

## Summaries

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*JERZY CIEŚLIK, DANUTA FLISIAK, JERZY FLISIAK, JAKUB MAZUREK*

**3D Pillar Strength Numerical Analysis in the Pagory Region of “Barycz” Salt Mine** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

This paper presents results of the three dimensional, geometrical and numerical modeling of cavern layout in the Pagory region of Barycz salt mine excavation region. In the first part of the paper authors perform 3D geological and mining situation geometrical model and prepare the whole region cavern representation. The stress and strength distribution maps obtained from numerical analysis allowed evaluation of strength of the salt pillars and regions of high probability of caverns hydraulic connectivity. Finally, a numerical calculations result was compared with mining caverns hydraulic connectivity investigations.

**Keywords:** *3D geometrical model, numerical calculations, pillar strength*

*ANDRZEJ DOMONIK*

**The Detection of Structural Anisotropy in Flysch Sandstones Using a Simple Techniques of Computer Image Analysis** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The study presents the results of investigations of joints surface texture obtained during indirect tensile strength tests on oriented samples of cergowskie sandstones. The techniques and method of quantitative analysis of crack roughness using fractal dimension were presented. Computed values of fractal dimension of precise specified, forced failure surfaces, were compared with directions of natural joints measured in terrain.

**Keywords:** *anisotropy, image analysis, stress, joints, fractal dimension*

*JAN DRZEWIECKI*

**Determination of a Destructive Influence Area for Seismic Events** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The article describes a method to calculate the range of a destructive influence area for seismic events, that is the area where destruction of working may occur. The basis for calculation of this range was the analysis of selected parameters of documented tremors which had taken place between 1990 and 2006. In the calculations a method of forecasting of seismic energy dependent on the intensity of exploitation with focus of tremors located in the front of coalface. Calculations were made for zones which size assumes probability of 20%, 50% and 80% of working destruction. Also an example of calculations for exploitation of a coal seam 750 meters below ground has been given.

**Keywords:** *rock mass, exploitation, seismic tremors*

*BARBARA DUTKA, MIROSLAW WIERZBICKI*

**Some Properties of Outburst Prone Coals in Upper Silesian Coal Basin, Poland** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Two sudden outbursts of gas and coal have occurred in the hard coal mine “Zofiówka” in the Upper Silesian Coal Basin (USCB — Poland) last years. Both incidents took place in a district which had been acknowledged hitherto

as a not endangered by that kind of hazard. It seems that the outbursts in USCB have a local nature and their incidence is connected with presence of geological disturbances in the rock mass. This paper summarises some results of the following laboratory measurements carried out for coals from the "Zofiówka" hard coal mine: sorptive properties of coal, their porosity and gas capacity. Coals of modified structure were tested and the tests results were compared with results obtained for coals of normal structure. Some obtained results show that coals of modified structure have higher gas capacity and diffusion coefficient than their non-modified counterparts as well as they have high porosity and low conciseness. These properties may cause a significant increase of gas and coal outburst hazard in the areas where coals of modified structure occur. Obtained results allow to understand better the mechanism of coal fracture and can lead to increase of safety of coal exploitation.

**Keywords:** *gas and coal outburst, methane, coal structure, sorption*

WŁODZIMIERZ FIGIEL, EWA KAWALEC-LATAŁA

**Analysis of Some Acoustic Pseudo-Impedance Section Images** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Approximate distribution of acoustic pseudo-impedance can be obtained from calculation of inversion of the seismic section. That data of the acoustic resistance distribution are the base to image creation and visual interpretation of surrounding rock morphology. That method is useful for lithology-phacial changes detection in case that the changes have response in acoustic resistance changes. In practice, high-level noise signal in coexistence with useful one, make interpretation difficult, if not even impossible. In the paper are suggested some methods of image analysis and processing to enhance the acoustic impedance image feature visualization. That is the way to increase image interpretation credibility in process of lithology-phacial change detection in salt deposits.

**Keywords:** *image processing, pseudo-impedance acoustic section, visual interpretation, salt deposits*

KORNEL FRYDRYCH

**Research of the Influence of the Coefficient of Subgrade Reaction on Underground Excavations' Lining Bearing Capacity** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Distinguishing feature of the underground excavations' lining (including tunnels) is their cooperation with a rock mass i.e. displacement on the lining and rock mass contact causing the creation of the forces (elastic passive rock mass pressure) which act beside active rock mass pressure. This fact caused that is necessary to take it into consideration in static calculations. Used method has two faults: it doesn't take into consideration both lining structure influence on the value of the coefficient of subgrade reaction and the variation of this coefficient value connected with the changing of the excavation radius in the breakthrough. The paper presents elastic passive rock mass pressure influence on designed distance of steel arch support. The lining structure influence on the elastic passive rock mass pressure value was also discussed.

**Keywords:** *lining design, coefficient of subgrade reaction, elastic passive rock mass pressure, underground excavations, tunnels*

STEFAN GAŁCZYŃSKI, ANDRZEJ WOJTASZEK

**Self-Accommodation Process of Degradated Rock-Mass into Geoengineering Caring System** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The rock-mass (rocks and soils), degraded during geoengineering working, as a construction material is characterized in the paper. This material is self-able to form the carrying systems such as an axial compressed rock beam or, into the degraded rock-mass, as an yielding pressure arch. The self-accommodation process is described as: the changing calculation schemes, the transforming boundary conditions implicated by redistribution of the internal forces. Some calculation formulas are given there.

**Keywords:** *rock mechanics, accomodation theory, carrying system*

WŁODZIMIERZ HAŁAT

**Use of Calculation Procedures for Solution of Bent Beams** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Codes of Computer Algebra System (CAS) belong to a common codes group. It is necessary to emphasize, there are not ready codes for a specific calculations, connected for example with a strength of materials discipline and especially for bent of beams. Sending of the routine algorithmic calculations to the computer, by means of the methods presented in the paper, the procedures based on the CAS and the distribution calculus may bring many advantages. The most important one is a simplification and shortening of notation. Knowing that the CAS method eliminates calculus errors the procedures will be considered as a means but not a final goal. In the paper there were presented the worksheets including solutions for of two beams. After choosing from the menu Edit/Execute/Worksheet option it is enough to press enter button to get the solutions in the form of charts describing the bent beams. The calculations have been performed with the Maple's. The presented procedures recorded in the "Proc\_beam" file are "ready for use" that facilitate and simplify use of Maple's for solution of bent beams.

**Keywords:** *Maple, symbolic calculus CAS, distribution calculus, calculation procedures, beam bending, beam deflection charts, charts of rotation angles of beam cross section, bending moments' charts, charts of shear forces*

ANDRZEJ JANOWSKI, MACIEJ OLCHAWA, MARIUSZ SERAFIŃSKI

**Closing the Mining Fields Based on the Example of Planned Closure of East Polkowice Region in the "Polkowice-Sierszowice" Mine** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The issues concerning closing the separated mine region are presented in the paper. Basic formal and legal regulation are discussed and problems concerning the possible hazards which may occur in the area being closed as well as technical issues are presented. All aspects are presented on the example of the concept of East Polkowice region in the "Polkowice-Sierszowice" mine closing taking also into consideration closure of P-III and P-IV shafts.

**Keywords:** *mine closure, mine region closure, natural hazards, mine design*

ANDRZEJ JANOWSKI, MACIEJ OLCHAWA, MARIUSZ SERAFIŃSKI

**Possibilities of Using the Workings Located Close to Gobs for Ventilation and Transport Purposes During the Mine Region Closure** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The paper presents the analysis of behavior of some example, existing ventilation and transport workings located in the vicinity of gobs in LGOM mines. Evaluation of their stability was presented as well as factors influencing on maintaining the functionality of working located in gobs.

**Keywords:** *closing mining fields, maintaining workings, ventilation, transport*

ADAM KANCIRUK

**Method of Ultrasonic Wave Velocity Measurement in Rock Specimens under Laboratory Conditions** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The measurement of the ultrasonic wave velocity in the process of uniaxial deformation of rocks specimens makes it possible to determine the degree of its internal destruction. For this purpose a standard testing device is equipped with a pair of special anvils. Each of them contains two piezoelectric ultrasonic transducers: one for P-wave, the other for S-wave. The tested cylindrical specimen is placed between the anvils after covering its faces with thin layer of couplant. The transducers of one anvil play the role of waves transmitters. They are attached to a typical industrial defectoscope output across a switch. Thus, electric pulses generated by the defectoscope can excite alternating both transducers. The transducers of the other anvil play the role of waves receivers. They are attached to two channels inputs of an analog-digital oscilloscope functioning in the digital mode. In this way the received signals can be easily observed on the oscilloscope display. In addition the oscilloscope synchronizing input is connected with the defectoscope output. It makes it possible to measure the period between the falling slope of the exciting pulse and the peak of the first positive pulse of the received signal. Thus, the P- or S-wave delay can be

manually measured every 30 s with resolution of 20 ns. During the test another quantities like load, longitudinal and transverse strains are automatically measured and recorded. The obtained data can be used for elaborating rock material characteristics.

**Keywords:** *rock mechanics, electronics, metrology*

WŁADYSŁAW KONOPKO, MIROŚLAWA BUKOWSKA

**The  $\tan \beta$  Parameter a Degree of Rock Mass Susceptibility to Bumps** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The geological and mining law introduces the term of “the rock mass susceptible to bumps”. Many classifications of rocks or rock mass concern only the general building, tunnel building or hydrogeological building. They describe rocks or rock mass properties on the small area. These classifications are not very useful for the bump issue, although the bumps result from all the geological and mine conditions of the mine workings, especially conditions that come as well from the strength, lithological and petrographic properties of rocks in the direct neighbourhood of the mine working, up to the ground surface, as their changes resulting from the geological disharmony and exploitation events in the concrete time and place. The author presented in the article the degree of the assessment of rock mass susceptibility to bumps on the basis of the range of main exploitation influence on the ground surface, in the theory Budryk-Knothe known as  $\tan \beta$ .

**Keywords:** *mining, susceptibility to bumps, parameter  $\tan \beta$*

GRZEGORZ KORTAS

**Influence of Physical Properties and Geometry of Salt Dome on Its Uplift** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Research model 3D had been carried out for testing elastic-viscous body as the representation of salt dome formation and formations in its surroundings. Finite element method was used for describe salt dome uplift rate. Influence of: density difference of salt dome and formation in dome surroundings, density of cap dome, viscosity of salt rock, high of salt dome, decline of salt dome wings on was the subject of research. The relations between dome uplift rate and density, flexibility on creep B in Norton creep law, geometric elements were shown as formulas in this paper. Consequences of these functions are compatible with geologic hypothesis about of salt dome uplift.

**Keywords:** *FEM, halokinesis, salt tectonic, diapir*

ANDRZEJ KWINTA

**Selection of Elementary Field Size for Subsidence Numerical Calculation** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

To calculation deformation coefficient we used notions: elementary function, elementary influence, elementary field. In consequence of partition exploitation field for elementary field we can change integration for summation. Results of calculations placed in the paper indicate that only size, not form of elementary field have influence for subsidence calculation precision.

**Keywords:** *subsidence prediction, elementary field*

MONIKA ŁÓJ

**Gravity Research on Dynamics of the Area Salt Dome “Dębina”** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

This paper presents results from two geodynamic profiles; located of the “Dębina” salt dome in Bełchatów. “Dębina” salt dome separates Bełchatów deposit from Szczerców deposit. Currently, the exploitation on the Bełchatów field approaches the salt dome limits and at the same time the construction of the new Szczerców strip mine has been started, which influences the dynamics of the phenomena occurring in the salt dome. The idea behind this research

project is to attempt to quantitatively interpret the results received from the gravimetric investigations i.e. to link temporal gravity changes with processes on “Dębina” salt dome.

**Keywords:** *gravity measurement, contemporary geodynamic processes, temporal gravity changes*

AGNIESZKA MAJ

**Dependence of Areal Convergence of Rectangular Gallery on Parameters of Elastic-Viscous Medium, Based on Model Research** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Dependence of relative areal convergence and its rate on slenderness of rectangular gallery and Young modulus has been presented in this paper. FEM and Cosmos/M were used to compute of displacements in elastic-viscous medium. Parabolic relation between slenderness and convergence was obtained as well as hyperbolic relation between Young's modulus and convergence. Minimum values of functions were reached for slenderness  $\lambda = 1$  and values of these functions were the same for slenderness  $\lambda$  and  $1/\lambda$ . Influence of Poisson's ratio in range from 0,2 to 0,4 was smaller. Absolute value of areal convergence and its rate decreased with increase of Poisson ratio. Results of research have been shown on figures.

**Keywords:** *convergence, FEM, elastic-viscous medium, model research*

JANUSZ MAKÓWKA, JÓZEF KABIESZ

**Rock Burst Risks Sources and Consequences Analysis in Case of Coal Mine ČSA** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

In the paper a method of possible rock bursts risk sources analysis during potentially endangered seam exploitation has been presented. Beside stress distribution in seam plane, deformation state in three roof horizons has been calculated, probable maximum seismic tremor energy during exploitation has been determined and seismic energy stream density reaching seam has been calculated. On that case, rock burst prevention scheme has been formulated.

**Keywords:** *hard coal, exploitation, rock burst, risk analysis*

PIOTR MAŁKOWSKI, ZBIGNIEW NIEDBALSKI, TADEUSZ MAJCHERCZYK

**Roadways' Convergence Based on Numerical Calculation and Its Verification by “In-Situ” Research** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Numerical models are common in use to evaluate the roadways' stability. The main task to solve the problem is to choose the appropriate model and rock-mass parameters. Only the above will ensure the working's proper function. Simultaneously only underground research carried out after the working drifting can confirm any necessary correction of numerical calculations. The numerical calculation results for two coal mine roadways were presented in the paper. The steel arch support was used in these workings — the most popular in Poland. Convergence measurements gave the possibility to recalculate the task. Several new elastic and elasto-plastic models were designed using the two years research. Initial assumptions were modified using the research data and the most accurate numerical models for evaluation of the workings' stability in the coal mines were found.

**Keywords:** *mining workings, convergence research, numerical verification*

ANDRZEJ MARKIEWICZ, JAROSŁAW SUCHAN

**The Horizontal and Sub-Horizontal Tectonic Deformation and the Mine Roof Stability, Exploitation Areas G-6/7 (Division G-26) and G-7/5 (Division G-7), “Rudna” Mine, KGHM Polska Miedź SA** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The tectonic deformation of Upper and Lower Permian rocks on the Fore Sudetic Monocline appears as subhorizontal shear zones of the bottom part of Zechstein rocks in vicinity of polymetallic stratabound orebody. The dislocations

relate to the paleomorphology of the Rotligende/Zechstein boundary. The paper describes the influence of the tectonic for mining works and mine roof stability.

**Keywords:** *fore-Sudetic monocline, Zechstein, tectonic, sub-horizontal share zones, mine roof stability*

MARIAN MARSCHALKO, PETER JURISĚ

**Former Mining Area in Terms of Subsidence Caused by Undermining and Slope Movements in the Localities of Slezská Ostrava, Vítkovice and Radvanice** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The paper deals with some selected engineering-geological conditions for the needs of landscape planning. The geofactors to be studied are numerous (engineering-geological zones, workability of rocks, type of preQuaternary bedrock, floodlands, surface subsidence (caused by undermining), slope movements and radon hazard), while the paper deals with two of them. The first one is undermining, which is evaluated on the basis of terrain subsidence caused by underground mining. It is a significant criterion for the utilization of former mining landscape that is an interest area the subject of the study. The area is determined by a map sheet No. 15-43-10 in 1:10 000 scale, covering the city districts of Slezská Ostrava, Moravská Ostrava, Vítkovice and Radvanice. The second monitored geofactor is slope deformation. There is an important limiting factor for land use and it must not be ignored during landscape planning. The study is motivated by an insufficient consideration of such information during landscape planning, issuing building permits, etc.

**Keywords:** *engineering geology, landscape planning, foundation engineering, GIS*

PIOTR MICHALSKI, EWA KOZIĘLSKA-SROKA

**Influence of Weathering and Mining Subsidence on Changes of Basic Geotechnical Parameters of Coal Mining Wastes Incorporated in the Embankments of Klodnica River** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Results of tests carried out on the embankment of the Klodnica river, erected from the colliery spoils from "Sońnica" mine, were presented in the paper. Determination of the influence of natural weathering and mining subsidence on changes of the basic geotechnical parameters was the subject of the investigation. The grain size distribution, bulk density and moisture content of the material were determined after 4 and 16 years of the embankment life time at the depths in the range of 0-1,15 m below the embankment crest. The strong influence of the weathering on changes of the granulation was stated, particularly visible in decrease of cobbles fraction content and considerable increase of silt and clay fractions content. However, the influence of weathering disappeared at the depth of 1 m. The granulation changes caused the changes of shearing strength parameters and permeability coefficient. The significant influence of the creeping of the earth surface resulted from moving the trough edge of mining subsidence on the loosening of the embankment body up to the embankment crest was stated. The loosening of the material caused decrease of the angle of internal friction and increase of permeability coefficient.

**Keywords:** *coal mining wastes, natural weathering, mining subsidence*

MARIUSZ MŁYNARCZUK

**Application of Image Analysis Methods to Characterization of Rock Fracture Surface** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Characterization of rock fracture surface plays an important role in geotectonic description of rock massifs. It gives information about rock strength, stability, permeability, etc. The parameters usually used in order to characterize the rock fracture surface are based on qualitative description or on basic quantitative analyses. Although these analyses are easy to perform, they generally give a limited amount of information and not always follow by the improvement of measurement techniques. In the paper a new method of the characterization of rock fracture surface based on image analysis and particularly on mathematical morphology was proposed. One assumes that application of these tools to analysis of data coming from profilers (i.e. laser profiler) may lead to determine new parameters describing the rock surface and in effect to improve the possibility of quantitative description of

rock fractures. As the result of the research one can also claim that application of image analysis and mathematical morphology to rock fracture measurements allows distinguishing (grouping) analyzed rock fracture in view of structural and textural properties of these rocks.

**Keywords:** *rock fracture, roughness, image analysis*

MARIAN PALUCH, ANTONI TAJDUŚ

**The Stability of the Roof Connected with the Seam by Two-Parameter Contact during Mining Excavation** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

This work is a development for T. Ozog's theory [7] by introducing two-parameter Wieghardt's contact. The formulas for beam deflection, reaction of foundation, bending moments, shear forces and the elastic energy of the cantilever beam are derived and discussed. The failure limit of the cantilever span is also calculated.

**Keywords:** *mining excavation, two-parameter contact, bending moments, shear forces, elastic energy*

RENATA PATYŃSKA, ANTONI KIDYBIŃSKI

**Modeling of Gas-Geodynamic Phenomena in Homogeneous Seams and Seams with Fault** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

In the article a brief review of state-of-the-art on coal and gas outbursts in underground coal mines is presented both in Poland and elsewhere. Opportunity is indicated to apply the numerical method for modeling outbursts in order to recognize their mechanism and make possible the hazard forecasting to the mines and thus to prevent the accidents connected with outbursts. Research results of an outburst of coal and methane with particle flow model are discussed and in particular — the role of solid phase and gas for homogeneous and heterogeneous seam. The development (phases) of outbursts process are discussed and final conclusions are given.

**Keywords:** *coal and gas outbursts, modelling of outburst process*

PATRYCJA PIĄTEK

**The Point Load Test, the Brazilian Tensile Test and the Uniaxial Compression Test — Comparative Studies** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The results of the point load test, Brazilian test and uniaxial compression test of cylindrical samples are presented in this paper. Sandstones of different grain size, coming from several collieries in the Upper Silesian Coal Basin, were selected for the studies. Based on the test results, values of the conversion factor that occurs in the linear relationship between the uniaxial compressive strength and point-load strength index and between the tensile strength and point-load strength index have been determined for the sandstones tested. When analysing the experimental results, particular attention was paid to the fracturing mode of rock samples under point load conditions.

**Keywords:** *brazilian test, point load test, sandstones, strength, uniaxial compression*

JOANNA PINIŃSKA

**Geomechanical Properties of the Siliceous Limestones** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The Lublin Region represents unusual example of co-existence of mining, building industry and rock workings. The roots of today's industries in the Lublin Region reach as far back as Medieval times and even farther back — the Palaeolithic. Cherts from chalky limestones in the river Vistula Valley, until the beginning of Iron Age, were basic supply for the various tools and weaponry. Prehistoric artisans, knowing the mechanical properties of chert bearing rocks and knowing how to mechanically processing hard cherts, become precursors of today's geomechanics. Availability of common carbonate rocks of the Upper Cretaceous and Neogene made significant impact on

building industry. The defense heavy fortresses, sacral monumental buildings, and magnificent residential and common buildings are typically made of white, chalky and siliceous limestone blocks all over the Lublin Area. In the paper are outlined geological aspects and geomechanical assessment of the special, regional rock building material resources in the Lublin Region — the siliceous limestone, their geomechanical properties, which became the base of traditional building industry. Under special consideration is the vulnerability of siliceous rocks to physical deterioration with the passage of time. The description of typical forms of destruction of stony building elements is completing the paper.

**Keywords:** *rocks raw, geomechanical properties, chalky and siliceous limestone, mining, deterioration, conservation*

ŚLAWOMIR PORZUCEK, MAREK CAŁA, JANUSZ MADEJ

**Gravimetric Representation of the Geomechanical Model of Loosened Zones Around an Old Working**  
• *Kwartalnik Górnictwo i Geoinżynieria* • z. 1, 2008

Continuous as well as more dangerous discontinuous land surface deformations are one of hazards in post-mining areas. They result from collapsing underground workings, both recorded in mining maps and unrecorded. The position of unknown workings can be determined using the microgravity method, particularly applicable in built-up urban regions with dense infrastructure. The method is also useful in localization of deeper-laying hollows, measuring directly not only their gravity effects but also the effects of loosened zones within the rockmass above such hollows. The authors carried out modelling that combines geomechanical models and gravity models. The theory of geomechanics can determine the range and the dimensions of loosened zones overlaying underground workings. Due to gravity models it is possible to describe the shape of anomalies disturbed by the loosened zones and predict the conditions, in which they can be identified. Identifying zones with lowered density within the rockmass provides important practical guidelines as they help select proper position of boreholes used to inject backfill into old workings.

**Keywords:** *geomechanics, geophysics, microgravity, mining, old abandoned workings*

JÓZEF RUSINEK, STANISŁAW KURNIK

**Analysis of a Distance and Time Between Tremors of Torpedo Blasting and Rock-Mass Tremors with the Seismic Energy of the Order  $10^4$  J in the Conditions of “Piast” Coal Mine**  
• *Kwartalnik Górnictwo i Geoinżynieria* • z. 1, 2008

In the years 2002–2006 there were carried out the mining operations at the areas V, VII, VIII, XV and XVII, which were a reason of rock-mass tremors and 1532 rock-mass tremors with the seismic energy of the order  $10^4$  J occurred. In the analysed period 751 torpedo blastings were carried out and 598 tremors were registered as a result of torpedo blasting. After joining the database of rock-mass tremors with the seismic energy of the order  $10^4$  J and tremors of torpedo blasting which link to the same area of the mine, there were obtained 311 tremors of torpedo blasting and 1118 rock-mass tremors with the seismic energy of the order  $10^4$  J. Inter-correlation between tremors concerns a distance from a hypocenter of the tremor of torpedo blasting to a hypocenter of the rock-mass tremor with the seismic energy of the order  $10^4$  J and a distance from a place of detonation of explosive charge (a foot of a blasthole) to a hypocenter of the rock-mass tremor with the seismic energy of the order  $10^4$  J. The time period between tremors of torpedo blasting and rock-mass tremors with the seismic energy of the order  $10^4$  J was also a subject of the analysis.

**Keywords:** *mining, seismicity, torpedo blasting*

NORBERT SKOCZYLAS

**The Risk Analysis Support Concept Using Fuzzy Logic Illustrated on the Outburst Danger in a Coal Mine**  
• *Kwartalnik Górnictwo i Geoinżynieria* • z. 1, 2008

The work contains suggestions about the use of fuzzy logic in the issues connected with the safety of works in mining. There are still problems in this area. Description of these problems in a traditional manner with the use of mathematical correlation seems impossible in the nearest future. It is, therefore, worth applying different techniques of the phenomena and processes description, such as fuzzy logic. The author presents an expert system created on

the base of fuzzy logic. It allows to estimate the risk of appearance of gas and coal outburst depending on the gas emission index and index of firmness. Functioning of the system was demonstrated giving the example of the analysis of the risk of gas and coal outburst appearance for the H4 409/3 gate in “Zofiówka” mine as well as H6 409/3 gate in “Zofiówka” mine.

**Keywords:** *fuzzy logic, expert system, gas and coal outburst*

JOANNA STRÓŻYK

**Properties of Silty Soils from Wrocław Area — Preliminary Research** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Preliminary edometer tests of silty soils - loesses from Wrocław area were presented. The coefficient of collapse value  $i_{mp}$  and effective yield stresses value were determined. The YSR were finally estimated. The calculated value of  $i_{mp}$  was less than 0,02 —  $i_{mp} = 0,016$ , so examined soils are not collapsing type. The YSR values changed together with the soil sample saturation — for  $S_r = 1$  value of YSR = 1,45, and for  $S_r = 0,35$  value of YSR = 0,95. They were noticed that the state of the consolidation of soils is changed after saturating from overconsolidated to normally consolidated state.

**Keywords:** *silty soils, collapsing soils, YSR*

MICHAŁ STRZELECKI

**Geographic Information Systems Used for Hydrogeology Analyses in the Area of Mines in Wałbrzych** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

The paper contains the description of the Geographic Information System used for hydrogeology analyses in the area of mines in Wałbrzych. Modern GIS tools has been used to create The Digital Terrain and Geology Model. This model is able to generated: profiles, contour maps, perspective views and was possible to calculate designed surfaces, generate cross section and others analyses.

**Keywords:** *filtration, Geographic Information System, Digital Terrain Model*

KRZYSZTOF MARIAN TOMICZEK

**Damage Variable  $D$  of Rocks under Direct Tension Condition** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

On basis of Lemaitre and Ju and Xie theories a new damage variables  $D$  are proposed to measure the damage and evolution of failure of rocks under uniaxial tension. The damage  $D$  was determined by load and unload stress — strain characteristics of cylindrical sandstones and granite samples under direct tension condition. Generally, the damage  $D$  of rocks under tension was lower than critical value ( $D < 1$ ), when the load amplitude reached ultimate strength. The results illustrated also that the tangent modulus  $E_t$  has determinative influence of  $D$ .

**Keywords:** *rock mechanics, direct tension test, damage mechanics, brittle fracture of rock, damage variable  $D$*

JAN WALASZCZYK, DARIUSZ WIEWIÓRKA

**Modeling of Influence Income of Tectonic Disturbance on Roof Oscillations in to Stratified Rock Mass** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Phenomenon of dynamic relieving present in paper and methodic of numerical modeling this problem. Numerical model of group of room present in interaction area of big fault. Diagrams in result of account received displacement, velocities and acceleration in chosen points of models. It implement analysis about diagrams of changes of tensions in pillars and enclosing of them. Numeric errors in digital filtration of result use eliminating.

**Keywords:** *rock mechanics, dynamics, numerical modeling*

*EUGENIUSZ ZAWISZA, ANDRZEJ TADEUSZ GRUCHOT*

**Influence of Stabilization with Cement or Silment on the Strength and Frost Resistance of Silty Soil** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Results of the tests of stabilization of a silty soil with cement and silment were presented in the paper. Compression strength of the silt with 3, 6 and 10% addition of stabilizer after 7, 14, 28 and 42 days was determined. Compression strength was also determined for the samples with stabilizer after 28 days treating with cycles of freezing at the temperature of  $-23^{\circ}\text{C}$  and thawing in water. The obtained values of compression strength and frost resistance index were analysed in relation to the values required for the materials used in road building.

*Keywords: silty soils, stabilization*

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**Compactibility Parameters Tests of Coarse-Grained Furnace Slag Aggregate** • Kwartalnik Górnictwo i Geoinżynieria • z. 1, 2008

Article presents results of compactibility parameters tests of furnace slag aggregate of granulation of  $0\div 31,5$  mm from Slag Recycling Sp. z o.o. in Kraków. Comparison of compactibility methods was the aim of the work. Two compaction methods were used in the tests: ramming (tamping) and vibration. Tamping tests were carried out in standard ( $V_{cyl} = 2,2$  dm<sup>3</sup>) and middle-sized ( $V_{cyl} = 9,8$  dm<sup>3</sup>) Proctor apparatus using standard and modified compaction energy. Vibration tests were conducted on a Ve-Be vibration table with cylinder of the volume of 8,1 dm<sup>3</sup>. As a result of the tests, the influence of time, load and the thickness of the compacted layers on compactibility of the aggregate were determined.

*Keywords: furnace slag, compactibility parameters*