Summaries

MARIAN BRANNY, BERNARD NOWAK, BOGUSŁAW PTASZYŃSKI, ZBIGNIEW KUCZERA, RAFAŁ ŁUCZAK, PIOTR ŻYCZKOWSKI

Discrete phase model of air flow with the water vapor condensation

The paper describes the use of the discrete phase model to describe the movement of air In the vertical ventilation shafts with condensation of water vapor. Conditions under which discrete phase model can be used were verified and the results of performed calculations were presented. The results were obtained fo vertical movement up to the drops of water in the shaft.

Key words: *Vertical two-phase flow, discrete phase model, mine ventilation*

MARIAN BRANNY, KRZYSZTOF FILEK, BERNARD NOWAK

Airflow patterns in blind headings with jet fans – numerical simulation with the use of viscosity models of turbulence

Room and pillar headings are frequently ventilated with the use of jet fans. The range of penetration of an air stream generated by the jet fan is determined by several parameters; the major determinants being the initial stream parameters and the place of fan's installation. The paper presents a method of calculation 3D velocity fields in room and pillar headings. Results obtained with the use of three turbulence models, it is two equations model k-Í i k-ů SST and one equation of Spalart-Allmaras. Calculation were compared with measurements [Meyer 1993].

Key word: *auxiliary ventilation, CFD models, jet fans*

ZBIGNIEW BURTAN

Geomechanical model of stratified rocks

Most studies exploring the influence of mining on the adjoining rock strata are based on theoretical solutions. Generally, analytical methods enabling us to find the stress and strain states have to be supported by various models of rock strata, and modelling normally involves simplifying assumptions. A typical assumption is that the rock strata should be treated as a continuous and homogeneous medium, which does not reflect its real structure. Typically, particular rock strata display entirely different geomechanical properties. This paper outlines the principles of creating a geomechanical model of stratified rock, enabling us to find components of stress tensor and displacement vector at an arbitrary point of the rock strata below the mined out level, for the given boundary conditions. The proposed mathematical tools might be well used in cognitive and applied studies.

Key words: *mining geomechanics, state of stress in the rock strata, underground mining*

WIKTOR FILIPEK

Numerical simulation of the slow flow of fluids in porous medium createdby a regular structure of macroscopic spheres

In the paper the author has presented the application of CFD technique for the problem of the flow through a regular Porous system consisting of repeating spheres. The virtual porous system has been created by author to simulate the flow through the genuine porous medium applied for hydrodynamic experiments. The results obtained from computer simulation have been compared to the results obtained by means of empirical investigations. The author has demonstrated that the results obtained by the techniques presented above are very similar. He also tried to determine parameters which enabled him to replace the empirical research by the computer simulations.

Key words: *fluid mechanics, flow through porous media, computer simulation*

RAFAŁ ŁUCZAK

Control of temperature hazard in the mine excavations by a direct action air cooler

Problems connected with proper climatic conditions and opportunities of their improvement in terms of intensification of production, growth of depth and difficult geothermal conditions require a complex application of many means in order to assurance of suitable working conditions. The usage in polish mining the local refrigerating systems with direct action and with refrigerating power 300 kW and 350 kW is a leading solution of air treatment in the exploitation place. In this article parameters of work of direct action cooler located in the excavations of coal mine "Sosnica-Makoszowy" – "Makoszowy" were analyzed.

Key words: *direct action cooler, refrigerating power, air conditioning*

TADEUSZ MIKOŚ

Stabilisation, reinforcement and renovation works of cross on the Giewont's

The metal cross on the top of Giewont had belonged to the most famous and recognisable symbols of the Tatra, the region of Podhsle and Zakopane itself for more than a hundred years. It is an expressive emblem of religious feelings and patriotic Poles. The problem connected with the risk of losing cross's stability has met with great attention of media among Poles within and outside the country. The scientific team of University of Science and Technology in Cracow has conducted the research of the present technical condition of its construction and foundation. The gropu of AGH reseachers together with the support of private companies has undertaken renovation and preservation works at the site. The article is devoted to this research and the cross's renovation.

Key words: *cross on the Giewont's top, monument's protection, turism*

ZBIGNIEW MUSZYŃSKI, JAROSŁAW RYBAK

Application of geodetic survey methods in load capacity testing of piles

Conventional measurement of pile settlement during pile load test may be affected by ground movement due to displacements of anchor piles. The application of direct leveling of high precision enables to provide an independent reference measurement which is free from systematic errors. However this method is less accurate than the use of displacement sensors but provides good results. Some case studies of the use of geodetic methods in vertical and horizontal pile load testing were presented in the paper.

Key words: *pile load test, geodetic survey of displacement*

BERNARD NOWAK, KRZYSZTOF FILEK, PIOTR ŁUSKA

Experimental researches on the performance of mining compression type of air refrigerators cooperating with evaporative water coolers

Measurement results of the work parameters applied to two types of air refrigerators: DV-290 and TS-300B located in underground mines and used by two evaporative water coolers: RK-450 and CWW-420 are presented in this paper. Parameters of the mass or the capacity flows were measured as well as the inlets and the outlets' temperature of the diaphragmatic exchangers – evaporators, condensers and evaporated water coolers for all of the mediums occured in the system – air, water, atmospheric pressure and the refrigerating medium. The air moisture was measured using the dry and wet bulb thermometer. Thermal power of all of the exchangers was determined on the basis of the results of the experiments.
All the data were presented in the form of charts and tables.

Key words: *mine air conditioning, mine refrigerator, evaporative water cooler*

BERNARD NOWAK, KRZYSZTOF FILEK, ZBIGNIEW KUCZERA, RAFAŁ ŁUCZAK, BOGUSŁAW PTASZYŃSKI, PIOTR ŻYCZKOWSKI

Statistic indices of work quality evaluation of refrigerator DV-290

In this article, on the basis of statistical analysis, quality indicators of work of air refrigerator DV-290 with evaporative water cooler RK-450 were shown. The quality indicators were designated from the analysis of multiple regression. That calculations based on equations which describe the actual processes taking place in direct action refrigerators cooperating with evaporative water coolers by using multiple regression analysis. Received multiple regression functions, which describe the evaporator thermal power for the two variants with different number of independent variables, are right in the performance of air coolers. Comparison of the proposed statistical models can identify the most practical for using by the mining service. It will allow to choose the liquidation of any discrepancies, which decide about reducing the effectiveness of air cooling.

Key words: *mine refrigerator with direct action, evaporating cooler, mine air conditioning*

MARIAN PALUCH

The static approach to point mass method for determination of axial forces in a truss

Flat trusses are used in surface building as well as underground building industry. The designer of such constructions has to know the axial forces, displacement of connecting joints and bearing reaction forces in order to choose the appropriate bar sections. This work presents a very convenient method for calculating forces in a bar of a truss. The method could be entirely automated and is considered as competitive with the finite-element method.

Key words: *truss, bar of a truss, axial force, connecting joint displacement*

JUSTYNA SWOLKIEŃ

State of salinity in the Odra river behind the "Olza" interceptor-sewer in connection with its flow and atmospheric conditions

This article treats about the state of salinity in Odra river in connection with its flow and atmospheric conditions. Very high chlorides concentration in the river is a consequence of dropping into its water highly contaminated mine waters form the south – western part of Upper Silesian Coal Basin. Mine waters are transported through the interceptor sewer called "Olza". The author divides the river flows on the five categories and classifies them due to the exact water classes. Taking into consideration flow margins calculated by using the computer program called "Dyspozytor" and river absorptiveness due to the specific water class, it was possible to estimate the influence of dosing and retaining on the state of river waters salinity. It was also possible to state in which conditions there is a chance to keep the highest water class and in which there is no such a chance.

Key words: *chlorides concentration, river flow, "Olza" interceptor-sewer, mine waters, river absorptiveness, mine waters*

NIKODEM SZLĄZAK, MAREK KORZEC

Methane hazard and its prevention in aspects of the use of methane in Polish coal mines

This article takes up a subject of methane hazard in Polish coal mines. CH4 in mines should be mainly considered as a methane hazard. Good preventive measures is the base to enable safe exploitation and the best one is methane drainage. In this article we present examples of locations of methane drainage boreholes in working face. The second part of this article touch upon a question of using it. Economic and ecological aspects determine the gas to be exploited. Moreover, we present various technologies to use methane and we have listed also systems using methane in Polish coal mines.

Key words: *methane hazard, prevention of methane, methane drainage, use of methane*

TOMASZ WIEJA

Revitalization of engineering structures

Engineering structures – bridges, silos, gasometers, tunnels, interceptor sewers and the like – are distinguished by expressive beauty and individual forms. Revitalization of the engineering structures is a consecutive design challenge for the architects, constructers, miners etc. Transformation of the engineering structures for new functions is a complex process technically complicated and introducing at the same time a new quality to the existing, frequently degraded, urban planning areas.
In the article maintenance and design problems related to the adaptation of the engineering structures have been presented. The shown examples of the revitalization engineering structures for the needs of the new utilitarian functions represent various technical solutions used in the process of adaptation.

Key words: *engineering structures, revitalization, design, adaptation, technical solution*

PIOTR ŻYCZKOWSKI

The analysis of impact of internal heat exchanger on thermal power of mining air refrigerators

An use of internal heat exchanger (IHX) in refrigerating system allows increasing the refrigerating capacity of refrigerators. The analysis of the changes of thermal power and refrigerating capacity of TS-300 and TS-450P mining refrigerators types with internal heat exchanger were described in this article.

Key words: *internal heat exchanger, refrigerator, air-conditioning*