STRESZCZENIE

Vasil ARSIRI Prof. D.Sc. Odessa State Academy of Building and Architecture, UKRAINE Elena ARSIRIY PhD. Odessa National Polytechnic University, UKRAINE

THE PHYSICAL METHOD OF VISUAL DIAGNOSTICS OF FLOW STRUCTURE

The article presents results of using the flow structure design equipment, which is based on the method of visual diagnostics of flow structure simulations in the physical models. The changes of radial compressor collector were designed according to distributing of speeds which were exposed by the method of visual diagnostics. The tests results on the stand of "H. Cegielski-Poznan" firm has shown the reduction of noise during work of compressor DA-210 from 96 to 84dB, at the same time the efficiency of work was increase up to 2,3%. KEYWORDS: visualization, flow structure, hydraulic resistance, modernisation of equipment.

Magdaléna BÁLINTOVÁ Assoc. Prof. Dr. PhD., Technical University of Košice, Košice, SLOVAKIA Alena LUPTÁKOVÁ Eng., PhD., Institute of Geotechnics of Slovak Academy of Sciences, SLOVAKIA Natália JUNÁKOVÁ Eng., Technical University of Košice, SLOVAKIA Eva MAČINGOVÁ Eng., Institute of Geotechnics of Slovak Academy of Sciences, SLOVAKIA

THE POSSIBILITIES OF METAL CONCENTRATION DECREASE IN ACID MINE DRAINAGE

Degradation of surface water quality that is in contact with acid mine drainage belongs to the serious environmental problems in Slovak Republic. Mainly abandoned sulphide mines produce AMD with high metal concentrations and low value of the pH (about 3-4) which has negative impact on water ecosystems. Novadays treatment of AMD includes passive and active systems. While passive treatment systems don't require continuous chemical inputs and that take advantage of naturally occurring chemical and biological processes to clean contaminated mine waters, active treatment system involves controlled physical, chemical and biological methods often based on pH increasing and the recovery of precipitate metals from AMD sludge.

The paper presents results of used selected physical-chemical and biological-chemical methods of AMD treatment for aluminium, copper, iron, manganese and zinc removal from acid mine water originated in mine Smolnik in Slovak Republic.

KEYWORDS: acid mine drainage, sorption, selective precipitation, sulphate-reducing bacteria

Volodymyr V. CHERNYUK Doc., Cand. Sc., Lviv Polytechnic National University, Lviv, UKRAINE

A METHOD OF CALCULATION FOR PRESSURE COLLECTOR-PIPELINES

A new method of calculation in which all geometric parameters of the pipeline and all characteristics of the stream are taken into account is suggested for collector pipelines. The results of calculations made by means of obtained formulae practically coincide with experimental data.

KEYWORDS: pressure collector-pipelines, variable mass fluid flow.

Volodymyr V. CHERNYUK Doc., Cand. Sc., Lviv Polytechnic National University, Lviv, UKRAINE Vadym I. OREL Cand. Sc., Lviv Polytechnic National University, Lviv, UKRAINE

EXPERIMENTAL VERIFICATION OF A NEW METHOD OF CALCULATION FOR PRESSURE DISTRIBUTIVE PIPELINES

In comparison with all the known methods of calculation for pressure distributive pipelines (PDP), those developed by Chernyuk,V.V. proved to most exactly agree with results of experiments. Calculated by this technique values of flow rate and of heads of fluid inside PDP practically coincide with experimental data. KEYWORDS: pressure distributive pipelines, variable mass fluid flow.

Volodymyr DOVGALIUK

Docent of Chair, PhD Kyiv National University of building and architecture, Kyiv, UKRAINE Anton GUSEV Post-graduate student, University of building and architecture, Kyiv, UKRAINE

FORMING THE DELIVERY JETS OF DIFFERENT DECAY RATE

Modern air distributive devices allow to form the different types of stream with parameters that can differ and by fading rates. Among the wide variety of air distributor devices, on principle of action will consider a few especially interesting.

All transferred methods provide the necessary method of serve of air in every concrete case, what provide the normative parameters of ventilation. The construction of air distributive which will unite all higher marked stream depending on requirements to organization of ventilation is offered.

KEYWORDS: air distributive device, air jet, velocity, temperature.

Jan JAREMSKI

Associate Prof., D. Sc. Ph. D. Eng., Rzeszow University of Technology, POLAND Jan DOMIN Assistant Prof., Ph. D., Rzeszow University of Technology, POLAND

AN EMISSION OF THE METHYLATED MERCURY COMPOUNDS FROM THE CLOSED LANDFILLS AND THEIR IDENTIFICATION WITH USE OF THE SPECTRAL ANALYSIS METHODS

The municipal or industrial closed landfills are the source of numerous volatile compounds containing the methylated mercury. The landfills are actually the bioreactors where several methylated mercury compounds are generated. These compounds are emitted to our atmosphere as the landfill gas. An analysis shows that dimethyl mercury is the most frequently occurring product emitted in landfills gas. Chemical assignment of the methylated mercury compounds involves very advanced analytical methods. It seems that spectral analysis can give the exact identification of the investigated compounds. The gas samples gotten from landfills we excited in an electric discharge to receive an emission spectrum of the compounds occurring in our samples. The registered spectra were analyzed using the spectral catalogues.

KEYWORDS: landfill, mercury, biomethylation, wastes.

Galina KALDA Prof. D.Sc. PhD. Eng., Rzeszow University of Technology, Rzeszow, POLAND Igor KOVTUN Doc. D. PhD. Eng., Khmelnitskiy National University, Khmelnitskiy, UKRAINE

USING NUCLEAR POWER AS ALTERNATIVE SOURCE

Paper represents perspectives for wider usage of nuclear power as one of the alternative sources. Paper studies nuclear reactions and their general principles, classification of various radioactive isotopes and chain reactions. Here are given calculations of thermal power, radioactive products power, changes of neutron current in reactor and irregularity factor of neutron current.

Power reactors are classified: by neutron energy that initiates decomposition reaction as thermal reactors and speed ones; by usage of fuel as multiply reactors and converters; by their structure as heterogeneous and homogeneous reactors; by cooling and moderating types as water, heavy water, water-graphite, gas, channel and complex reactors.

KEYWORDS: nuclear power, radioactive isotopes, neutron energy.

Oleksandra MAKARUKHA

The post-graduate student, National University "Lviv Polytechnic", Lviv, UKRAINE Nadiia SPODYNIUK The post-graduate student, National University "Lviv Polytechnic", Lviv, UKRAINE Vasyl ZHELYKH The senior lecturer, Cand.Tech.Sci. National University Lviv Polytechnic, UKRAINE

The senior fecturer, Cand. Lech.Sci. National University LVIV Polytechnic, UKRAII

APPLICATION of PIGFARMS RADIATION HEATING SYSTEMS

In this article the followin results of the investigation are shown: infrared heater's work with outlet in changing it's heating power and the quantity of exhaust air. The results of investigations can be used for projection of heating systems of pigfarms.

KEYWORDS: infrared heating, infrared heater, heating power, convection component.

Oksana MATSIYEVSKA Docent, PhD. Eng., Lviv Polytechnic National University, Lviv, UKRAINE Borys ILNYTSKYY Assistant, PhD. Eng., Lviv Polytechnic National University, Lviv, UKRAINE Uljana HNYLYANSKA Students, Lviv Polytechnic National University, Lviv, UKRAINE Iryna SHEVCHUK Students, Lviv Polytechnic National University, Lviv, UKRAINE

UTILIZATION OF REFINED ATMOSPHERIC SEWAGE IN TECHNICAL WATER SUPPLY OF A KNITTING FACTORY

The results of experimental investigation as to determination optimal dose of the coagulant $Al_2(SO_4)_3$ for the cleaning the atmospheric sewage are represented in the article. KEYWORDS: optimal dose, coagulant, atmospheric sewage.

Katarzyna PIETRUCHA

M. Sc. Eng., Rzeszow University of Technology, Rzeszow, POLAND

EMERGENCY EVENTS IN WATER SUPPLY SYSTEM IN POLAND

In the thesis emergency events in polish Water Supply System (WSS) were presented. Three kinds of emergency events were distinguished on account of main premises which caused them: technical (T), human (H) and environmental (E). Also emergency events ensuing as a result of cooperating of the factors mentioned above were distinguished. A model of the probability of the appearance of emergency events in Water Supply System as a result of occurring and cooperating of the three factors: technical (T), human (H) and environmental (E) was displayed.

KEYWORDS: emergency events, Water Supply System (WSS), the probability of the appearance of emergency events

Nadiia SPODYNIUK The post-graduate student, National University "Lviv Polytechnic", Lviv, UKRAINE Vasyl ZHELYKH The senior lecturer, Cand.Tech.Sci. National University "Lviv Polytechnic, UKRAINE Oleksandra MAKARUKHA The post-graduate student, National University "Lviv Polytechnic", Lviv, UKRAINE

INCREASE OF THE OVERALL PERFORMANCE OF INFRA-RED HEATING SYSTEMS OF THE HEN HOUSES PREMISES

The schedules of air speeds of movement field's distribution at job of heating device for heating premises of hen houses are presented. The results of investigations can be used at designing infrared heating on industrial objects. KEYWORDS: infrared heating, air temperature, bird's finding zone, exhaust outlet.

Andrzej STUDZIŃSKI PhD. Eng., Rzeszow University of Technology, Rzeszow, POLAND

WATER STORAGE TANK CAPACITY INFLUENCE ON DRINKING WATER SAFETY

Recently a problem of municipal systems safety became on of the most important. Safety can be defined as a probability that there is no threats for human's life, health or extremely high financial costs. Loss of safety usually results from raw water quality or insufficient treatment. Usually it is reduced by monitoring of raw water or during the treatment process. Important role can have water storage tanks which end treatment process. They reduce pollutant concentration by thinning it down and extend time, when safe water is delivered to water network. In the paper mathematical model of thinning down the pollutant was shown. It makes possible to calculate time of thinning down to get water indicator values recognized as safe for human's health. The method was shown by computational examples for Fe removing process. The tank's safety role lies in reducing pollutant's influence on water consumers, like closing valves or modify the treatment processes. KEYWORDS: safety, reliability, drinking water, water storage tank, contamination

Orest VOZNYAK Head of Chair, PhD National University "Lviv, Polytechnic", Lviv, UKRAINE Khrystyna MYRONYUK Assistant of Chair, National University "Lviv, Polytechnic", Lviv, UKRAINE Iryna SUKHOLOVA Post-graduate of Chair, National University "Lviv, Polytechnic", Lviv, UKRAINE Anton CHETERBOK Post-graduate of Chair, National University "Lviv, Polytechnic", Lviv, UKRAINE

AIR DISTRIBUTION BY OPPOSED NON-COAXIAL NON-ISOTHERMAL ROUND AIR JETS

In this article results of experimental investigations of air supply into the room by air distribution device with interaction of opposed non-coaxial air jets for creation more intensive turbulization air flow in the room are presented. Experimental investigations in order to composed matrix have been carried out; graphycal and analytical calculation dependences have been obtained as well 3-factor chart has been designed. Obtained results of these investigations give possibility to realize engineer calculations of air distribution with interaction of opposed non-coaxial air jets.

KEYWORDS: opposed, non-coaxial, air jet, velocity, temperature.

Orest VOZNYAK Head of Chair, PhD National University "Lviv Polytechnic", Lviv, UKRAINE Stepan SHAPOVAL Post-graduate of Chair, National University "Lviv Polytechnic", Lviv, UKRAINE Oleksandra DACKO Docent of Chair, PhD National University "Lviv Polytechnic", Lviv, UKRAINE

RISE OF USE EFFECTIVENESS OF SOLAR ENERGY IN ANNUAL SOLAR SYSTEMS

This article coves the results of investigation of solar radiation incoming on the heliocollectors. Dependence between the amount of discreet orientations of the solar collector and efficiency of work of its system has been established. The results of the experimental researches of one constant and four variable orientations of the collector on the Sun are given.

KEYWORDS: solar collector, solar energetic, discrete orientation.

Frantisek VRANAY Eng. PhD., TU of Kosice, Kosice, SLOVAKIA Zuzana VRANAYOVA Assoc. Prof. PhD., TU of Kosice, Kosice, SLOVAKIA Daniela OCIPOVA Eng. TU of Kosice, Kosice, SLOVAKIA

RENEWABLE ENERGY SOURCE FOR TODAY SITUATION - GEOEXCHANGE SYSTEMS

An increased utilization of renewable energy sources in the heat and electricity generation is one of priority tasks of the Slovak Republic to boost the use of domestic energy potential and thus to decrease the Slovakia's dependence on imported fossil fuels. For this reason the experimental workplace "Economic Research Centre for Re-

newable Energy Sources and Distribution systems" was founded last year. In the article we deal with heat pumps offering the most energy-efficient way to provide heating (central and water heating) and cooling in many applications, as they can use renewable heat sources in our surroundings. It is argued that heat pumps are very energy efficient, and therefore environmentally benign. Within good conditions the energy from low-potentional heat, in other way unusable, is used for the price of supplied energy for heat pump performance. This article determines applicability of this system supports utilization of electric energy low tariff rate, which is also valid for the other electrical appliances on the real administrative building.

KEYWORDS: heat pump, operation, low-potentional heat, electric energy

Zuzana VRANAYOVA

Assoc. Prof. PhD., Civil Engineering Faculty, TU of Kosice, SLOVAK REBUBLIC Daniela OCIPOVA

Eng., Civil Engineering Faculty, TU of Kosice, SLOVAK REPUBLIC

POTABLE HOT WATER AND ITS MICROBIOLOGICAL OUALITY

The presence of the bacteria Legionella in water systems especially in the hot water distribution system represents in terms of health protection of inhabitants is the crucial problem which is not possible to overlook. Expenses on the elimination of Legionella from the water distribution systems are very high and the results are not often sufficient. It should be the common goal of designers and operators to reduce the risk of Legionella bacteria in the installation inside buildings. To prevent the tragic events it is obviously needed to monitor the issue in the word and pay attention to precautionary regulations. There are a lot of common shortages in hot water distribution systems of the large buildings. The age of system, material base, missing regulation and lack of maintenance play the most important role. In the article we would like to describe technical possibilities for prevention of Legionella growth from contaminated hot water and which could be transferred into operation of water distribution system from the point of view of solving by current European legislation. KEYWORDS: Legionella, hot water system, European legislation, operators

Martina ZELEŇÁKOVÁ PhD. Eng., Technical University of Kosice, Institute of Building and Environmental Engineering, Košice, SLOVAKIA Magdaléna BÁLINTOVÁ Assoc. Prof. PhD. Eng., Technical University of Košice, Institute of Building and Environmental Engineering, Košice, SLOVAKIA Katarína FORAIOVÁ

Eng., East Slovak Water Company, Košice, SLOVAKIA

RAIN WATER MANAGEMENT FOR THE PURPOSES OF SUSTAINABLE DEVELOPMENT

Sewage systems of residential units were constructed as a single system in the past. Tribal sewers of most cities are now congested. A new built-up area is situated to a greater distance from the historic centre. Reconstruction investments of tribal sewers are expensive. Consequently, there are strong pressures to limit the runoff of rain water from the newly constructed buildings at the edges of cities. Therefore the sophisticated use of alternative supplies of water, such as the purified waste water from households and capture rain water is essential, to help reduce water consumption. Reasonable rain water management leads to maintain or recover a sound and sustainable water cycle. This involves retentions, infiltrations, vegetation strips, paving and design techniques, and so on. Changes in the amount of hard (impervious) surfaces in urban areas have significantly altered the way rain water moves over, and infiltrates into, the land.

KEYWORDS: rain water management, infiltration systems, sewage systems, sustainable development

Vasyl ZHELYKH The senior lecturer, Cand. Tech.Sci, National University "Lviv Polytechnic", UKRAINE Oleksandra MAKARUKHA The post-graduate student National University "Lviv Polytechnic", Lviv, UKRAINE Nadiia SPODYNIUK The post-graduate student National University "Lviv Polytechnic", Lviv, UKRAINE

APPLICATION OF APARTMENTS LARGE VOLUME RADIATION HEATING SYSTEMS

In this article are submitted results engineering choice of installation height infra-red heaters and definition of the heating area of industrial and agro-industrial rooms.

KEYWORDS: infrared heating, air temperature, convection heating, irradiation.

Volodymyr ZHUK PhD. Lviv Polytechnic National University, Lviv, UKRINE Ivan MATLAY MSc. Lviv Polytechnic National University, Lviv, UKRINE Vasyl BOSHOTA Lviv Polytechnic National University, Lviv, UKRINE

TIME OF CONCENTRATION FOR LINEAR CATCHMENTS WITH VARIABLE SLOPE FOR THE RAINS OF CONSTANT INTENSITY

New theoretical method of the stormwater hydraulic calculation for linear catchments with variable longitudinal slope is substantiated. It is obtained the dependence of the time of concentration from the catchment's length, middle slope, coefficient of the slope variation and rain intensity.

KEYWORDS: stormwater, hydrograph, time of concentration, longitudinal slope.

Volodymyr ZHUK PhD. Lviv Polytechnic National University, Lviv, UKRAINE Lesya VOVK PhD. Lviv Polytechnic National University, Lviv, UKRAINE Igor POPADYUK Eng. Lviv Polytechnic National University, Lviv, UKRAINE

STORAGE VOLUME OF TWO-SECTIONAL STORMWATER STORAGE TANKS FOR THE LINEAR CATCHMENTS FOR THE RAINS WITH CONSTANT INTENSITY

Storage volume coefficient of two-sectional stormwater storage tanks is obtained as function of initial coefficient of regulation α_0 , coefficient of head changing *b*; dimensionless rainfall duration X_d ; dimensionless chamber's area relationship coefficient *k*, defined as overflow chamber's area divided by the full tank's area. KEYWORDS: stormwater, storage tank, storage volume.

Stepan ZHUKOVSKYI Docent of Chair, PhD National University "Lviv Polytechnic", Lviv, UKRAINE Orest VOZNYAK Head of Chair, PhD National University "Lviv Polytechnic", Lviv, UKRAINE

NATURAL PRESSURE INFLUENCE ON AIR FLOW THROUGH HOLES AND NON SOLIDITY OF ROOM ENCLOSURE

It is considered that thermal pressure influences are caused by densities of external ρ_e and internal ρ_i air. They directly proportionally depend on height of ventilation pipe. Analysis shows, that there are not taken into account at least such values: pressure influences of convective flows, which are resulted from heat sources; temperature division of internal air; variability of boundary layer external air density against running height of building. It must be noted, that only gravital pressure influences are taken into account, but wind pressure influences are ignored. However, wind pressure influences are based at natural ventilation of rooms in different seasons. KEYWORDS: gravital pressure, natural ventilation, convective flows.

Stefan ZHUKOVSKY Docent of Chair, National University "Lviv Polytechnic", UKRAINE Hanna KLYMENKO Assistant of Chair, National University "Lviv Polytechnic", UKRAINE.

EXPERIMENTAL AND ANALYTICAL RESEARCH OF PRESSURE EFFECTS INSIDE THE SECTIONAL SOURCE AIR DISTRIBUTOR

Results of experimental and analytical research into the distribution of static pressures inside a sectional source air distributor with interior and exterior perforated walls and horizontal shelf pressure equalizers inside the first pressure chamber are presented in this article. A four-factor experiment matrix has been compiled, a regression equation generated and analyzed. Optimal relative dimensions of pressure equalizers has been established.

KEYWORDS: displacement ventilation, sectional source air, horizontal shelf pressure equalizers.