravity modeling, the size of the zones and bulk density decrease were obtained. The results should help in construction of right geomechanics model as well as qualitative evaluation of the condition of workings.

ADRIAN RÓŻAŃSKI, DARIUSZ ŁYDŻBA

Some Remarks on the Size of Representative Volume Element (Rve) in Case of 2d Lattice Model · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The aim of this work is to propose a more quantitative definition of representative volume element (RVE), i.e. by defining both the size of the sample and the sufficient number of realizations. The methodology is applied to a specific random microstructure, namely two-phase two-dimensional square lattice model. It is shown that the geometrical property, namely volume fraction, can be determined either for large samples and a small number of realizations or smaller volumes can be utilised providing that a sufficient number of realizations are considered. It is proved analytically that in case of transport properties there exist some threshold value of the size of RVE below which the results do not converge towards effective properties. This size of the sample is determined by making use of the properties of the two-point probability function.

Keywords: representative volume element (RVE), effective properties, two-point probability

ADRIAN RÓŻAŃSKI, MACIEJ SOBÓTKA

A Procedure of Underground Excavations Shape Optimization · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

A new condition in view of underground excavation shape optimization is proposed. Linear elastic model of rock mass is assumed. Both ellipsoidal and half-ellipsoidal excavation shapes are considered. In order to verify the proposed criterion numerical results are compared with the solution formulated by Sałustowicz. Numerical simulations are performed and the conclusions are formulated.

Keywords: underground excavation, shape optimization, linear elasticity

JAROSŁAW RYBAK, ELŻBIETA STILGER-SZYDŁO

Subsoil Recognition that Accompany the Execution of Objects In Infrastructure of Land Transport · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

This work addresses the specificity of the programming and the performance of in situ subsoil investigations that accompany the execution of road and bridge facilities. Special attention has been paid to the faults in subsoil recognition and their consequences in the designing and the execution of construction works. The examples of such faults have been presented in relation to pile foundation designing.

Keywords: subsoil, in situ investigation, road and bridge facilities

URSZULA SANETRA, JERZY GAWRYŚ

Physical-Mechanical Properties of Limestones from the Szachownica Cave · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

In the paper, results were presented of works targeted on recognition of physical-mechanical properties of limestones forming Szachownica Cave being the second bat settlement in Poland with respect to its size. The cave is subjected to an advanced process of destruction under impact of natural factors as well as human activities. An opinion was developed for Silesian Voivodeship Office on the basis of laboratory tests and *in situ* measurements conducted. In the opinion, several variants of cave protection were proposed targeted on stopping of the cave destruction advancing process and preserving the cave in a state enabling a fulfillment of its functions it has been playing so far in the environment.

Keywords: security, investigation laboratory, physical-mechanical properties, limestone

JACEK SOBCZYK

Investigation of Some Phenomena Leading to an Outburst in Laboratory Conditions Employing Upper Silesian Coal · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Research on Upper Silesian coal concerning some aspects of initial conditions of coal and gas outbursts has been presented in this paper. All works have been done by means of artificial material — coal briquettes — and on the basis of previous experiences with the Lower Silesian coals. Achieved results point out, that in order to initiate

outburst there need to be a pressure gradient equal or greater than tensile strength of coal and it should be adjoined to the coal face.

ANDRZEJ STANIEK

Roof Section Monitoring System in the Aspect of Quality Assessment of Grouted Rock Bolts · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The rock bolt support system plays a great role as an element of safe maintenance of roof sections in coal mines almost all over the world. With the aim to develop an efficient monitoring system of quality of grouted rock bolts an apparatus of new generation was invented. The monitoring system is based on the method for non-destructive identification of continuity of resin layer of grouted rock bolts [10], worked out in Central Mining Institute. The apparatus has implemented new registration methods, wireless data transfer and robust enclosure capable to resist heavy environmental conditions (IP65). A new way of exporting collected data is proposed as well as launching of analytical and diagnose center for assessment of quality of rock bolt installation in Central Mining Institute is recommended. In the article the outline of the method, technical description of the invented apparatus, wireless data export to a workstation after measurements and validation of the measurement chain are also presented.

JOANNA STRÓŻYK

Silty Soil Characteristic Exemplified by Loess from Wroclaw Area · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

The results of laboratory examinations, of silty soil compressibility were presented. The soil sample have been taken from Wrocław area. Silty soil are creating a number of problems in geoengineering. The soil structure is characterized by a great sensitivity to changes water content what causes fast changes of engineering properties caused among others with change of the state from the unsaturated to saturated. In the paper a silty soil structure sensitivity was examined for the water content changes. The assessment were done by comparing of the oedometer curve get from test of soil about the natural structure, at first saturated as well as unsaturated with water, with oedometer curve gets from soil sample about the structure prepared in laboratory.

HANNA B. SUCHNICKA

Significance of Preconsolidation Pressure in Engineering · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

In the opinion of some scientists and engineers the knowledge of the preconsolidation pressure σ'_p is a requisite for the evaluation of subsoil subsidence. The aim of the present paper is to demonstrate that such knowledge is not required in every instance. The problem is discussed taking as examples several compressibility curves for soils exhibiting different types of overconsolidation (due to unloading or aging, or of a structural nature) which is related to the stress value. It seems worth remembering that the compressibility of normally consolidated soils decreases when stresses increase. This means that the stress interval where the relations $(e - \sigma')$ are linear becomes wider.

JAN WALASZCZYK, STANISŁAW HACHAJ, ANDRZEJ BARNAT

Spectral Analysis of Building Vibrations Caused by Mining Quakes · Kwartalnik Górnictwo i Geoinżynieria · z. 1, 2009

Building vibrations are registered by the measurements of velocity and acceleration. There is question of the quality of these measurements as far as, for example, calculating one of those variables based on the other one is concerned. The answer to this question was searched for by means of spectral analysis of velocity and acceleration measured velocity.