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**Abstracting and Indexing**

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**LAUDATIO Profesorului consultant dr.ing. Victor GIONCU Facultatea de Arhitectură, Universitatea "Politehnica" Timișoara (Pages 9-11)**

Traian ONEȚ

*(Short communication)*

**Steel Box Members Subjected to Compression (Pages 12-23)**

Petru Moga, Ștefan I. Guțiu, Octavian Ilea

**Abstract**

In this paper are presented two numerical examples to evaluate the compression resistance of box section members made-up by stiffened plates and a comparative analysis are performed taking into account the similar non-stiffened sections. The design procedure is performed in accordance with EN 1993-1-1. Eurocode 3: Design of steel structures. Part 1-1: General rules and rules for buildings and EN 1993-1-5. Eurocode 3: Design of steel structures. Part 1-5: Plated structural elements, respectively the Romanian equivalent standards.

**Keywords:** Eurocode, compression resistance, stiffened box section, steel members

**Studies on Composite Steel Concrete Columns (Pages 24-31)**

CAMPIAN Cristina, SAV Vladut and HAUPT – KARP Alina

**Abstract**

The paper describes experimental tests on small-scale and full scale composite concrete encased steel columns, made at the Technical University of Cluj, Central Laboratory of Civil Engineering Faculty, as well as at laboratories of universities abroad (taken from technical papers). The experimental results were discussed using several parameters considered appropriated, from the point of view of different design codes.

**Keywords:** Composite members, encased steel cross section, axial loading, bending loading

### **Shrinkage of Ultra-High Performance Concrete (Pages 32-37)**

Ioan Sosa, Cornelia Magureanu

#### **Abstract**

The paper presents time effects regarding shrinkage of Ultra-High Performance Concrete, with steel fibers reinforcement (UHPC) and without fibers (UHPC). The concrete composition contains mainly local materials. The shrinkage characteristics were determined in terms of early age shrinkage and long-term shrinkage. Early age shrinkage was tested on concrete without any heat curing regime and the measurements started one our after casting the concrete and lasted for 7 days. Long-term shrinkage was tested on concrete subject to five days steam treatment ( $T=90^{\circ}\text{C}$ ;  $UR=80\%$ ). The measurement started immediately after the finalization of the curing regime at the concrete age of 6 days and lasted more than 110 days. The results revealed the prevalence of the autogenous shrinkage in the magnitude of the overall shrinkage at early age. After thermal treatment finalization no shrinkage occurred, in stead swelling occurred in the first 130 days of measurement.

**Keywords:** ultra-high performance concrete, fibers, steam treatment, autogenous shrinkage, swelling.

### **Experimental Study of the Cracking Behaviour at Bending of High Strength Concrete Beams (Pages 38-44)**

L.C. Letia

#### **Abstract**

This paper summarizes the research findings of the characteristics of high strength concrete (HSC) for flexural cracks of reinforced concrete girders. A number of 14 HSC beams with different percentage of  $\rho$  (reinforcement ratio) cast and incrementally loaded under bending. The test results showed that not all equations used to evaluate the different mechanical properties and cracking behaviour of normal concrete can be applied to HSC. In some cases, the difference between test results and theoretical results is quite important. The 14 reinforced HSC beams, prism and cubes were cured and tested at the Laboratory of Reinforced Concrete Department, of the Technical University of Cluj- Napoca.

**Keywords:** Experimental study, Cracking behavior, High strength concrete, Beams.

### **Cracking Behavior at Bending of Singly Reinforced Concrete Beams (Pages 45-53)**

L.C. Letia

#### **Abstract**

When studying the crack behaviour of singly reinforced concrete beams under external loads, there are determined the stress, respectively the forces that are recorded in the transversal section. The stages that have to be studied are: the bending moment when the first recorded crack appeared and when the tension concrete strength is reached,  $M_{cr}$ ; the crack stabilization; the ultimate bending moment,  $M_u$ .

**Keywords:** Experimental study, Cracking behavior, Reinforced concrete beams.

### **The High Performance Concrete Elements Calculus Using Eurocode 2 (Pages 54-57)**

R. Olar, T. Onet

#### **Abstract**

This paper presents the general calculus algorithms, very useful taking into account that the actual automatic programs used in structural designing are limited to C50/60 concrete classes. A comparative analysis regarding the utilisation of different concrete classes to multistored structures is detailed in the authors PhD-thesis.

**Keywords:** High performance concrete, Eurocode 2, Automatic programs, Structural design.

### **The Multistoried Structures Realised From High Performance Concrete (Pages 58-61)**

R. Olar, T. Onet

#### **Abstract**

In this paper are presented the aspects regarding the high performance concrete utilisation on tall buildings and the peculiarities of the Eurocode 2 rules utilisation in the design process.

**Keywords:** High performance concrete, Eurocode 2, Tall building, Structural design.

### **Yielding Criteria Used in Geotechnical Engineering Problems (Pages 62-71)**

Iulia C. Molnar, A. Popa, O.C. Muresan

#### **Abstract**

The paper represents a synthesis of the main yielding criteria used in geotechnical design. The paper describes the main yielding criteria, the yielding surfaces equations and presents a graphical representation for each of the yielding criteria discussed. The main criteria approached are: Mohr-Coulomb Criteria, which relies on a line defined by the Coulomb failure stress and the stress circles of Mohr. The field of failure is given by the cohesion and internal friction angle. The Mohr-Coulomb criterion is based on the assumption that the phenomenon of macroscopic plastic yielding is, essentially, the result of frictional sliding between material particles. Drucker-Prager criterion is a smooth approximation to the Mohr-Coulomb law. The Drucker-Prager criterion states that plastic yielding begins when the invariant of the deviatoric stress and the hydrostatic stress reach a critical combination. Represented in the principal stress space, the yield locus of this criterion is a circular cone whose axis is the hydrostatic line. The first critical state models for describing the behavior of soft soils such as clay, Original Cam-Clay and Modified Cam-Clay were formulated by researchers from Cambridge University. These models describe very important aspects of soil behavior like strength, compression and dilatancy and also critical states.

**Keywords:** yielding criteria, yielding surface, yielding surface equation.

### **Finite Element Analyses of a Multi-Propped Diaphragm Wall (Pages 72-82)**

T. A. Hulpus, A. Popa

#### **Abstract**

Rising demand for commercial, residential and industrial needs has driven the architect to consider underground structures in their design. Diaphragm walls have been widely used as primary structural elements for supporting deep excavations in urban area due to their structural advantages. The design of retaining walls and support systems for deep basement construction requires careful analysis, design and monitoring of performance. This is especially critical for deep basement construction in urban areas where the need for space and high land prices justify the deep basement construction. The walls should be designed to have high stiffness to comply with strict specifications on the limitation of ground movement induced by excavations in congested urban areas.

**Keywords:** deep excavation, diaphragm wall, finite element method, GFAS, excavation stage

### **FEM Modeling and Analysis of Precast Large Panels Joints (Pages 83-91)**

Alexandru CHIRA

#### **Abstract**

This paper describes a dynamic nonlinear finite element analysis that was made on a precast large panel joint, which simulates an experimental test on a particular joint. This study is carried out with Abaqus v.6.10 finite element software. The three dimensional model has the exact configuration of the tested specimen as presented in the paper. Several finite element models of the joint were analysed until a model could be validated with the experimental results. The validated numerical model was used to propose additional models in order to obtain a better behavior on the precast large panel the joint.

**Keywords:** precast large panel joint; dynamic explicit nonlinear analysis; finite element analysis; friction; solid elements; beam elements

### **Specific Behaviour of Lightweight Aggregate Concrete (Pages 92-95)**

Hans Udo KRASSER, Dan V. BOMPA

#### **Abstract**

Lightweight aggregate concrete is available for years but it has not been used for many structural applications due to its low compressive strength. Hardly, with prestress it can reach compressive strengths of  $60 \text{ N/mm}^2$ . It is well known that LWAC has a particular behaviour when compared to normal one. At failure point it crushes through the coarse part of the mixture making it an unpredictable material. The purpose of this paper is to identify the specific mechanical behaviour of lightweight aggregate concrete as presented in technical literature. A list of nine shear-

walls with different constitutive laws are analysed using finite element method.

**Keywords:** Lightweight aggregate concrete, mechanical behaviour, finite element analysis

### **Consolidating Brick Masonry Structural Walls Using Ferrocement Coating (Pages 96-103)**

Gavrilă MUNTEAN, Radu MUNTEAN, Traian ONET

#### **Abstract**

This paper aims at giving a succinct presentation of some aspects regarding the advantages of the brick masonry walls, which makes their consolidation necessary and realistic in case of damage. Secondly, various solutions are presented for strengthening, with emphasis on those made of micro-concrete reinforced with thin wire mesh, also called “ferrocement”, a solution verified by practice in the INCERC Cluj-Napoca laboratory.

**Keywords:** Ferrocement coating, Structural walls, Brick masonry, Strengthening.

### **Checking the Concordance between the Theoretical and the Experimental Model for Brick Masonry Walls Consolidated With Ferrocement Coating (Pages 104-114)**

Gavrilă MUNTEAN, Radu MUNTEAN, Traian ONET

#### **Abstract**

The paper demonstrates the concordance between the theoretical calculations and the experimental results obtained on real scale bricks masonry walls reinforced by ferrocement, in the INCERC Cluj-Napoca laboratory.

**Keywords:** Ferrocement coating, Masonry walls, Strengthening, Experimental model.

### **Performance of Modified Asphalt Mixtures Obtained Using Plastomers Added In Station (Pages 115-123)**

Mihai Iliescu, Mariana Pop

#### **Abstract**

Economic and technical reasons, we are currently witnessing a phenomenon of expansion on the market of additives used in the technology of asphalt mixtures. These products are used in order to improve performance and reduce the costs for asphalt pavement production and exploitation. In general, meeting all these goals by a single product is difficult, because a high quality requires higher costs. Latest research in this area have resulted in products whose quality is to increase performance at minimal cost. This paper presents a comparison of actual performance between an asphalt mixture with PmB modified bitumen and an asphalt mixture modified by adding plastomer type polymer

during the manufacturing process, directly in the station. Mixture performance is improved in both cases, roughly the same level, with some specific differences for each type of material. The technology of modified mixtures proved to be beneficial both technical, technological and economic. Mixture characteristics are substantially improved. The risks of compromising the mixture due to technological accidents such as failure of storage temperature and bitumen storage times are excluded in this case. From an economic perspective, the raise of paving preparation and storage temperatures is waived and the modifier has a lower price per ton of mix. The conclusions highlight the criteria for adopting the optimal solution according to performance requirements.

**Keywords:** asphaltic mixture / modified bitumen/ plastomer / elastomer

### **Estimation of Vehicle Road Emissions Factors Using Copert III Methodology (Pages 124-130)**

Cristian Tosa

#### **Abstract**

In this paper we used a computer model called Copert III to assess vehicle emissions from road transport. For the case study we used passenger cars, gasoline and diesel powered for which we obtained emission factors for carbon monoxide (CO), particulate matter (PM) and nitrogen oxides (NO<sub>x</sub>), for different average speed profiles. We approximated the emission function as a second degree polynomial and through graph fitting operations we obtained a general equation for the emission factors. Having the speed dependant emission curve, we obtained an average speed for the studied vehicle categories for which the emission factors are minimum.

**Keywords:** air quality, COPERT III, emission factor, polynomial fitting, minimum emission speed, low emission zones

### **Thermo-Energy Analysis of a Building for Housing with Insulation Placed Onto the Interior Surface of the Cover (Pages 131-139)**

Mayer Zsombor , Mihaela Costin

#### **Abstract**

The building is designed as a building with the thermal insulation placed on the interior surface of the opaque elements of the cover of each apartment of the building. The apartments of the building are thermal insulated both from the external environment and from the neighbouring apartments, from the staircase, girdles, common areas of the buildings etc.

Interior air quality and humidity control is done with heat recovery devices installed in rooms or by using heaters which are equipped with such devices.

**Keywords:** Insulation, energy, extruded polystyrene, humidity, building.



### **Considerations on Building Degradations due to Excessive Humidity (Pages 140-145)**

Mihaela Costin, Mayer Zsombor

#### **Abstract**

Numerous buildings in our country show degradations due to humidity causing esthetic, higrothermic, biological and also structural dysfunctionalities. The most affected ones are the old inhabited buildings, but also some historical buildings, architectural monuments. The most important cause for such degradations is the ascending capillary humidity due to lack of horizontal and/or vertical hydro-insulation, but also the use of highly porous building materials, lack of maintenance for rainwater collecting and drainage systems. That is why it is very important to find the most adequate solutions scientifically demonstrated for draining the humidity of the buildings affected by this calamity.

**Keywords:** Degradations, humidity, buildings, hydro-insulations

### **Numerical Solving of the Thermal Singularity of the Ground-Building Connection in Permanent Thermal Regime (Pages 146-151)**

Ousseynou Diao, Ioan Moga, Ligia M. Moga

#### **Abstract**

A 2D numerical model for calculating the heat transfer through the ground-building connection under permanent thermal regime is proposed in the following paper. The method takes into account geometric and thermal parameters that have a great influence on the treated structure. The method was applied to a semi-underground building and an on-ground building. The results show that semi-underground building loses more heat than the on-ground building.

**Keywords:** thermal transfer, numerical model, semi-underground building, on-ground building, linear thermal transfer, MatLab.

### **The Fire Spread Outside of a Building (Pages 152-155)**

Ruxandra DARMON

#### **Abstract**

The article is a review of the research about the fire spread outside of a building, the shape of the venting plume which expand out of a window, the mechanisms of fire spread upward on a building and to an adjacent building and some of the existing fire design regulations to prevent the fire spread. As conclusions, are given some directions for future research in this domain.

**Keywords:** exterior flame, flame spread, window openings.

### **Issues Regarding Stadiums Resistance Structures (Pages 156-168)**

N. Socaciu, B. Petrina, Al. Cătărig, T. Petrina, R. Hulea, R. Zoicaș

#### **Abstract**

Stadiums are impressive buildings through their structural shapes and the technical solutions adopted, real works of art, in most cases perceived as representative buildings for the nation's development and civilization level at that time. This study describes the structural concept of Cluj-Napoca City Stadium. The paper consists of two parts, the first containing an architectural description, then the second, describing the resistance structure, loadings and structure's particular elements. The adopted foundation solution is given by rigid isolated foundations under the columns and continuous under diaphragms, with the mention that the superstructure is in monolithic and precast reinforced concrete frames and the roof is a 3D steel structure.

**Keywords:** Stadiums; Precast reinforced concrete frames; 3D steel structures.

### **Precast Reinforced Concrete Elements of the Structure of the City Stadium of Cluj-Napoca (Pages 169-177)**

Tudor Petrina, Mircea Petrina, Nicolae Socaciu, Bianca Parv, Monica Nicoreac

#### **Abstract**

This study describes the precast reinforced concrete elements of the Structure of the City Stadium of Cluj-Napoca. These elements were realized in order to obtain a smooth concrete surface, because the concrete remains apparently. The first part of the study contains the detailed description of the structural solution, in the second chapter is about precast under-plates and precast beams for the slabs. In chapter 3 the stepped beams that sustain the tiers are presented, then in chapter 4 we have the tiers of the grandstand. In chapter 5 other precast elements are mentioned. At last, in chapter 6 we have the conclusions.

**Keywords:** stadium, precast, grandstand, tiers, beams, trusses

### **The Steel Structure for the Roof of the City Stadium of Cluj-Napoca (Pages 178-186)**

Mircea Petrina, Nicolae Socaciu, Tudor Petrina, Monica Nicoreac, Bianca Parv

#### **Abstract**

This study presents the steel elements of the roof structure of the City Stadium of Cluj-Napoca. These consist in main cantilever trusses fixed on reinforced concrete columns, longitudinal 2D trusses and bracings. The first part of the study includes introductory elements about the steel structure of the stadium and in the second chapter the describing of the design of each type of elements was presented. Chapter 3 is about the composition of the elements: main cantilever trusses, longitudinal trusses – simple and with stiffen task and bracing systems.

**Keywords:** stadium, roof, steel, trusses, bracing.

### **Similitude Theory and Applications (Pages 187-196)**

Monica P. Nicoreac, Bianca R. Pârv, Mircea Petrina, Tudor Petrina

#### **Abstract**

Experimental techniques are vital for the development and validation of new analytical models and they are used extensively to determine complex loadings such as wind and earthquake, but also to analyse the behavior under these loading conditions. This paper presents some aspects regarding dimensional analysis and the Buckingham theorem. Similitude requirements for both static and dynamic loadings are synthesized and a simple example is presented for a 5-story plane steel frame loaded with static forces.

**Keywords :** dimensional analysis, Buckingham theorem, similitude requirements, experimental models.

### **Results of the Romanian Researchers from Cluj Napoca Concerning High-Rise Structures (Pages 197-207)**

Bianca R. Parv, Monica P. Nicoreac, Mircea Petrina, Tudor Petrina

#### **Abstract**

In this article we intend to realize a study on high-rise structure's calculation methods nominated by researchers from Cluj-Napoca. Firstly we will focus on the shear walls-frame structure and after on the perimeter tube structures. We will present the results obtained using the calculation methods recommended by professor Ioan Olariu and also the results experimentally obtained after applying the similitude theory. Considering the perimeter tube structure our starting point -we will present a comparison between the results obtained using the calculation programmes, the results experimentally obtained and those results obtained by using the finite element method.

**Keywords:** high-rise structure, tall building, finite element method, shear lag effect

### **Using the Satellite Positioning System within the Public Transportation Management (Pages 208-213)**

Voichița A. Roib

#### **Abstract**

The Global Navigation Satellite Systems are systems which make possible the determination with high precision of the position within a geocentric reference system. One of the applications of the satellite positioning technology is that provided for the management of transports, regarding vehicle navigation and fleet monitoring. The technical performance of telecommunication and informatics allow us to address traffic problems arising due to the constant development of mobility. The paper presents the satellite positioning system for determining and monitoring positions in real time, applied within the management of public transportation of Cluj-Napoca city, its implementation, advantages and an informatic program designed for informing the user about the urban transport conditions.

**Keywords:** Global Navigation Satellite Systems, traffic management, information, urban transport

### **The Choice of Boilers Using Global Evaluation Method of Performances (Pages 214-220)**

I Giurca

#### **Abstract**

In this paper, there is presented the choice for optimum method as concerning boilers, by using global evaluation of performances. In the end there is made a comparison of the results obtained by the author in contrast to those obtained by other authors as a conclusion under the supervision of Electre method. On the base of this study it is clearly presented the choice of technical solution that can be influenced by: chosen Mathematical pattern, type of chosen scale for quality features, importance criteria given to the decisional criteria.

**Keywords:** Global evaluation method; Boilers; Mathematical pattern; Electre method.

### **Structural Behavior of Corrugated Web Cold-formed Girders (Pages 221-231)**

Gîlia Lucian-Dumitru, Nagy Zsolt, Păcurar Vasile

#### **Abstract**

The objective of this paper is present a new structural solution for the trusses of the pitched roof portal frames of industrial buildings. Cold-formed steel members are used in a wide variety of applications, both residential and industrial, due to their high strength to weight ratio. The girder solution proposed in this paper is composed of back to back cold-formed C cross-sections acting as top and bottom chords, and corrugated sheeting acting as the girder web. The girder components are described, as well as the stress state of each member of the girder. Also several finite element based analyses have been carried out. These analyses point out the serviceability of some truss configurations. Several remarks are stated resulted from the FEM-based analyses. The paper concludes by briefly stating the technologic and economic advantages of the proposed cold-formed girders.

**Keywords:** cold-formed steel, steel girders, stressed skin sheeting, finite-element analysis, modified Riks analysis, serviceability limit

### **Research and It's Place in Economical Development (Pages 232-242)**

Mircea I Rus

#### **Abstract**

Scientific research plays an important role in the evolution of the society in all of its aspects, therefore its interference with the innovation process should be also taken into consideration Both, the scientific research and the innovation process take part in the technological progress. The outcome of this progress has positive effects on the economical and financial activities at a global level, thus encouraging the spreading and the consolidation of globalization, as well as the

development of the multidisciplinary aspect of scientific research. Technological progress generated by scientific research has led to the appearance of new areas in the economical field of activities, but it had also caused the extinction of some others which were obsolete. On a global scale, the activities are constantly changing because of technological progress, one of the main goals is finding an alternative power sources, and nevertheless, protect the environment, meaning that these power sources should generate a decrease in the global pollution level.

**Keywords:** Research, Innovation, Economical development, Technological, Environment

### **Fields of Research Activity (Pages 243-260)**

Mircea I Rus

#### **Abstract**

In the last decades the scientific research areas have become more diversified, which has led to an increase in the funds accorded for this kind of activity, and also to finding new solutions to the various problems mankind is facing. Important steps have been taken in finding alternative power sources, treatments for diseases thought to be untreatable, ending world hunger, and not least, ways to protect the environment. All of this wouldn't have been possible if the main scientific research fields hadn't been diversified and set to interfere with each other resulting in the multidisciplinary aspect of scientific research. We must be confident that in the future, the results of scientific research will offer answers and solutions in those fields and to those issues for which mankind has not yet found an answer.

**Keywords:** Research, Innovation, Economical development, Technological, Environment