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Abstracts of
Acta Technica Napocensis: Civil Engineering & Architecture, Vol. 51, 2008

SUSTAINABLE BUILDING - DESIGN, CONSTRUCTION, USE AND DEMOLITION

C. Aciu, M. Brumaru

ABSTRACT

The paper presents some aspects concerning the sustainable development in constructions, as an important part of the sustainable development of the entire society. It tackles issues regarding the problem of material resources, the energy crisis and environment pollution, which has occurred as a consequence of the worldwide industrialisation, population boom, globalisation and accelerated economic development. Not only does the present paper emphasize the need for action, but it also highlights the different opportunities of action to be taken in order to solve all problems encountered in the various stages of the life cycle of buildings and their dependencies, in the framework of the new concepts of accountability to environment and sustainable development. Moreover, it is brought forth the idea that, whilst making decisions regarding construction and the diverse means of materializing it, a multi-criteria analysis is needed, which can be achieved by the new automated tools used in the analysis of buildings and building materials.

Keywords: *sustainable development, lyfe cycle, building materials, embodied energy;*

Full bibliographic reference:

ENVIRONMENTAL PROTECTION BY RECYCLING OF WASTE IN THE BUILDING MATERIALS INDUSTRY

C. Aciu, D. Manea

ABSTRACT

In the current framework of sustainable development, waste management represents an increasingly delicate issue, especially regarding the storage of waste materials and their impact upon the environment. Using waste materials in the production of building materials is an efficient means of reducing the consumption of natural resources and, at the same time, substantially lowering the negative impact on the environment. This paper aims at raising awareness on the recycling possibilities of some products and industrial waste materials which could be used in construction and in the technology of building materials, thus highlighting some of the directions in the approach of some specific economic, technical and ecological problems. In conclusion, the paper synthesizes and enriches the knowledge on material recycling, a fundamental component of the eco-political model imposed by the necessity of adopting a strategy based upon sustainable development, which means transmitting to future generations an unaltered environment.

Keywords: *sustainable development, waste materials, recycling, co-processing;*

Full bibliographic reference:

MANAGING CRITICAL SYSTEMS IN DENSED URBAN AREA AS IASI MUNICIPALITY

A.D. Ancas, G.M. Atanasiu

ABSTRACT

Evaluating the risk of natural disasters is an intensely debated issue, both on national and international level. In the present paper, after a brief review of the international research in this field and an introduction in risk management, we insisted on risk analysis of an urban area, called urban system. More precisely, we investigated the evaluation of risk and the behavior of the pipelines infrastructure characteristic to an urban area during an earthquake. By taking into account a certain region in lasi city area, we present a methodology of evaluating seismic risk of the utilities network of the region. The methodology consists in establishing the necessary steps to be taken in such an evaluation. These steps are also graphically displayed for the gas pipelines of the area, and emphasizing the critical

points existent in that sector (e.g. gas stations).

Keywords: *natural disasters, risk management, lifeline system, urban system, gas pipelines;*

Full bibliographic reference:

THE BEHAVIOR OF WOODEN STRUCTURES AT SEISMIC ACTIONS

H.A. Andreica, A.D. Berindean, R. Dârmon, I. Muresanu

ABSTRACT

In this essay we are presenting how the wooden structures behave when seismic actions occur. Due to the specific deformations of the joints in wooden structures, plastic articulations are produced and a redistribution of tensions with important values for the dissipation of energy. The successive flattening and augmentation of the amplitude, with each loading cycle, of the hysteresis curve's bends, specific to the wood-metal joints that are under cyclical actions, illustrates the plasticization of steel and crash of wood phenomena that appear in joints. In this dissertation we are pointing up the most significant solutions regarding the interventions and consolidations for seismic actions in wooden buildings or wooden structures in buildings with mix structures, taking into consideration the P 100-1:2004 Code, Eurocode 5 and Eurocode 8 requirements, in such a way that the general structural continuity of the building should be ensured, as well as a provision of sufficient resistance through ductility and energy dissipation. The consolidation solutions, specific to each and every building, need experience in expertise, design and executions.

Keywords: *wooden structures, wood-metal joints, seismic actions, ductility, consolidation;*

Full bibliographic reference:

THE ECONOMIC AND ECOLOGICAL CONSEQUENCES OF THE THERMAL PROTECTION DEGREE OF BUILDINGS

H.A. Andreica, L. Moga

ABSTRACT

The Energetic Performance Certificate of a building made in accordance with the Calculus Methodology of the Energetic Performance of Buildings, elaborated for applying the 372/2005 Law contains the annual energy specific consume in kWh/(m²-year) and the equivalent emission index CO₂ in kg_{CO2}/(m²-year). Increasing the thermal protection degree of a building the reduction of the annual energy specific consumption and implicit of the equivalent emission index CO₂, will take place. Reaching the energy consumption indexes of the EU countries with favourable consequences for the environment protection, when subsidizing a building with modern installations, can be made by increasing the thermal protection degree of windows. In Romania the existing building background from the energy point of view contains mainly non-performance constructions which determine important liberations of chemical and thermal pollutant agents.

Keywords: *Building energy performance, building energy economics, thermal protection, expert systems, numerical methods and CO₂ emission;*

Full bibliographic reference:

MODERN LINES IN ACOUSTIC DESIGN OF CONCERT HALLS – A CRITICAL VIEW

H.A. Andreica, D.R. Tamas-Gavrea

ABSTRACT

Concert halls represent one of the most interesting types of interior places. Recent findings in acoustical research have lead to theories as to which architectural features contribute to high-quality acoustics. The acoustical environment in and around buildings is influenced by numerous interrelated and interdependent factors associated with the building planning -design - construction process. The materials and construction elements that shape the finished spaces will also determine how sounds will be perceived in that space as well as how they will be transmitted to adjacent spaces. Auditoriums can be design to provide good acoustics for many different types of performances. To illustrate this, the multipurpose auditorium was designed. Each of the world's important concert halls presented in this article, incorporates strategies based on acoustical theories that are only recently beginning to be tested in the actual buildings.

Keywords: *multipurpose auditorium, reverberation time, diffusion of sound;*
Full bibliographic reference:

PROPERTIES OF FRP BARS FOR CONCRETE BEAMS

C. Banu, N. Taranu, O.M. Ionita, V. Munteanu

ABSTRACT

There are several reasons why civil and structural engineering may need to use resin-matrix continuous fibre (fibre-reinforced polymer - FRP) reinforcement in concrete. The primary reason is durability, but other reasons include electromagnetic neutrality, high strength and lightweight. For structures, which are exploited in aggressive environments, the corrosion of steel is a significant problem. Types of structures, which are particularly at risk, include marine structures, bridges subjected to de-icing salts and industrial buildings. Two main type of FRP composite bars will be analysed in the paper: glass fibre reinforced polymer bars and basalt fibre reinforced bars. The principal characteristics needed for design are first discussed theoretically and then tested experimentally. Comments are provided on the theoretical and experimental values and the suitability of these materials for concrete elements is assessed.

Keywords: *FRP reinforcement, GFRP, BFRP-basalt fibre reinforced polymer;*
Full bibliographic reference:

EXPERIMENTAL TECHNIQUES USEFUL FOR THE BUILDINGS ENERGETIC AUDIT

I. Baran, I. Bliuc, C. Avram

ABSTRACT

The aim of energetic audit of existent buildings is to find out the real energetic performances and to identify the proper measures to bring them up to the actual level. For the energetic performance evaluation it is necessary to find out the constructive structure and the characteristics of the used materials. Because of the long time of building operation, some difficulties aroused, the most frequently met being the followings: the incomplete or missing designs, the discrepancies between the design and the real building because of the adoption of some constructive solutions apart from the design stipulations or because of some work errors, and the degradations during time of the thermal insulation as moisture result. The paper presents some experimental ways for the analysis of the main aspects that influence the real energetic performance of buildings: discontinuities of the envelope thermal insulation, real thermal resistance of closing elements. There are shown the necessary equipments, the experimental methodology, the recordings program and the results get from a case study.

Keywords: *thermal performances, IR thermography, thermal flowmeter, energetic audit;*
Full bibliographic reference:

CALCULUS ALGORITHM FOR STRATIFICATED PLATES OF LONG WIRES-MATRIX LAMINAE

R. Boazu, A. Secu

ABSTRACT

This work suggests an integral calculus algorithm, to solve the stratificated plates with layers of long wires-matrix identical composite laminae. The integral algorithm presumes: measurement, by micromechanical methods, of the elastic and mechanical lamina characteristics, measurement - for composite laminae - of the rigidity matrix depending on the main axes and of the low transformed rigidities matrix and rigidity expressions depending on invariants, calculus of the geometrical (w) factors for the layer, measurement of the layer bending modules (D_{ij}) depending on invariants and geometrical factors, assembling of the bending modules matrix, measurement of the reverse of the bending modules matrix, calculus of the practical bending values depending on the reverse matrix elements of the bending modules and on the inertial moment of the stratificated plate, the static solution of the plate starting from the classical methods and from the practical bending values, the plate rigidity verification, measurement of the bending moments vector for the stratificated plate, calculus of the curvature vector in the plate point of measurement of the bending moments vector, measurement of the specific deformations at a lamina point in the layer's thickness, measurement of the strain in the selected lamina (for wrapping reasons) depending on the deformations vector and on the low transformed rigidities matrix, strength verification by application, for the strain

vector measuring, of an yield criterion.

Keywords: *algorithm, module, layer, lamina, rigidity, bending, curvature, deformation, strain, critical point, yield criterion;*

Full bibliographic reference:

BENEFITS OF THE BALLAST CUSHION IN IMPROVING THE DIFFICULT FOUNDATION SOILS

N. Boți, A. Stanciu, I. Lungu, I. Boți

ABSTRACT

Ballast cushions are recommended as improving solutions of the foundation soil based on added material, by compaction, with a double purpose: to increase stability of the soil by decreasing the settlement of the direct foundations that will be performed on that construction site and to ensure the water drainage from the soil underneath. The paper presents the difficult site conditions and foundation solutions considered for an objective on the Somes river bank. The soil profile on the site reveals clayey soils with different thicknesses accompanied by a swelling-contraction potential followed by silty sands, sands and gravel until 10 m deep and the underground water table increase from 2.4 - 3.5 m to 1.0 - 1.8 m from the ground surface. The foundation solutions were considered by three options: indirect foundations on open caissons, indirect foundations on short piles and continuous flexible footings under columns, foundation beams in combination with a soil improvement with added material as ballast, in order to perform a direct founding. The proposed ballast cushion as a soil improvement solution has the thickness of 2 m based on specific calculations to accommodate the soil restrictions related to the Deformation Limit State and it allows the decrease of the foundation depth, a very important issue to build foundations within places with high underground water table.

Keywords: *active clays, soil improvement, ballast cushion, deformation limit state;*

Full bibliographic reference:

RENEWABLE ENERGY SOURCES, USED FOR RESIDENTIAL BUILDINGS

N. Cobirzan, M. Brumaru

ABSTRACT

The major problems of today's society consist of fighting against climate changes, efficiently managing the natural resources necessary for the present and future generations, in other words, of insuring a sustainable development. The purpose of sustainable development is to reconcile, on one hand, the economic and social progress and, on the other hand, to insure the environment protection, altogether having as a result improving the quality of life. The need for using the renewable energy in the residential sector has an indubitable priority, due to reasons of energetic safety, diversifying the sources and reducing the import dependence on conventional combustibles, all these having as a result the environmental protection and insuring a long-term sustainable development, observing at the same time the regulations imposed in the field by the European Union. The article presents the renewable energy sources and the importance of implementing them in the residential sector, in order to reduce the consumption of conventional energy, of the CO₂ emissions and of the cost for heating and hot water preparation.

Keywords: *sustainable development, energy efficiency, renewable energy sources;*

Full bibliographic reference:

IMPROVEMENT OF ENERGETIC PERFORMANCES OF THE STUDENT'S HOSTELS BELONGING TO THE POLITEHNICA UNIVERSITY OF TIMIȘOARA

D. Dan, V. Stoian, T. Nagy, C. Dăescu, C. Floruț

ABSTRACT

The student's hostels located in Timișoara-Romania were mostly built from 1970 to 1980 with the adoption of minimum solutions for the thermal insulation required at the time. The hostels are heated by using a district heating station. The use of the buildings without general repair work has led to the occurrence of certain damages, especially because of the sweat on the walls. The technical department of the university has promoted and sustained the improvement of the energetic performances of the hostels located in the campus area. The paper presents the situation of one hostel before and after thermal rehabilitation, along with the solutions adopted. It is presented also

an economical study performed in order to sustain the execution of the constructional works. The solutions adopted referred to the improvement of global thermal resistance of the envelope elements in order to reduce the pollution and the energy loss. Finally the energetic performances and energetic classification are presented for rehabilitated hostel.

Keywords: *sustainability, thermal insulation, energetic audit, thermograph;*

Full bibliographic reference:

SYNTHESIS OF COMPOSITE MATERIAL APPLICATIONS IN THE ENGINEERING FIELDS

G. Draghici, G. Paduraru, I. Ionitiu

ABSTRACT

This article refers to the composite material applicability in the engineering fields. After a brief look over the present humanity development, along with its specific problems, we refer in the first place to the definition of the composite materials being: "artificially created, by the rational combination of at least two necessary components, the finished product bearing some properties that none have separately", then at the present and future development directions of the constructions field concluding with the necessity of the composite materials for the engineering fields progress. Next we compare the composite and the traditional materials, including the properties, advantages and disadvantages of the composite materials, and then in the second part the basic problems are exposed: the main usages and their specific details. The main directions are :

1. replacing the traditional materials when their technical-economical efficiency is no longer optimum;
2. consolidating and/or modernizing the existent structures;
3. tubing rehabilitation using the interior protection procedure.

So, from the point of view of replacing the traditional materials, we can observe, at present, the usage of a diversity of polymeric materials in the auto, space, marine, industrial and architectural components. Referring to the second point concerning the consolidation of the engineering structures, the polymeric composites are mainly used as plat band and membranes, reinforced with unidirectional and bidirectional fibres. Regarding the tubing rehabilitation, one solution consists in applying a textile flexible tube on the interior surface of the broken tubing part, made of various textile layers, with peroxide resin. Another rehabilitation procedure is by pulling a new tube inside the old one, the new one sustaining itself, in the end.

Keywords: *composite materials, composite systems, segment, reinforcement, fiber;*

Full bibliographic reference:

NONLINEAR BEHAVIOUR OF THE REINFORCED CONCRETE BENT ELEMENTS WITH RECTANGULAR CROSS SECTION

M. Dumitra, N. Cobirzan

ABSTRACT

The nonlinear behaviour of the reinforced concrete bent elements with rectangular cross sections is analyzed on the base of moment-curvature diagram, defined by the characteristic loading stages. If the reinforcement and concrete properties are known, the ductility section coefficient can be expressed in respect with reinforcement percentaje and used in seismic design.

Keywords: *nonlinear behaviour, moment-curvature diagram, loading stages, ductility coefficient;*

Full bibliographic reference:

EARTHQUAKE BEHAVIOUR OF HISTORICAL MASONRY STRUCTURES

Z.S. Ferenczi, I. Bucur-Horváth, D. Samoila

ABSTRACT

The paper deals with post-earthquake damage assessment and global earthquake behaviour of historical masonry structures. The study refers to a certain type of 2-4 storied masonry buildings placed in seismic areas. The research is focused on a significant case, the Miko Castle of Olteni (Transylvania), incorporated in a mediaeval ensemble. This little castle comprises important empire style wall paintings. The paper presents investigations on the

earthquake-produced damages of the building. Taking into account the structural conception and examining the grade of damage of different walls, some conclusions concerning the earthquake behaviour of the structure and different structural elements are drawn. These findings represent the base for the retrofitting proposal.

Keywords: *historical masonry structures, earthquake damages, strengthening;*

Full bibliographic reference:

A NEW 1200 SEAT PHILHARMONIC HALL FOR THE FILARMONICA CLUJ-NAPOCA

P. Gillieron, M. Petrina, T. Scott, A. Borda

ABSTRACT

The paper describes the acoustic design development of a 1200 seat concert hall with variable acoustics, in the Simion Barnutiu Park, next to the old Casino Building. The concert hall has been designed to the highest international standards for concert and choral performances and rehearsals. Development of the room acoustic was carried out using CATT software. The basic building form was designed by a team of Technical University of Cluj-Napoca. The free volume was chosen to create a reverberant acoustic with a reverberation time (RT) close to two seconds at mid frequencies, with an audience present. Parameters such as Reverberation Time (RT), Early Decay Time (EDT), Distinctness (D50), Clarity (C80), Lateral Energy Fraction (LEF), Inter Aural Cross Correlation (IACC), Speech Intelligibility (RASTI), and Strength (G) are discussed, together with their optimisation. Data from Echograms, Sound Roses and Vectorgrams are discussed. Evaluation of the hall acoustic using auralisation within CATT software and anechoic speech and music samples in a specially constructed playback studio in London is described. Effective control of external noise and vibration is demonstrated.

Keywords: *scoustics/ RT/ EDT/ D50/ C80/ LEF/ IACC/ RASTI/G/ IACC/ sound, roses/ vectorgrams/ reflection tracking/ diffusion coefficients/ external noise control.;*

Full bibliographic reference:

VERY LOW NOISE MECHANICAL AND ELECTRICAL SERVICES SYSTEMS FOR THE FILARMONICA CLUJ-NAPOCA

P. Gillieron, T. Petrina, A. Borda

ABSTRACT

The paper describes the acoustic design development of very low noise air conditioning systems for the new Philharmonic Hall. The concert hall has been designed to the highest international standards for concert and choral performances and rehearsals. A range of noise and vibration criteria is proposed for spaces within the new building. A general approach to noise control is proposed, with contributing factors. Low velocity, streamlined risers and ductwork are described, together with the design of appropriate attenuators for the building. Effective control of services noise and vibration is demonstrated in the hall. The design of quiet ventilation systems for ancillary areas, including practice, ensemble, soloist and choral rooms is discussed.

Keywords: *concert hall, acoustic design, noise rating curves, very low noise air conditioning, low velocity air systems, attenuator design;*

Full bibliographic reference:

METHODS FOR STRUCTURAL ANALYSIS OF HISTORICAL BUILDINGS

V. Gioncu, M. Mosoarca

ABSTRACT

The paper presents the investigations of historical spatial building behaviour under seismic actions for two limit states, damage control and ultimate limit states. In the first case the cracks of masonry are limited and the elastic FE methodology can be used, in order to determining the weakest parts of building and the efficiency of adopted strengthening method. For the ultimate limit state, collapse mechanisms methodology is very useful in order to determine the measures to strengthening the historical buildings. Some different types of historical buildings are investigated: church, synagogue, mosque and apartment building.

Keywords: *historical buildings; damage control state; ultimate limit state; Collapse Mechanisms Methodology; seismic behaviour, churches, synagogues, mosques, apartment buildings;*

Full bibliographic reference:

KNOWLEDGE-BASE FOR ECO-FRIENDLY CONSTRUCTION

F.Z. Gobesz

ABSTRACT

The modification of the natural environment is significantly affected by past and present human activities. One of the most glaring activities is building. The development, maintenance and usage of constructions should avoid, or at least minimize the unwholesome side effects on the natural environment. Nowadays this can be done in an eco-friendly manner, firstly because of the rising consciousness regarding the quality of life, secondly due to the development of ecological building technologies combined with the availability of more and more environmental friendly materials. The objective of the author was the early-stage development of a knowledge-base prototype for eco-friendly constructions. In the future, the system should be accessible through the Internet for information/self-learning about eco-friendly materials and solutions, but also for the evaluation of future or existing buildings, during design, construction and maintenance.

Keywords: *eco-friendly, environment, construction, knowledge, information;*

Full bibliographic reference:

REHABILITATION INTERVENTIONS AT THE ORADEA FORTRESS

O. Groza

ABSTRACT

The fortress from the centre of Gradea spreads over a total surface of ~150.000 m², and it is more than nine centuries old. The fortress of Gradea, although its national and international historical and architectural value has been recognized, is in an advanced state of degradation. Both the local administration as well as the citizens wish for the rehabilitation of the fortress and its reinstatement in the tourist, cultural and economic circuits. The profound study of the classical techniques of building and seismic retrofitting, considering the structural behavior of historic buildings and the intervention technique using compatible materials to the original ones, have become the new research objectives of the Technical Department of the Faculty of Architecture and Construction, Gradea. Complex research programs have been initialized regarding the monitoring of the behavior of fissures/cracks and existing damage; methods of consolidating and structure safety; rehabilitation of the foundations and brick masonry structures.

Keywords: *fortress; pentagonal palace; stone and brick masonry; extensive damage; minimal intervention;*

Full bibliographic reference:

THE INFLUENCE OF THE EQUIPMENT HEATING SCHEDULE ON THE BUILDING INTERIOR COMFORT

S. I. Ianca, D. F. Tudor

ABSTRACT

The thermal insulation of the new and existing buildings is one of the basic conditions for ensuring a normal environmental comfort and the most important component of the building interior comfort is the hygrothermic comfort, which means ensuring temperature and humidity parameters inside the building according to the needs of the human body. The paper presents the influence of the equipment heating schedule on the interior comfort in residence buildings. There are presented in this paper the influence of the heating daily duration on the condense temperature over the interior surface of the envelope elements and on the relative humidity of the air inside the rooms, as a result of the theoretical and experimental research developed some years ago in the Civil, Industrial and Agric. Constr. Department, from the Civil Engineering Faculty of Timisoara.

Keywords: *thermal conductivity, hygrothermic comfort, thermal insulation;*

Full bibliographic reference:

ROBUSTNESS OF FRAMING SYSTEMS FOR BUILDINGS

O.M. Ionita, N. Taranu, S. Rominu, R. Bancila, C. Banu

ABSTRACT

The awareness of the significance of the robustness of structures has gradually intensified over the years due to experiences with failure and collapse of many structures. Recent events of terrorism in different parts of the world have further emphasized the urgent need for development of rational approaches to ensure that risks to people, environment, assets and functionality of the societal infrastructure and built environment are acceptable and affordable to society. A significant amount of research has hence been invested into the various aspects of robustness resulting in a number of useful recommendations on how to achieve robust structures. However, despite many significant theoretical, methodical and technological advances over the recent years, structural robustness is still an issue of controversy and poses difficulties with regard to its interpretation as well as regulation. The aim of the present paper is to present some aspects regarding the assessment of the structural robustness starting with the knowledge of the failure mechanisms of existing structures. There are also specified the currently used methods of designing for robust structural systems according to the Eurocodes.

Keywords: *robustness of structures, reliability, structural integrity, risk assumption, structural failures;*

Full bibliographic reference:

PATRIMONY BUILDINGS THE « SFANTUL IOAN CEL NOU - NICORITA » CHURCH OF IASI

D. Iuraşcu, L. Groll

ABSTRACT

We performed an expertise on the Sfantul Ioan cel Nou Church - Nicorita of Iasi, Iasi County, in order to establish the best method of restoration, consolidation and preservation of this historical monument. The church is 378 years old and must be studied to determine its resistance and stability and the possibilities of rehabilitation of this objective due to its importance to our national patrimony. By this expertise we mean to establish and preserve intact the original architectural structure of the monument and to make all the necessary calculations to determine its resistance, as well as to determine the tensions and forces that lead to the forming of fissures into the church's walls.

Keywords: *walls, stone, consolidation, preservation, restoration;*

Full bibliographic reference:

RESEARCHES CONCERNING ADHESIVENESS OF BITUMENS TO AGGREGATES

L. Judele, L. Groll

ABSTRACT

The estimation of the capacity of coverage in the laboratory may be made visually as well. The operator's subjective perspective, the angle of view, the luminosity, the nature and colour of aggregates are many factors that may influence the result. The computer-assisted image analysis qualifies and quantifies objectively enough the capacity of coverage of bitumen on aggregates, removing any exterior influences. It is a simple, repeatable, and reproducible use method.

Keywords: *bitumen, adhesiveness, capacity of coverage, computer-assisted image;*

Full bibliographic reference:

PROPERTIES OF CEMENT BASED MATERIALS WITH FLY ASH FROM CO-COMBUSTION OF COAL AND BIOMASS

M. Kosior-Kazberuk

ABSTRACT

The introduction of industrial byproducts such as fly ash into concrete or mortar can significantly enhance their basic properties in both fresh and hardened states. The present paper concerns the mortars and concretes containing fly ash from co-combustion of coal and biomass (FAB). The properties of fly ash from co-combustion of coal and wood biomass should be evaluated considering fly ash utilization as supplementary cementing material in concrete. The rate of strength increase of cement based materials with fly ash is slower but sustains for longer periods than the rate of strength increase of Portland cement concrete or mortar. Due to this fact a research program concerning

relationships between the composition of mortar and concrete and their strength development has been realized. Mortar specimens prepared with 25% of fly ash replacement were evaluated for their compressive as well as flexural strength at 14, 28 and 90 days and the results were compared with Portland cement mortars without fly ash. The mechanical properties of concretes containing from 0 to 25% of fly ash was determined after 2, 28, 90 and 180 days of curing. Beneficial effect of fly ash on cement based material properties is evident as early as after 28 days of curing, although the changes in microstructure continue to occur for longer time.

Keywords: *concrete, mortar, fly ash, biomass, co-combustion, strength development;*

Full bibliographic reference:

PRESENT TRENDS IN LANDSLIDING CONTROL

I. Lungu, N. Boți, A. Stanciu, O. Donciu

ABSTRACT

The efficient management of the natural disaster is a base concept for the long term development of all societies. Once the present problems related to landslides are defined as part of the natural disaster issue, new approaches and methods are needed that will simultaneously allow: the improvement of prognosis related to the place, time and characteristics of these natural phenomena, creating scenarios concerning the optimum strategies to adopt when such a disaster is triggered, as well as the adoption of post-disaster strategies in order to reduce the damages and re-install the normality within the community. The paper presents elements that define such methods based on geo-sciences and bring to attention a sum of experiences related to the field of landslide management with interventions on reducing the effects on society at large.

Keywords: *landslide management, natural disaster, prognosis, post-disaster strategies;*

Full bibliographic reference:

USE OF INDUSTRIAL WASTE FOR THE PRODUCTION OF BUILDING MATERIALS

D. Manea, C. Aciu

ABSTRACT

Waste materials resulting from technological processes represent a major problem, both from the point of view of ensuring a storage space and from the point of view of pollution. This is why viable solutions for the reuse of waste material need to be found. This study shows the results of the experimental program carried out in the Building Materials Laboratory, aiming to find solutions for the reuse of sludge for obtaining ecological building materials. The performed studies aimed to identify the physical-mechanical characteristics of sludge, so that this could be used in as high amounts as possible in construction. Sludge was tested in order to check if it can be used as an aggregate or as an addition for the preparation of mortars. From an economical point of view the material costs of any of the mortar networks using sludge are markedly lower than in the case of standard mortar and an additional advantage is that there is no more need for deposit space that affects the ecological balance.

Keywords: *sustainable development, waste recycling, ecologic materials, sludge;*

Full bibliographic reference:

NEW THERMOINSULATING MATERIAL USED IN THERMAL REHABILITATION OF THE DWELLING BUILDINGS, IN THE CONTEXT OF SUSTAINABLE DEVELOPMENT

D. Manea, C. Aciu, N. Cobirzan, M. Voda

ABSTRACT

In the field of constructions, a special importance within the concept of sustainable development, has the accomplishment of ecologic constructions, aiming at saving energy and reusing the wastes resulted from industry. The paper present the results from an experimental study concerning a new thermoinsulating material which is destined for new and existing buildings. The novelty of the method comes from the fact that it is obtained following a proper composition, using cement, aggregates, industrial waste materials, a blowing agent, water and additives. This material can be ranked in the category of light cell concrete. Another novelty resides in the fact that its application on the living building casing is not the classical, traditional one, applied by mechanical fastening, but by casting the material in casing panels, whose thickness results from the calculation. Not only does the material

proposed have a high efficiency, at least comparable to the thermo-insulating materials currently used, but it can also be considered an ecological material which uses products resulted from industrial waste.

Keywords: *thermal rehabilitation, sustainable development, ecologic material, waste recycling, thermal conductivity coefficient;*

Full bibliographic reference:

THE IMPROVEMENT OF THE BUILDING'S ACOUSTICAL INSULATION AGAINST AIRBORNE AND STRUCTURAL NOISE. CASE STUDY

M.T. Marcu, D.R. Tamaş-Gavrea

ABSTRACT

The paper presents recent methods for improving the sound insulation of building elements by reducing the level of airborne and structural noise transmitted through the separating construction elements and the structure of the building. The case study, which is being presented below, illustrates the acoustical insulation of the auditorium "Megalos Club" in Constanta, situated at the ground floor of a hotel. The choice of the best acoustical solution was made by analytically determining the sound reduction index R_w of the separating construction elements, in the case of homogenous and inhomogeneous structures, as well as in the case of one-layer and multi-layer structures. The ways of noise transmission to the structure of the building have been analyzed. The reduction of the structural noise level propagated through the collateral ways of the building was obtained by using binding elastic elements of the multi-layer structures. After the project was put into practice, although the level of measured noise in the auditorium was high, about 100 dB(A), a level of 35 dB(A) was obtained in the rooms of the hotel, a value which is well within the limits required by the current legislation.

Keywords: *acoustical engineering, acoustical insulation, the airborne sound reduction index, binding elastic elements, structural noise;*

Full bibliographic reference:

A NEW TYPE OF BEARING STRUCTURE AND ROOFING SYSTEM WITH A HIGH DEGREE PREFABRICATION, SUITABLE FOR RESIDENTIAL BUILDINGS

D. Marusciac, A. Marusciac, I. Mos, I. Muresanu

ABSTRACT

The work is presenting a new type of structure and roofing used for the construction of multistorey residential buildings. The new types of structure and roofing were each one, by itself, awarded with an invention patent. The new type of bearing structure, made out of precast reinforced concrete of a special type (i.e. T and TT type), is based on the use of a new technology of pre-fabrication and construction procedure. The use of this new type of structure in the construction of residential buildings allows the gain of some important technical-economical advantages compared to the conventional constructive solutions, in what concerns the consumption of energointensive materials (cement and steel), as well as in what concerns the price of the square meter. The new type of roof with spatial structure, used for the residential constructions that have a mansard roof or not, is formed from typified elements that form the two slanted sides of the roof and from post and prop elements, which ensure the transfer of loads and the general stability of the structure. Through the adjustment of the new type of bearing structure and of the this type of roof with spatial structure, characterized by a high level of the precast processes and typified elements, besides the significant decrease of the construction's time, an important diminution of the material's consumption and price is ensured.

Keywords: *structure, precast, elements, spatial, typified elements, diamond shape;*

Full bibliographic reference:

OPTIMIZING THE THERMAL PROTECTION FOR RESIDENTIAL BUILDINGS BY USING A NEW AND EFFICIENT THERMAL SYSTEM

D. Marusciac, C. Munteanu, A. Marusciac, A. Bojan, I. Mureşanu

ABSTRACT

One of the main challenges faced today by the construction designers is finding a better solution to design and

execute a *thermal insulation* of the exterior facades in order to obtain a better thermal interior comfort and a better thermal behavior of the buildings. The improvement of the thermal protection will be achieved by using new thermal design procedures for the cladding elements. The goal of this design procedure is to obtain optimal thermal protection of the cladding elements against climate variation while keeping the employment of insulation materials and heating energy consumptions at minimal level. The work is presenting a *new thermal protective system* using a combination of traditional system (i.e. a layer of insulating material) with a thin non-ventilated air layer (such layer will have a network of vapor diffusion channels in the direction of the main diffusion orifices at windows sill or building each levels).

Keywords: *residential buildings, thermal insulation, thermo-system, new, economy, cladding elements;*

Full bibliographic reference:

FRP CONFINED CONCRETE MODELS

S. Metaxa Sophia

ABSTRACT

Following recent destructive earthquakes an urgent need has risen so as to upgrade structures designed according to inadequate seismic codes so as to meet even the stringent criteria by current seismic design standards. For the cases in which inadequate lateral reinforcement has been observed existing repair/strengthening techniques are aiming in increasing the confinement action in either potential hinge regions or even over the entire length of the member under repair. Lateral confinement of RC members increases their ductility and hence their energy absorbing capacity. Confinement using steel is a well-established type of repair/strengthening technique with some disadvantages. Over the last decade fibre reinforced polymers (FRP's) have been suggested so as to overcome some of those disadvantages. Confinement with FRP is compared with steel confinement and it is shown that higher ductility levels can be achieved without increasing the weight of the structure. This paper presents a model for predicting peak axial strength and strain for FRP confined circular concrete sections. The proposed model for predicting peak axial strength was based on regression analysis and energy balance method suggested by Mander et al [1], [2] and showed good agreement with experimental results collected from various researchers. Whereas the proposed model for the peak axial strain was based on the assumption that the stress-strain curve of FRP confinement is bilinear. The simple model is shown to compare well with experimental results from previous studies and researchers.

Keywords: *ductility, confinement, RC structures, Fibre Reinforced Polymers (FRPs);*

Full bibliographic reference:

THE TECHNOLOGY OF ASSEMBLING SEPARATORY WALLS

M. Misca

ABSTRACT

One of the big problems that had appeared in construction area, after the Revolution it was the work regulation. Work regulation is one of the most important elements in the management of construction projects. Without a correct project regulation we can't talk about a correct programming, we can't coordinate in an efficient way the construction activity, it doesn't exist a control of projects, so, as a conclusion management is difficult. Lately appeared a lot of new materials that are used with specific technologies and that need to be regulated for a better control of projects. Unfortunately after the Revolution people stopped the regulation at all levels, this aspect was totally forgotten. We only tried to put together the times of some operations and to propose some standards with the achieved results. But in cases like this we didn't thought at the specific technologies, at the necessary resources to obtain a high quality. For this reason I considered that is urgent to begin again the activity of regulation in construction area. Because of this I consider paper gypsum boards as one of the most used building material, that is used in a large scale of finishings and situations. In the present work I tried to propose a new technology for execution of paper gypsum boards and to propose a program that can help us watch the quality of execution and also some critical observations related with the way in which are made this walls on the building site nowadays. For a correct regulation of an article, first of all, it has to be determined the right execution technology for every work process. Using this observations there were pronounced other observations and direct countings on the building site and this results were analysed. The results were compared with the prescriptions and recommendations of various enterprises that are producer of paper gypsum boards and there were established execution technologies for

different work processes in which enters also the paper gypsum boards material. The conclusions put in the first place the correct assembling technology of paper gypsum boards, a control programme for the operations that compose the work process from the standpoint of the effector, the beneficiary and also the mistakes that are often found on the building site. I also made some critical observations related with the work efficiency on the building site and a minimum consumption of resorts.

Keywords: *gypsum cardboard, technology, quality, control, error;*

Full bibliographic reference:

ENERGY AUDIT OF THE EXISTING BUILDINGS. THE EXPERT CALCULUS PROGRAM "AEC"

I. Moga, L. Moga

ABSTRACT

The 372/2005 Law transposes in Romania the stipulations of the Directive 2002/91/CE of the European Parliament and of the Council of 16 December 2002 regarding the energy performance of buildings. This law stipulates the compulsoriness of making the Energy Performance Certificate of the building, technical document that testifies this performance for new and existing buildings, with a serviceable surface of over 1000 m², or for renovation, modernization, selling, renting or assurance works. In current practice the realization duration for the Energy Expertise documentation, for elaborating the Energy Performance Certificate of a building is about 30 days. The automation necessity of those operations appeared in order to reduce the necessary duration for the thermo technical calculus, for making the Energy Expertise documentation, for elaborating the Energy Performance Certificate and for writing the specialty reports.

Keywords: *Building energy performance, building energy economics, thermal protection, expert systems, and numerical methods;*

Full bibliographic reference:

ANALYSIS OF THE CONFINEMENT EFFICIENCY OF CONFINED SQUARE RC COLUMNS USING NUMERICAL MODELLING

V. Munteanu, G. Oprisan, N. Taranu, Ioana Entuc

ABSTRACT

The use of Fiber Reinforced Polymer (FRP) composites as materials for confining systems applied to structural reinforced concrete (RC) columns has surpassed the pioneering stage. Prior studies on FRP confinement refer to small size circular concrete columns, not considering the effect of the existing internal steel reinforcement. The encouraging results obtained on this type of elements stimulated the extension of the composite solutions to other types of columns mainly rectangular ones. Recent studies on the topic concern the specific aspects of the confinement mechanism in the case of rectangular cross-section. Distribution of the confining pressure over the cross-section depends on a larger number of factors than in the case of the circular columns, hence the complexity of the subject. The paper deals with a numerical modelling based on the finite element method in case of square RC columns. Effects of the internal existing steel reinforcement together with the externally applied confining system (FRP membrane) are analysed. Various sizes of RC columns with different FRP thicknesses have been modelled. The main problems related to the modelling process (geometrical, meshing, materials and loading conditions) and some results are also presented.

Keywords: *RC columns, FRP confinement, finite elements method;*

Full bibliographic reference:

EXPERIMENTAL RESEARCHES REGARDING THE VIBRATORY POLLUTION IN HISTORIC BUILDINGS

S. Nastac, C. Debeleac, A. Leopa

ABSTRACT

This paper aim is to present a few relevant aspects regarding the general settlements about the vibration and shock pollution, levels, risks, and limit values, with application on historical buildings monitoring. This study is based on the experimental tests that was developed by the authors in Engineering Faculty building. Also, this study is one of

the first steps from the large research concerning the noise and vibration pollutant factors and their nocive influences about the historic main interest buildings. The final results of this analysis will have a direct and immediately impact both of the real situation evaluation on this area of interest, and of the coherent, unitary and systematic ensemble of legal remedies with the pollution reduction main purpose and put it into the limit values provided by the effectual National and European laws and normatives.

Keywords: *vibration pollution, experimental, research, historical buildings;*

Full bibliographic reference:

EXPERIMENTAL RESEARCHES REGARDING THE NOISEPOLLUTION IN EDUCATION INSTITUTIONS

S. Nastac, A. Leopa, C. Debeleac

ABSTRACT

In this paper the authors presents a few relevant aspects regarding the general settlements about the noise pollution, levels, risks, and limit values, in particular in education institutions. This study is based on the experimental tests that was developed by the authors in Engineering Faculty building. Also, this study is one of the first steps from the large research concerning the noise and vibration pollutant factors and their nocive influences about and on the education institution. The final results of this analysis will have a direct and immediately impact both of the real situation evaluation on this area of interest, and of the coherent, unitary and systematic ensemble of legal remedies with the pollution reduction main purpose and put it into the limit values provided by the effectual laws and normatives.

Keywords: *noise pollution, experimental, research, education institutions;*

Full bibliographic reference:

RESEARCH ON SITES WITH SLIDING POTENTIAL

A. Nicuta, A. Rotaru

ABSTRACT

Prevention and establishment of the active processes of instability of sites pursue the determination in time of displacement, settlement or failure possibilities for the foundation soils. It can be signaled the fact that in these situations is impossible to establish with good precision the process importance, the form of the sliding or bursting of the surface, the conditions of phenomena creation and proceeding. Based on the general considerations regarding the soil sliding, the author analyzes these phenomena on the range of different roads works, realized in Iasi

Keywords: *sliding phenomena, slope, instability;*

Full bibliographic reference:

ROMANIAN CODE FOR STRUCTURAL MASONRY IN THE CONTEXT OF CORRESPONDING INTERNATIONAL STANDARDS

S. Palacean

ABSTRACT

The construction industry experiences periodical adaptations to changes brought in by the new design codes, but it is now the first time when the challenge of implementing a complete range of rules regarding major loading and materials requirements should be faced. This is the case with the new Romanian code for masonry design, CR 6-2006. In order to make sure that both, the construction industry and the market are ready to achieve the opportunities provided by the recent design codes, the paper presents a comparative study of the main international codes for masonry design, focused on the structural behaviour of reinforced masonry elements subjected to compression, bending and shear.

Keywords: *masonry, codes;*

Full bibliographic reference:

OBSERVATIONS CONCERNING SEISMIC PROTECTION OF BUILDINGS IN ROMANIA

I. Pop, I. Madularu, I.M. Pop

ABSTRACT

In this paper we determine the seismic forces for different types of buildings with either reinforced concrete frame structure or reinforced concrete wall structure, placed in different seismic areas. In Romania, the first set of regulations regarding the seismic protection of buildings was introduced in 1963, when the first seismic design code P13-63 was elaborated. The assessment will be done based on the regulations (codes) P13-63, P13-70, P100-81, P100-92 and P100-2006. One of the first criterion regarding the seismic protection of reinforced concrete frame structures and reinforced concrete wall structures in Romania, results from the comparison of the seismic forces values determined in accordance with the different codes mentioned above. The criterion of the value of the seismic forces is not the only criterion that can reflect sufficiently enough seismic protection of buildings. In the last part of the paper there will be estimations concerning the ensuring of seismic protection of buildings with certain conclusions that derive from them.

Keywords: *earthquake, elastic response spectra, seismic forces;*

Full bibliographic reference:

SEISMIC PROTECTION OF BUILDINGS BETWEEN CODES AND REALITY

I. Pop, I. Madularu, I.M. Pop

ABSTRACT

The paper presents the design conceptions included in codes (also related to the Romanian design code), and the manner in which they succeed in ensuring the seismic protection of buildings. The seismic protection of buildings is reflected by the requirements connected to the safety of people's lives, the safety of material assets, the avoidance or limitation of degradation, and the ensuring of post-earthquake building functionality. They are analyzed within the two systems: the conservative system and the non-conservative system. Seismic protection assumes, as we have shown above, requirements, but also the control of requirement fulfillment. The control of requirement fulfillment is analyzed within the two systems: conservative and non-conservative. Since the non-conservative system is used for most of the buildings designed in seismic areas, this system will be thoroughly analyzed. The control of requirement fulfillment is analyzed according to the fulfillment of the Ultimate Limit States (U.L.S.), and the Serviceability Limit States (S.L.S.). The paper presents the results that can be obtained for different analysis alternatives, as well as their limits.

Keywords: *earthquake, seismic protection, design philosophy, energy concepts;*

Full bibliographic reference:

DESIGN OF SHALLOW FOUNDATIONS ACCORDING TO SR EN 1997-1-04 AND EUROCODE 7

A. Popa, V. Farcas, N. Ilies, C. Gherman

ABSTRACT

In 2007 it was adopted as Romanian standard SR EN 1997 - 1 - Geotechnical design. General rules, having 11 sections. Section 6 - Spread foundations presents general principles for ground calculus. The paper presents limit states principles used to design spread foundation systems, according to new European norms and makes a comparisons with Romanian norms (STAS 3300/2 - 85).

Keywords: *Eurocode 7, shallow foundation;*

Full bibliographic reference:

MODELLING THE STRUCTURAL EXPLOSIVE DEMOLITIONS

H. Puscau

ABSTRACT

Collapse modelling using Adaptively Shifted Integration [ASI] technique and Applied Element Method [AEM] are approached within the paper. The ASI fracture modelling of a section is achieved by a plastic hinge located at the exact position within the beam element, with a simultaneous release of resultant forces in the linear Timoshenko

beam element. With AEM the structure is modelled as an assembly of distinct elements made by dividing the structural elements virtually. These elements are connected by distributed virtual springs in both normal and tangential directions. The paper deals with the applicability of both ASI and AEM for collapse analysis and deals with the cracking simulation, occurrence and propagation. It is proved hereinafter that AEM provides a better environment for the simulation of structural response after the failure, down to the moment when the structure itself ceases to exist.

Keywords: *collapse, Finite Element Method, Adaptively Shifted Integration, Applied Element Method, modelling, failure;*

Full bibliographic reference:

SOIL NAILED WALLS FOR DEEP EXCAVATIONS

F. Roman

ABSTRACT

Deep excavations and retaining structures are necessary in order to build in urban areas. A more recent solution for these works is soil nailed walls. The paper presents this solution and two examples of Cluj-Napoca city where it was applied.

Keywords: *deep excavations, retaining structures, soil nails, soil nailed walls, drilling, grouting, active zone, passive zone, slip surface, pull out resistance;*

Full bibliographic reference:

USING NOISE MAPPING SOFTWARE FOR THE ACOUSTIC DESIGN OF MOTORWAY BARRIERS

T. Scott, B. Petrina

ABSTRACT

Noise mapping software has become a very useful tool for predicting noise propagation from new developments such as motorways, airports and railways. The software enables the user to incorporate land contours, terrain features and even satellite imagery. Sound sources such as roads, railways, and aircraft can be virtually placed in a proposed or existing location and their acoustic impact can be determined in two & three dimensions at the click of a button. When applied to new or existing motorways the proposed route of the road can be drawn over a map, a sound level be assigned to it and a noise map generated. It is then possible to insert an acoustic barrier to reduce sound propagation to residential or other areas. The barrier design can then be adjusted to determine the optimum location height or angle to arrive at the required noise levels in the noise sensitive areas. Barrier reduction requirements are derived from predicted increases over pre construction background noise levels and local legislation on allowable increases. Acoustic treatment of the barrier noise side face can improve its effect. Once the critical dimensions have been ascertained from the noise map the type of barrier can be designed to fit in with the surroundings, client requirements or eco requirements of the site. E.g. metal barrier, timber fencing, glass screens, earth, vegetation etc.

Keywords: *Traffic noise control, noise barrier, noise map, noise modelling, CRTN, barrier effect;*

Full bibliographic reference:

CALCULUS ALGORITHM FOR STRATIFICATED ELEMENTS AS MEMBRANES OF LONG WIRES-MATRIX LAMINAE

A. Secu, R. Boazu

ABSTRACT

This work suggests an integral calculus algorithm, to solve the stratificated elements of composite laminae as membranes. The suggested composite laminae are of long wires-matrix type. The integral algorithm presumes to measure, by micromechanical methods, the elastic and mechanical characteristics of the (long wires-matrix) composite laminae, the rigidity matrix of the composite lamina main axes, the calculus of the low transformed rigidity, the low transformed rigidity depending on invariants, the statical solution of the membrane elements shown in the calculus of the axial forces, the relation between the axial forces vector and the deformations vector, the equivalent layer modules (A_{ij}) of identical laminae having different angles, the reversal of the equivalent modules matrix (a_{ij}), the specific deformation depending on the matrix (a_{ij}) and the axial forces vector, the strains depending on the deformation vector and the low transformed rigidity matrix, strength verification of an yield criterion. The

calculus presumes the force vectors selection, the evidence - for the selected values - of the laminae to verify, the application for each case of the accepted fall criterion.

Keywords: *algorithm, composite, layer, lamina, membrane, module, operator, rigidity, stress, deformation, strain, yield criterion;*

Full bibliographic reference:

EXPERIMENTAL STUDIES AND THEORETICAL APPROCHES ON MASONRY DIAPHRAGMS

S. Secula, D. Dan, D. Tudor

ABSTRACT

The resistance capacity of masonry diaphragms to horizontal forces is influenced by the characteristics of materials and especially by the compression effort from the applied gravitational loads. The studies have as purpose the drawing up of a quick method for verifying structures with masonry diaphragms at seismic actions; the method is based on the limitation of the compression stress from the structure. The theoretical and experimental studies within the program developed at the CCIA Department related to the study on the behaviour of masonry diaphragms at seismic actions have as main purpose the setting up of an efficient and quick method to verify diaphragm structures in the masonry at seismic actions, method based on the limitation of the compression stress from the structure. This paper presents some of the conclusions drawn up as a result of a special experimental program and theoretical studies on the bearing capacity of masonry diaphragms subjected to horizontal forces.

Keywords: *rehabilitation, clay brick masonry, bearing capacity, seism;*

Full bibliographic reference:

EVOLUTION OF THE DESIGN METHODS FOR REINFORCED SOIL WORKS

A. Stanciu, O. Donciu, I. Lungu

ABSTRACT

The behavior of a reinforced soil structure has been analyzed both by laboratory tests and large scale models, as well as by field tests on works already performed, with the purpose of improving the design methods. The design methods of reinforced soil evolved in time based on the allowed hypotheses and research performed both in laboratory and field conditions. The results reflected in design codes and computing programs, specific for each country and for different types of structures (retaining walls of reinforced soils, reinforced slopes), some taking into account the corresponding technologies and materials involved in such works. Based on the references related to this subject and some comparative calculation analysis, an evolution is presented of the design methods that can be grouped as it follows: methods based on the static equilibrium analysis of the active zone and methods based on limit equilibrium.

Keywords: *reinforced soil, design methods, retaining structures;*

Full bibliographic reference:

EXPERIMENTAL RESEARCHES TO OBTAIN CD40 TO CARPATCEMENT HIDELBERG ROMANIA

D. Stoian, O. Marsu

ABSTRACT

In this paper are presented the experimental researches on raw materials needs to obtain CD 40 road cement (for roads and landing strip) into Carpatcement Hidelberg Romania from Deva factory. This type of cement can be used to make and to repair surfacing roads. This cement must accomplish the requirements of STAS 10092-78. There were studied mixtures which are current use to obtain usually cement compared with improved mixtures to obtain CD 40 road cement. From these mixtures were realized clinkers which were tested with the target to touch technical and economical requirements.

Keywords: *raw materials, CD 40 cement road, concrete road surfacing, yellow clay, sand;*

Full bibliographic reference:

3D STRUCTURAL BEHAVIOUR OF TRANSYLVANIAN ROOFS

B. Szabo, I. Kirizsan

ABSTRACT

Historic roof structures are ensured by the quality of the geometrical-mechanical empirical-intuitive concept, the historic materials used and the traditional technologies, through which the historic materials were put in operation. They are characterized with a high heritage value, sometimes are more than 600 years old. Built as a three dimensional network of lineal elements, contains thousands of bars disposed in transversal and longitudinal planes without connections to the attic floor. One of the main difference between the historic and engineered roof structure is the way to discharge, to the external walls, and almost never to the attic slab. Studying their structural behaviour the structural engineer could understand and appreciate the correct conformation and behaviour helping to the proper decision making and the intervention (as conservation, restoration, retrofitting, or reconstruction) to the roofs.

Keywords: *historic roof structure, intervention, cross- and longitudinal bracing frames, three dimension structural behaviour;*

Full bibliographic reference:

CONSIDERATIONS ON THE ROOF STRUCTURE LOAD-BEARING CAPACITY - LUTHERAN CHURCH IN SIBIU / HERMANNSTADT

B. Szabo, H. Kreuzinger, H. Muhsam

ABSTRACT

Dated from the 14th century, the Lutheran church on Huet Square in Sibiu has parts from the original roof structure. In the course of history numerous more or less successful interventions had been carried out on these late Romanesque parts. An intervention beside the nave is quite incorrect: in the case of certain trusses the tie-beams have been interrupted, compelling thus the trusses to rest to some degree on the vault. The vault was in its turn reinforced through metal tie bars, which hung from wooden hanging trusses that were included for this purpose in the roof structure. The coexistence between vault-, roof structure, which is impossible to control and an extremely sensitive issue, has produced many damages in the slab, threatening with its collapse. The interventions were emergency works (a scaffolding was erected to avoid the collapse during the research-design and conservation) and there will be some restoration interventions as well. Herein we present the modelling of the roof structure above the nave (with an acceptable behaviour of the original roof structure towards the present resistance and stability requirements - allowing its restoration), as well as the implementation of the emergency works, the conservation being in a preparation phase.

Keywords: *Romanesque type roof structure, restoration interventions, modelling;*

Full bibliographic reference:

CALIBRATION OF DATA OBTAINED FROM SIMULATION OF THE AIR FLOW OVER STRUCTURES IN ATMOSPHERIC BOUNDARY LAYER WIND TUNNELS

E.C. Teleman, E. Axinte, R. Sillion, R. Pescaru

ABSTRACT

The simulation of the air flow over models in atmospheric boundary layer tunnels is a rather young research domain based on advanced scientific technologies imposed by the necessity of studying the turbulent fluid movements in the proximity of the Earth's surface. Up-graded codes for design of structures for wind action recommend these studies whenever the complex environmental conditions and the unusual shape and dimensions of a structure may lead to uncertain and unexpected effects of wind dynamic action. The experiment presented is developed in the wind tunnel from the Laboratory of Structural Aerodynamics of the Faculty of Civil Engineering and Building Services in Iași. Measurements necessary for the determination of the turbulence scales of the wind action in urban environment were conducted. The data obtained were processed and analyzed and interpreted with specific software. The results are used for a synthesis regarding the scales of turbulence of the model of flow and the actual accuracy of measurements. The paper presents some of the important elements of this synthesis.

Keywords: *atmospheric boundary layer, wind flow modeling, spatial scales of turbulence;*

Full bibliographic reference:

IMPACT OF MODERN SYSTEM OF ISOLATION GLAZING OF INDOOR HIGROTHERMICAL COMFORT

A. Tabrea

ABSTRACT

This paper presents so much the advantages of modern systems of isolation glazing as much as the effects in the superior performances as effects degradation of hygro-thermal comfort, under aspect of increase of concentrations of pollution of gas of indoor air, as result omit the aspects concerning at proper steps ventilation of rooms and inadequate exploitation of buildings. The modern elements of isolation glazing present coefficients of heat transfer/thermal transmittances with low values and superior performances at tight of air and water tight. The problematic is very actual because a measure which must in national program of improve of thermal performance of existent buildings constitute improvement of thermal performances of elements of joinery.

Keywords: *element of joinery, thermal transmittance, air permeability, rate of ventilation, concentrations of pollution of gas;*

Full bibliographic reference:

STRUCTURAL BEHAVIOUR OF COMPOSITE MATERIALS STRENGTHENED MASONRY ARCHES

G. Taranu, M. Budescu, N. Taranu, V. Munteanu

ABSTRACT

The paper makes a detailed presentation on structural behaviour and failure mechanisms of a horizontally loaded masonry arch. The arch model was built at a 1:1 scale using solid bricks and M10Z mortar. It was firstly loaded with vertically acting dead loads and with horizontal load acting in its plane. In this loading hypothesis, a plastic hinge occurred leading to the failure of the arch and loss of load bearing capacity. In the next stage of the experimental program, the arch was strengthened using a composite material membrane at the upper face. The membrane consisted in a continuous, glass-fiber fabric and epoxy resin. After proper curing, the same loading hypothesis was used. The failure mechanisms changed and a larger horizontal loading level was noticed. Further on, the arch was rehabilitated using a different composite material layout the membrane was applied both on upper and bottom faces as well as partially on the lateral faces of the arch. This new rehabilitation layout leads to a significant increase in the load bearing capacity of the arch. The failure mechanisms were changed causing a significantly better overall structural behaviour of the arch.

Keywords: *masonry arches, historic monuments, rehabilitation, composite materials;*

Full bibliographic reference:

FRP COMPOSITES AS INTERNAL AND EXTERNAL REINFORCEMENTS FOR BUILDING ELEMENTS

N. Taranu, D. Isopescu, G. Oprisan, I. Entuc, V. Munteanu, C. Banu

ABSTRACT

During the latest decades fibre reinforced polymer (FRP) composite materials have proven valuable properties and suitable to be used in construction of new buildings and in upgrading the existing ones. These materials have covered the road from research laboratory and demonstration projects to implementation in actual structures. Nowadays the civil and structural engineering communities are about to commence the stage in which the use of FRP composites is becoming a routine similar to that of traditional material such as concrete, masonry and wood. Two main issues are presented in this paper, the use of FRP composite materials for new structural members (internal reinforcements) and strengthening of existing members (externally bonded reinforcements). The advantages and disadvantages as well as the problems and constraints associated with both issues are discussed in detail mainly related to concrete members.

Keywords: *FRP composites, internal reinforcements, externally bonded reinforcements;*

Full bibliographic reference:

REDUCTION OF CO₂ EMISSION ON EXISTING BUILDINGS

M. Vasilache, R.L. Ilie

ABSTRACT

The buildings from public domain, which have various functions that were made before 1997 do not match the actual exigency in thermal and energetic performances. Still the reserve of carrying capacity must be improved because of the application done in time by the earthquakes. To apply the new solution of thermal rehabilitation within the structural rehabilitation can cause amelioration of comfort condition and reduction the impact on environment. The authors propose a thermal analyze of several old buildings, which would have applied on the thermal and structural rehabilitation solution.

Keywords: *CO2 emission, existing buildings, sustainable development;*

Full bibliographic reference: