

## Abstracts Vol. 2 No. 2

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### **Andrzej BAJ, Andrzej ŁAPKO**

*Evaluation of structural capacity under fire conditions of steel-concrete composite members according to PN-EN 1994-1-2:2008*

This paper presents the structural capacity evaluation of steel-concrete composite structures under fire conditions based on Eurocode 4 part 2. Three different methods of analysis of individual elements, parts of the structures or global structure are described. The innovative design solution for beams and columns was suggested. Applying this solution the whole building can achieve one hour fire rating without any additional protection.

### **Katarzyna DOŁŻYK**

*Failure criteria for geomaterials*

Many failure criteria were proposed for geomaterials in the sixties of the 20th century. In most of them the influence of middle main stress is neglected and linear influence of hydrostatic pressure on failure is assumed. The most popular and simplest is the Mohr-Coulomb criterion of failure with two material failure parameters: angle of friction  $\Phi$  and cohesion  $c$ . The Mohr-Coulomb criterion is most often used in engineering practice.

### **Valeriy EZERSKIY, Małgorzata LELUSZ**

*Fly-ash and air-entraining admixture common influence on kinetics of cement composites hydration process*

The results of laboratory investigation concerning the influence of: the amount of fly ash and air-entraining admixture, the  $W/C$  ratio, and the time of curing is presented in the paper. The range of changeability factors was determined:  $X_1$  factor (the amount of fly ash) – from 0 to 33%;  $X_2$  factor (the amount of air-entraining admixture) – from 0 to 0,3%;  $X_3$  factor ( $W/C$  ratio) from 0.5 to 0.6;  $X_4$  factor (the time of curing) – from 28 to 180 days. On the basis of the results a mathematical model was elaborated  $Y = f(X_1, X_2, X_3, X_4)$ , and the character and the grade of influence of each factor were analysed. The factor space was examined for occurrence of extrema. The optimum factor values assuring maximum compressive strength were given. They are for the following factor values:  $X_1 = +1$ ;  $X_2 = -1$ ;  $X_3 = -0.1$ ;  $X_4 = 0.9$ , i.e.: with the amount of fly ash  $P/C = 0.33$ ; without the air-entraining admixture; with  $W/C = 0.54$  and after 169 days of curing.

### **Monika KALINOWSKA, Renata ŚWISŁOCKA, Włodzimierz LEWANDOWSKI**

*Physicochemical, microbiological and biodegradation studies of selected derivatives of benzoic acids and its salts. searching for new antimicrobial compounds applicable in protection and environmental engineering*

Still growing interest in studies of the effect of metal ions on the electronic system of carboxylic acids is caused by the huge biological importance of metal-ligand linkages. In the field of protection and environmental engineering metal complexes act as antimicrobial compounds safe for human and natural environment. In this work the results of physicochemical studies of alkali metal *o*-methoxybenzoates, *o*-nitrobenzoates and *o*-aminonicotinates were presented. The following analytical methods were used: infrared spectroscopy (FT-IR), Raman spectroscopy (FT-Raman), electronic absorption spectroscopy (UV), magnetic resonance spectroscopy ( $^1\text{H}$  and  $^{13}\text{C}$  NMR) and quantum-mechanical calculations. The degrees of biodegradation of studied compounds were established on the basis of BZT, ChZT and RWO values.

**Janusz KRENTOWSKI, Rościśław TRIBIŁŁO**

*Analysis of the impact of temperature load on the building construction strain state*

The paper analyzes the impact of the phenomenon of temperature load on the building structures deformation processes. As an example, authors describe the failure of the top plate of the tank to the liquid medium. Defects such as cracks along the direction of the main reinforcement in the structural elements occurred. The structure has been designed properly in terms of static and dynamic loads, but without taken into account the impact of temperature load. As a result of the analysis it has been shown errors in the design of distributive reinforcement, what resulted in a state of the structure degradation. The concept of repairing a damaged tank plate is given. Authors present the course of reinforcement works. The staked thesis of the possibility of design defects or errors in terms of missed important type of load was confirmed.

**Paweł PRÓCHNICKI**

*Changes of spatial structure of settlement in Supraśl and Zabłudów communes within 1931-1998*

The economic and demographic development has a various impact on the nature environment. One of its impact element is urban and rural settlement expansion. The aim of work was to analyze changes in spatial structure of settlement within Supraśl and Zabłudów communes, which are located in the Białystok vicinity. The changes of structure in 1931, 1953 and 1998 were conducted. A GIS methods and spatial analysis were use in the study. The analysis reveals that development of suburban area has a significant influence on the development of settlement in a rural area. The impact is noticeable both in spatial aspect and structure aspect.

**Agnieszka TRĘBICKA**

*Functioning modelling of water supply system elements in the dynamic conditions*

An attempt to analyse Białystok water distribution subsystem using computer simulation was made for the first time, with shown in the paper. The subsystem was investigated in both time and space. In the paper a trial of description of the construction method of the Białystok water supply system model, which takes into account dynamical conditions of subsystem, performing model verification and using the results of examination was made. In frames of this work it was described the evaluation study of water distribution subsystem work conditions based on: a water flow rate and pressure computer modelling as well as the analysis of a subsystem response to introduced changes.

**Piotr Krzysztof TUZ**

*Volumetric watermeters after 5 years of using in water supply systems*

A water meter is the basic device in a water supply company to measure supply of both water pumped into a water-pipe network and at a final consumer. DN15 and DN20 devices belong to the largest group. More often water supply companies decide to buy and install water meters of C class to reduce water loss. The choice of a type of water meter should be based on e.g. quality of water in a water-pipe network. More and more often water supply companies are interested in volume water meters because of accuracy and resistance to stealing them. The time of working water meters in a water-pipe network is 5 years. The article presents the research of metrological features of volume water meters after 5 years of operating in networks in different water supply companies.

**Marta WASILEWSKA, Andrzej PLEWA, Władysław GARDZIEJCZYK**

*Some problems in the road pavement construction*

The research carried out in the Division of Road Engineering at the Białystok Technical University mostly concerns the skid resistance of wearing course and road pavement fatigue life. The results of the analysis of roughness index of the asphalt concrete pavement and SMA pavement taking into account the grain size and fatigue life are presented in the paper. The special note is taken to asphalt concrete with high stiffness modules (AC WMS). It was determined that there is no possibility of right estimation of skid resistance characteristic, taking into consideration only resistance of grain polishing. It is shown, that the highest resistance had AC WMS 16 mixture with PMB10/40-65 asphalt and the lowest with road asphalt 20/30. The mixture type AC WMS have higher resistance on durable deformation and high modulus of stiffness with small amount of hard or special asphalt.



**Elżbieta WOŁEJKO, Marzena MATEJCZYK**

*Problem of biological corrosion in building*

Authors review research on microbial contamination of residential and public buildings, such as: jobs, libraries, archives, museums and livestock housing. These places come to become favorable habitat for many different species of bacteria, fungi and insects – pests of biological wood. In each of these areas a special microclimate is produced, which creates the right conditions for settlement, growth, development and reproduction of many microorganisms, both in finishes of the external and internal, which leads to detrimental to health, human and animal life of indoor air quality changes buildings. Especially dangerous is the development of species of fungi that produces toxic secondary metabolites called mycotoxins, which are characterised by anisotropic biological activity, that is: mutagenic, neurotoxic, immunosuppressive, carcinogenic or allergenic.

**Anna ŻAKOWICZ, Czesław MIEDZIAŁOWSKI**

*Building structures models taking into account time-dependable geometric and material parameters and statical schemes*

The paper presents the calculation models used in the analysis of various building structures and soil-structure interaction. The basic schemes, principles and possibilities, which take into consideration the changing in time geometric parameters, material and boundary conditions are described.