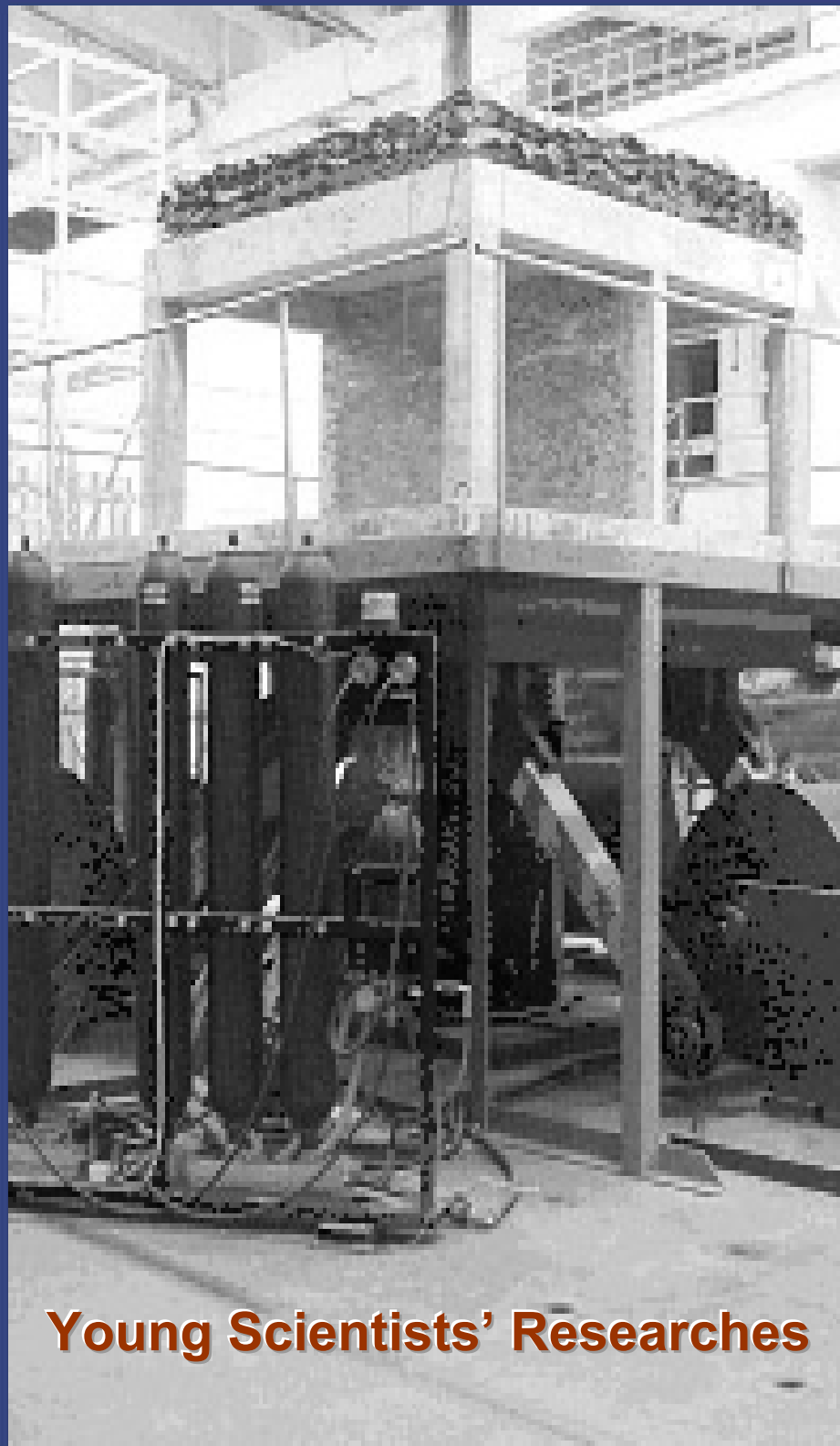


ISSN 1582 - 3024

Volume 2, No.4, 2005

INTERSECTIONS



Publishing House of the

Societatea Academica
"Matei - Teiu Botez", Iasi



Young Scientists' Researches

Violeta Elena CHITAN

Department of Structural Mechanics
Faculty of Civil Engineering
"Gh. Asachi" Technical University of Iași, România
chitan@ce.tuiasi.ro

Septimiu George LUCA Team Leader

Department of Structural Mechanics
Faculty of Civil Engineering
"Gh. Asachi" Technical University of Iași, România
septigeo@yahoo.com

Cristian PASTIA

Department of Structural Mechanics
Faculty of Civil Engineering
"Gh. Asachi" Technical University of Iași, România
pastiacristian@yahoo.com

Maria Nicoleta PESEHONOV Secretary

Department of Structural Mechanics
Faculty of Civil Engineering
"Gh. Asachi" Technical University of Iași, România
nicoleta@ce.tuiasi.ro
nicoleta47@yahoo.com



2000

-  **Contributions concerning solving some buildings acoustics problems by computer simulation**
by Rodica Rotberg 3-4
-  **Contributions to the analysis of high-rise structures with cores**
by Mihaela Ibanescu 5-6
-  **About underground works state of stress and stability in performing and using time**
by Costel Boariu 7
-  **Contributions regarding optimization of structural analysis of buildings taking into account the spatial behavior**
by Cornel Ivasc 8-9
-  **Contributions regarding the use of fibre concrete at the pre-compressed concrete elements**
by Vladimir Corobceanu 10-11
-  **Contributions concernant le dimensionnement des renforcements des chaussées souples / semirigides à l'aide de l'indice de structure (in French)**
by Valentin Brinister 12-13
-  **Contributions concernant le dimensionnement des chaussées souples-semirigides a l'aide de l'indice de structure (in French)**
by Pavel Untură 14-15
-  **Contributions concernant les technologies routiers qui utilisent les émulsions de bitume (in French)**
by Mircea Puiu Fierbinteanu 16-17
-  **Contributions of the introduction the new criteria's for the plumbing systems calculus and performance's evaluation**
by Victorai Cotorobai 18-19



 **Upon solar energy use in hot water supply installations** 20-21
by Sorin Theodoru

 **Contributions considering the concept and design of multi-storey steel structures** 22
by Carmen Elena Teleman

 **Contribution to the studies of the wind action in aerodynamic (wind) tunnels** 23-24
by Radu Aurel Pescaru

2001

 **Modélisation des paramètres climatiques en vue d'optimiser les profils en travers des routes en régions avec des hivers severes (in French)** 25-26
by Eugen Constantin Florescu

 **Contributions concernant les chaussées rigides et semirigides nonconventionnelles (in French)** 27-28
by Doru Cătălin Bârsan

2002

 **Contributions concernant les systèmes d'auscultation des chaussées, en vue d'optimiser l'entretien, la réhabilitation et la reconstruction du réseau routier (in French)** 29-30
by Ioan Druta

 **Increasing liability and exploitation safety of structures towards seismic actions by using some energy dissipating devices** 31-32
by Mihaela Traistaru

 **Optimisation of the software dedicated to structures subjected to seismic and dynamic loads** 33-34
by Octavian Victor Rosca



-  **Contributions on tunnel analysis for transportation using modern methods**
by Vasile Gheorghe Rovenschi 35-36
-  **Contribution to the study of the composite and associated materials joints**
by Livia Ingrid Groll 37-38
-  **Modern solutions for strengthening of framing systems for industrial buildings**
by Gabriel Oprisan 39-40
-  **Contributions to the enhancement of the structural solutions and computational methods for the structural rehabilitation of the masonry buildings subjected to seismic actions**
by Vitalie Florea 41

2003

-  **Contribution at evaluation study of residual mechanical characteristics to reinforced concrete elements**
by Petru Mihai 42-43
-  **Contributions about processes engineering for strengthening the brickwork diaphragm structure buildings**
by Andrei Slonovschi 44-45
-  **About the parametric analysis of some nonlinear and hysteretic models on structural response under static and dynamic actions**
by Violeta Elena Chițan 46-47

2004

-  **Contributions concernant la stratégie d'entretien et de dimensionnement des renforcements routiers (in French)**
by Florica Padure 48-49



-  **The analysis of the quality criteria of the reinforced concrete strength structures**
 by Cristian Mihai Nenov 50
-  **Contributions to integrated programs systems for structural analysis**
 by Ioana Sorina Nica 51-52
-  **Increasing the safety of the constructions placed in seismic regions through the enhancement of the energy dissipation capacity**
 by Septimiu George Luca 53-54
-  **Research concerning the evaluation of the degree of homogeneity of the mechanical properties of materials experimentally determined and of the random effects in the structural response**
 by Florentina Chira 55-56

2005

-  **Contributions regarding the dimensioning of airport rigid pavements**
 by Maria Parvu 57-58
-  **Contributions to integrated programs systems for structural analysis**
 by Georghe Ionica 59-60
-  **Environmental impact indicators for buildings**
 by Laura Dumitrescu 61-62
-  **Contribution to the earth slopes and earth works stability with a view to environmental protection**
 by Daniela Ioana Mitrofan 63-64
-  **On resistance and stability of the structural elements subjected to temperature variations width application in construction and industrial installations**
 by Ana Diana Gorbanescu (Ancas) 65-67



-  **Contributions concernant l'étude de la rhéologie des liants bitumineux et des enrobés (in French)**
by Mihai Stasco 68-69
-  **Contributions à l'étude des systèmes constructifs de protection des façades (in French)**
by Cristina Busuioc 70-72
-  **Study about the masonries realised with low-strength mortars**
by Daniel Covatariu 73-75
-  **Contributions in the field of composite materials uses for strengthening of industrial buildings**
by Codrin Saftiuc 76-77



Contributions Concerning Solving Some Buildings Acoustics Problems by Computer Simulation

Rodica Rotberg¹

Department of Civil and Industrial Engineering, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

- ▶ Date of submission: (15.03.2000)
- ▶ PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - LEOPOLD BIBOROSCH, "ALEXANDRU IOAN CUZA" University of Iasi, România
 - MARIANA STAN, National Institute For Building Research Bucuresti, Romania
 - ALEXANDRU VERES, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

Protection against noise is one of the six essential requirements, which have been stated in the European Construction Product Directive. The construction works must be designed and built, in such a way, that the noise perceived by the occupants or people nearby is kept down to a level that will not threaten their health and will allow them to sleep, rest and work in satisfactory conditions. The purpose of this thesis was to study some buildings acoustics problems by computer simulation.

Starting from the recommendation of the Romanian Code concerning the calculation of road traffic noise levels and sound attenuation by acoustic noise screens, in thesis, some proposal have been applied. The aim has been to provide a basic platform for calculating road traffic noise levels in complex situations and acoustic modeling of road noise barriers. An index, rating uniquely the insertion



Rodica Rothberg

loss of a noise barrier, has been determinate, which allows any noise barrier to be uniquely described.

Acoustic absorbent panel consist of perforated supporting plates that act like support of absorbent materials. Thesis studies the absorption spectra changes of these devices based on the acoustic characteristics of the absorbers used and on the perforation coefficients of the supporting panels.

Micro-perforated panels require small space to achieve high sound absorption when compared with typical foam or porous materials. The effect of micro-perforated plate and airspaces layers towards the sound absorption of the multi-layer construction was also investigated in this thesis. Acoustic absorption coefficient is the main parameter to be estimated.

Computer simulation using author's program was done to calculate the acoustic absorption coefficients. A study concerning acoustic behavior multiple layers walls were performed by computer simulation. The software was written by author.

Keywords: traffic noise, acoustics barriers, simulation, absorbers, buildings isolation, acoustic absorption, double wall, multi-perforated plate, resonance, modeling



Contributions to the Analysis of High-Rise Structures with Cores

Mihaela Ibanescu¹

¹*Department of Structural Mechanics, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania*

- ▶ Date of submission: (23.03.2000)
- ▶ Ph.D. Supervisor: NICOLAE UNGUREANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - MIRCEA IEREMIA, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - CORNEL TRAIAN BIA, Faculty of Civil Engineering, Technical University of Cluj Napoca, Romania
 - CONSTANTIN AMARIEI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The present thesis approaches some important problems concerning the structural analysis of high-rise structures that are generally mixed structures: central core – frames, especially in seismic areas, where the strength and stiffness conditions require an assembly of coupled walls (named core), as a stiffing element.

The two sub-structures are firstly individually studied and then, as a complex, interactive system.

The main original contributions of the work are referring to new models and methods for the analysis of central cores as thin-walled bars, subjected to bending and torsion, to improved methods in the study of mixed structures response to lateral loads. It could be mentioned here the introduction of correction coefficients which take into account the shear force influence upon the core behaviour and a new, simplified model that generalizes Albiges-Jalil model.



Mihaela Ibanescu

It has been also analyzed the influence of the connection between frame and core upon the structural response, and some important conclusions for the design of such systems have been drawn.

Keywords: high-rise structure, core, warping



About Underground Works State of Stress and Stability in Performing and Using Time

Costel Boariu¹

¹*IPTANA Filiala Iasi*

- ▶ Date of submission: (23.03.2000)
- ▶ PhD. Supervisor: NICOLAE UNGUREANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - MIRCEA IEREMIA, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - CORNEL TRAIAN BIA, Faculty of Civil Engineering, Technical University of Cluj Napoca, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary:

In underground working, the most important stage is temporary cavity reinforcing.

Reinforcing type selection depend on performer and geologist experience.

Selection is very relevant when rock material characteristics are at border between elastic and hard reinforcing exigence. So is important to have a kind of reinforcing with optimum response at rock material loading.

We made model experiments for various structures both elastic and until collapse.

The model experiments match theoretical results estimated with finite element method.

In this paper we indicate temporary lining with strain capability, made by precast elements. This temporary lining maybe used in final coating

Keywords: Reinforcing, underground, stability



Contributions Regarding Optimization of Structural Analysis of Buildings Taking into Account the Spatial Behaviour

Corneliu Ivasc¹

SC ICAR SRL Iasi, Romania

- ▶ Date of submission: (30.03.2000)
- ▶ Ph.D. Supervisor: CONSTANTIN AMARIEI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - FLORIN MACAVEI, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - DAN OLARU, National Institute For Building Research Bucuresti, Romania
 - ALEXANDRU DUMITRAS, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

In the Ph.D. thesis are presented and analysed the principles and analytical method in the optimal design of constructions taking into account the special behaviour.

There are developed the main problems of structural design regarding the outlook process, the preliminary stage, the selection and interaction of optimality criteria, also the adequate computing optimal methods in the elastic and in the postelastic range as well.

In a distinct section are analyzed the specific space models consisting of elements provided with marginal elastic connections which are useful both for the examination activity of damaged by earthquakes structures and in the issue of adequate solutions having efficient behaviour at extraordinary actions.



Corneliu Ivasc

The work enhance also a study of the hidro geotechnic parameters defining the selection of the solutions in the design of the foundations in the municipality zone of Iassy as an additional way of optimization.

The analyzed and recommended optimal procedures of computation take into account the fulfilment of the serviceability and structural requirements with application in the fluent design of constructions.

The undertaken study and investigations which are presented herein by the author have been applied in the frame of projects of different constructions in the city of Iassy.

Keywords: optimal design, spatial structures, structural modeling, elastic links



Contributions Regarding the Use of Fibre Concrete at the Precompressed Concrete Elements

Vladimir Corobceanu¹

¹*Department of Concrete Structures, Building Materials, Technology and Management, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iasi, Romania*

- ▶ Date of submission: (02.06.2000)
- ▶ PhD. Supervisor: CONSTANTIN LEONTE, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - TRAIAN ONET, Faculty of Civil Engineering And Building Services, Technical University of Cluj-Napoca, Romania
 - CORNELIU BOB, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara
 - LIVIU GROLL, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The present work deals with theoretical and experimental elements regarding the use of the fibre concrete at the pre-compressed concrete elements. On a worldwide level, as well as in our country, there has been conducted a documentary study regarding the researches and the different performed applications of this new composite; the main issue is to analyse the effects that the presence of discontinuous fibres in different types of materials has over the main characteristics of strength, deformation, ductility and durability of the concrete.

At least in what regards the conditions in our country, the author opts for the use of steel fibres as the best solution for the dispersed reinforcement of the concrete; this solution is entitled by the following facts: these fibres are quite easy to procure and process, the way of realising the metallic fibres – matrix co-working and some other technical and economical advantages.



Vladimir Corobceanu

The third chapter of this work deals with the general theory of fibre reinforced concrete, and especially the steel fibres. The main analysis is on the way the tensile strength of the fibre concrete may change, which is the most influenced mechanical parameter and how to increase its durability and ductility.

The work presents the concept of span between the fibres and theoretical and practical means of investigating it, as well as technical peculiarities of the dispersed reinforced concrete. The experimental part of the thesis is divided into:

- the study of the mechanical properties of the composite, realised with steel fibres in order to obtain high strength concrete, marking out the originality of the fibre used, as well as the advantages it brings;

- the analysis until the last stage of the behaviour of the elements with the initial tensions realised with reinforced concrete and bending stressed fibres.

The first part of the present work deals with the way in which the prescription for this concrete was conceived, the type of fibres used and realised in the faculty's laboratories, the technological methods of mixing and working out, the results of the mechanical tests. We collaborated with the FORTUS SA company from Iasi, mainly with their flaw detection lab, where we analysed by radiography the way of distribution of the concrete fibres; the results were compared with the theoretical ones based on the use of calculus relations established by known researchers in this field. From a technical and economical point of view it has been established an optimum span of the cubical percentage of fibre reinforcement.

The second part of this work deals with the behavioural study under load of pre-compressed beams with pre-tensed reinforcements made of dispersed steel concrete; it is also shown the importance of increased tensile strength of the concrete over the position of the active reinforcement on section which decides the length of its strength moment. At the same time this second chapter demonstrates that, in order to obtain the same capable bending moment, the dispersed reinforcement of the concrete can lead to reducing the active reinforcement quantity up to 15...20%.

The work concludes with an analysis of the economical aspects, personal contributions and the prospects of the fibre concrete. The analysis of the last aspect shows that in our country there are several unvalued possibilities regarding the use of the fibre concrete at structural elements, as well as the use of some new metallic fibres having increased adherence at the matrix.

Keywords: Fibre concrete, precompressed concrete elements



Contributions concernant le dimensionnement des renforcements des chaussées souples / semirigides à l'aide de l'indice de structure

Valentin Brinister¹

Administration des Routes Nationales de la Republique Moldova

- ▶ Date de défense: (02.06.2000)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - LAURENTIU NICOARA, Faculty of Civil Engineering and Architecture, "POLITEHNICA" University of Timisoara, Romania
 - CONSTANTIN ROMANESCU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

La thématique générale des renforcements des chaussées souples-semirigides, présentée à titre monographique, comprend l'identification des dégradations / causes probables, des méthodologies d'évaluation de l'état technique d'une chaussée, le stade des méthodes de dimensionnement des couches de renforcement.

La synthèse monographique est complétée par les critères empiriques / théoriques pour la quantification des coefficients d'équivalence et les modes d'utilisation dans les méthodes pratiques de dimensionnement. La synthèse concernant AASHO Road Test met en valeur la corrélation entre la déflexion et la structure d'une chaussée.

La thèse de doctorat est finalisée par les contributions suivantes :



Valentin Brinister

- la méthodologie pour la quantification des coefficients d'équivalence des couches des chaussées, en utilisant le critère de la réduction de la déflexion élastique à la surface du multicouches Burmister, pour des divers hypothèses envers les interfaces.
- la méthodologie du dimensionnement des renforcements des chaussées souples /semirigides à l'aide de l'indice de structure pour la déflexion élastique.
- l'étude de cas relatif à l'influence de la valeur du module d'élasticité équivalent de la chaussée à l'égard de la valeur de la déflexion élastique après le renforcement est finalisé par une corrélation qui sert comme critère complémentaire pour établir les secteurs homogènes de la chaussée existante.

La méthodologie de dimensionnement est recommandée au moins dans les étapes préliminaires de projection.

Mots clefs: indice de structure, coefficients d'équivalence, déflexion, renforcement.



Contributions concernant le dimensionnement des chaussées souples-semirigides a l'aide de l'indice de structure

Pavel Untură¹

Administration des Routes Nationales de la Republique Moldova

- ▶ Date de défense: (02.06.2000)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University "Gh. Asachi" of Iasi, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - GHEORGHE LUCACI, Faculty of Civil Engineering and Architecture, "POLITEHNICA" University of Timisoara, Romania
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Résumé

Pour assurer la possibilité d'encadrer la méthodologie proposée parmi les méthodes de dimensionnement, on présente, en synthèse, l'évolution de la méthode de l'indice de groupe jusqu'aux méthodes rationnelles.

La thèse de doctorat est finalisée par les contributions suivantes :

- la méthodologie multicritères pour la quantification des coefficients d'équivalence des couches des chaussées neuves, en utilisant les critères de la déformation horizontale spécifique en traction (ϵ_r) / la contrainte en traction (σ_r) à la base des couches bitumineuses / traitées aux liants hydrauliques et le critère de la déflexion élastique (d) à la surface de la chaussée. La chaussée est modélisée par le multicouches Burmister.
- l'étude des correlations: $\epsilon_r - d$, $\epsilon_r - \sigma_r$ et $\sigma_r - d$, qui permettent le dimensionnement en fonction du critère le plus défavorable.



Pavel Untura

- la méthodologie de dimensionnement en utilisant les coefficients d'équivalence qui sont déterminés par les critères ε_r , σ_r et d .
- l'élaboration des valeurs complémentaires pour les coefficients d'équivalence qui correspondent au critère de dimensionnement du Catalogue des structures types des chaussées neuves élaboré en Roumanie.

La méthodologie de dimensionnement est recommandée au moins dans les étapes préliminaires de projection.

Mots clefs : indice de structure, coefficients d'équivalence, déformation horizontale en traction, contrainte en traction, déflexion élastique.



Contributions concernant les technologies routiers qui utilisent les emulsions de bitume

Mircea Puiu Fierbințeanu¹

INTER BITUM București

- ▶ Date de défense: (09.06.2000)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi,, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - MIHAI ILIESCU, Faculty of Civil Engineering and Architecture, "POLITEHNICA" University of Timisoara, Romania
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

Dans la première partie de la thèse de doctorat, on présente le stade-au plan mondial-des technologies routières à base d'émulsion de bitume, qui permettent – par l'utilisation des liants bitumineux „à froid” ou à des températures limitées – l'intégration sur la ligne du développement durable (la protection de l'environnement / l'économie d'énergie). On synthétise aussi les méthodologies de laboratoire qui sont utilisées dans des divers pays, dans le but d'assurer le raccord avec les normes techniques roumaines.

Les résultats des secteurs expérimentaux représentatifs (matériaux, durée de vie, conditions climatiques, trafic routier) pour des variantes technologiques Slurry-Seal et des recyclages à froid, qui sont présentés en détail, sont, à présent, inclus dans les normes techniques roumaines.



Mircea Puiu Fierbinteanu

Les catégories d'emulsions de bitume et les essais de laboratoire qui ont été recommandées, aussi que les domaines d'utilisation de la méthode de recyclage à froid font l'objet d'un chapitre special.

L'élaboration de la méthodologie de l'étude statistique des résultats IRI est complété par la corrélation „avant-après” l'exécution d'un Slurry-Seal. Pour établir les secteurs homogènes on utilise la méthodologie AASHTO.

Mots clefs : Slurry-Seal, IRI, recyclage, emulsion de bitume.



Contributions of the Introduction the New Criteria's for the Plumbing Systems Calculus and Performance's Evaluation

Victoria Cotorobai¹

Department Building Equipments Engineering, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania

- ▶ Date of submission: (16.06.2000)
- ▶ PhD. Supervisor: THEODOR MATEESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania
- ▶ Scientific Board:
 - STEFAN VINTILA, Faculty of Building Services, Technical University of Civil Engineering Bucharest, Romania
 - ADRIAN RETEZAN, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania,
 - MIHAI PROFIRE, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania

Summary

The objective of the thesis is to introduce a conception algorithm which analyzes the conjugated action of all factors involved in the supporting activities to keep running the quality system in the sanitary plumbing domain. The main purpose is to consider a high quality installation concept by the means of the most adequate performance criteria (iposed criteria and proposed criteria: chemical stability, thermal stability...), and the most capable optimization algorithm to allow designing one of the most performing installations from the global quality aspect.

We used the annealing adaptive algorithm and an optimization algorithm based on the Greedy combinatorial method. The cost function was built on the bases of the global cost function adapted to the water supply sanitary plumbing technical system and to its dynamic.

The paper concludes on the results in the use of this algorithm, which allows considering the influences of the properties of the components (materials,



The contributions of the introduction the new criteria's for the plumbing systems calculus and performance's evaluation

water qualities, local necessary pressure systems, etc) as a precious instrument in the decisions process of conception or rehabilitation problems.

The research purpose was to introduce in the design norms some recommendations which allow emphasizing the influences of the properties of individual performances contribution of the component elements to the global qualities of the products.

Keywords: the annealing adaptive and Greedy algorithm, global plumbing quality system, optimal design plumbing system, criteria chemical stability.



Upon Solar Energy Use in Hot Water Supply Installations

Sorin Theodoru¹

*Department Building Equipments Engineering, **Faculty of Civil Engineering**, "Gh. Asachi" Technical University of Iassy, Romania*

- ▶ Date of submission: (16.06.2000)
- ▶ PhD. Supervisor: THEODOR MATEESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania
- ▶ Scientific Board:
 - COSTICA BRANDABUR, Faculty of Building Services, Technical University of Civil Engineering Bucharest, Romania
 - ADRIAN RETEZAN, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - GHEORGHE LOZONSCHI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iassy, Romania

Summary

This work synthesized the subject of the use of "energies that can be regenerated", in present and future, globally and also referring strictly to our country.

From the multiple forms of "energies that can be regenerated", this work focuses on the use of solar energy. As application it is described in detail the matter of plan solar panels with sera effect used to produce hot water. This subject is being developed both theoretically and practically.

The author has created, realized and tested prototypes of such solar panels.

Another objective was that of making a critical analysis of the programs existing in this domain in our country between 1975 and 1990 and from the 1990 until nowadays.

There were also enounced pertinent conclusions in order to suggest solutions and measures for the improving of the use of solar energy situation and also for the correspondent programs in our country.



Upon solar energy use in hot water supply instalations

It is also important to discuss the present standards in this domain and how to grant them with the international standards.

Keywords: solar energy, solar panels, higher efficiency



Contributions Considering the Concept and Design of Multi-Storey Steel Structures

Carmen-Elena Teleman¹

Department of Civil and Industrial Constructions, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Roumania

- ▶ Date of submission: (07.07.2000)
- ▶ PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Roumania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - DAN GHIOCEL, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - RADU MIRCEA DAMIAN, Hydrotechnical Faculty, Technical University of Civil Engineering Bucharest, Romania
 - ELENA AXINTE, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The envelope of high buildings with steel or steel and reinforced concrete structures is very sensitive to wind dynamic action. The thesis presents the authors results of the extensive studies and also the interpretation of fluctuating pressures on static models of high buildings placed in urban areas. An important number of data were obtained by modeling and measurements in boundary layer wind tunnel.

Thorough methods of interpretation were developed based on modern concepts of evaluating the wind action on the surface of bluff bodies by determination the instantaneous values of wind local pressure and processing the date with the computer aids.

Keywords: Boundary Layer Wind Tunnel, Curtain walling, Fluctuating wind pressure, Modeling, Statistical processing



Contribution to the Studies of the Wind Action in Aerodynamic (Wind) Tunnels

Radu – Aurel Pescaru¹

Department of Civil and Industrial Constructions, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Roumania

- ▶ Date of submission: (07.07.2000)
- ▶ PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering, "Gh. Asachi", Technical University of Iasi, Roumania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - DAN GHIOCEL, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - CONSTANTIN IAMANDI, Hydrotechnical Faculty, Technical University of Civil Engineering Bucharest, Romania
 - ELENA AXINTE, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The Ph.D. thesis is structured in seven chapters developed on 210 pages. In the essay there are 148 figures, 44 tables and the references contain 174 tiles. This abstract presents the thesis retaining the main structure.

Chapter 1 – entitled "The importance of the researches regarding the wind acts on the buildings and their surrounding environment" after a short introduction regarding the type of negative actions generated by the wind (dynamic pressures on the buildings, negative actions at the pedestrian level, heat loss acceleration, accelerates the emission of the air pollution, snow/sand drift on roads or roofs, etc.) presents some casualty events generated by the wind actions and the financial evaluation of the wind endamagement in Europe in the last ten years.

Chapter 2 – entitled "The engineering (mathematical and physical) model used for the studies of the wind flow" develop the mathematical models of the atmospherically boundary layer (near the ground) - based on power law and



Radu Aurel Pescaru

logarithmical law of the vertical profile of the main wind speed and the spectral analysis and models of the turbulent aspect of the air flow.

Chapter 3 – “The building - wind flow interaction” presents the static and dynamical aspect of the wind action of the building (normal pressures on the building envelope, along wind torsion and buffeting, across wind Karman vortex, ant transversal buffeting, fluttering and galloping.

Chapter 4 – “The physical model of the wind engineering” presents the main aspects of the physical (scale) models used in the Building Aerodynamics Laboratory from the Department of Civil and Industrial Building Engineering of the Faculty of Civil Engineering equipped with a Boundary Layer Wind Tunnel (BLWT) which has a working section 1.40 m wide x 1.40 m high x and 10 m long, with a maximum empty-tunnel wind velocity of 20 ms⁻¹.

Chapter 5 – “Researches regarding the pedestrian level wind actions” develop simple approach (using an original methodology developed by the author) to provide information about wind environment conditions for preliminary building design and city planning or for the improvement of windy conditions in already existing built areas.

Chapter 6 – “A complex model for a study of case regarding wind-loads on a cable supported roof of hyperbolic paraboloid shape” develop on a physical scale model placed in the boundary layer wind tunnel combined with a mathematical model using the finite element method.

Chapter 7 – “Final considerations and new research directions” describe the main characteristics on the original methodology proposed for the study of the pedestrian level wind action and the possibility to include this in an expert system; and also for the wind action on an atypical flexible buildings the model of researches proposed by the author that develop a statistical evaluation of the peak wind actions, the influence of the site details and the combination between the physical scale model and the mathematical model.

Keywords: wind actions / load, boundary layer wind tunnel tests, pedestrian level wind nuisance, expert system, cable supported structure, pressure tapping, wind loads coefficients, roof permeability



Modélisation des paramètres climatiques en vue d'optimiser les profils en travers des routes en régions avec des hivers sévères

Eugen Constantin Florescu¹

COLAS, Romania

- ▶ Date de défense: (30.03.2001)
- ▶ PhD. Supervisor: HORIA GH. ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - ION COSTESCU, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - MIHAI ILIESCU, Faculty of Civil Engineering, Technical University of Cluj Napoca, Romania,
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Résumé

L'étude de la géométrie routière, en corrélation avec les paramètres climatiques d'hiver, poursuit l'assurance de la viabilité hivernale (sécurité routière et mobilité).

La synthèse à titre monographique des expérimentations dans des tunnels aérodynamiques, qui ont été réalisées dans des divers pays, est complétée avec les catégories des facteurs qui interviennent dans la dynamique du neigement des routes. On présente les limites de la modélisation dans une installation de type tunnel aérodynamique.

Dans les expérimentations dans le tunnel aérodynamique de la Faculté de Génie Civil de Iassy la modélisation de la neige est réalisée à l'aide des microbilles (par l'aide d'un dispositif prototype), qui assure deux des trois critères de similitude pour la modélisation temporelle, complétée par la quantification de la durée d'agglomération.



Eugen Constantin Florescu

La visualisation des courants auto nettoyeurs, dans les profils en travers en déblais, on a utilise un générateur de fumée.

Pour l'hauteur moyen des sédiments de neige, on admet la loi Student, les secteurs homogènes étant établis par la méthodologie AASHTO

Mots clefs : paramètres climatiques, neigement, modélisation, tunnel aérodynamique, courants autonettoyeurs.



Contributions concernant les chaussées rigides et semirigides nonconventionnelles

Doru Cătălin Bârsan ¹

SCCF, Iasi

- ▶ Date de défense: (01.06.2001)
- ▶ PhD. Supervisor: HORIA GH. ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - GHEORGHE LUCACI, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Résumé

L' évolution des caractéristiques du trafic routier justifie la conception / la réalisation des chaussées dans les conditions de la diversité des matériaux routiers, à part les déchets industriels / les matériaux puzzolaniques.

La thèse de doctorat synthétise les solutions technologiques destinées a restreindre l'état de fissuration des couches bitumineuses, dans le cas des chaussées semirigides; pour les chaussées en béton de ciment nonconventionnelles (béton armé continu / béton de fibres) on présente la méthode de dimensionnement.

La proposition de l'analyse multicritères, pour justifier le type de chaussée, comprend les méthodes de calcul / les critères représentatifs.

Les études systématiques de laboratoire, au sujet des graves traitées au ciment – avec addition puzzolanique / avec des liants mixtes (hydrauliques – bitumineux), sont finalisés par des propositions en ce qui concerne les granulosités / les dosages



Doru Cătălin Bârsan

et par des corrélations entre les caractéristiques mécaniques, qui permettent l'obtention de la résistance à la traction par fendage / le module d'élasticité statique à base de la résistance à la compression, déterminée par équipement accessible au niveau d'un laboratoire de chantier.

Les études de laboratoire pour le béton armé nonconventionnel (l'armature est représentée par le copeau d'acier - déchet industriel) mettent en évidence la corrélation nécessaire entre la géométrie de l'armature (le rapport l / d), le pourcentage de l'armature et le type de la granulométrie du grave.

Mots clefs: liant mixte, armature dispersée, copeau d'acier, caractéristiques mécaniques.



Contributions concernant les systèmes d'auscultation des chaussées, en vue d'optimiser l'entretien, la réhabilitation et la reconstruction du réseau routier

Ioan Druta¹

¹*Chef Département, Administration Nationale des Routes Bucarest*

- ▶ Date of submission: (25.03.2002)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi,, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil Engineering, Technical University of Civil Engineering Bucuresti, Romania
 - MIHAI ILIESCU, Faculty of Civil Engineering, Technical University of Cluj, Romania,
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

La thèse de doctorat se place dans le souci d'optimiser la gestion des réseaux routiers, dans les conditions d'évolution des caractéristiques du trafic routier (catégories, débits, charges à l'essieu), tandis que financièrement les ressources sont limitées.

On présente le système intégré de gestion optimisé - dénommé ACCORD élaboré par l'auteur de la thèse de doctorat. ACCORD assure l'évaluation globale de l'état technique de la chaussée / l'ensemble des travaux effectués par une administration routière (sauf les ponts et les tunnels), à la différence des PMS qui sont limités à l'évaluation technique de la chaussée / aux travaux afférents, avec priorité pour les couches de roulement. On présente en détail: le système de référence, l'évaluation technique / fonctionnelle du réseau routier à l'aide des paramètres / sous paramètres pour les dégradations (par catégories de revêtements / superstructures)



Ioan Druta

ainsi que les sous paramètres pour la qualité de la projection, des travaux, de l'entretien et de l'exploitation.

L'indice global de viabilité est proposé par l'agrégation des valeurs pondérées des paramètres d'état technique, pour lesquels sont formulés les interactions.

Les équipements pour l'auscultation font l'objet d'une annexe.

Mots clefs: ACCORD, PMS, état technique, indice global de viabilité.



Increasing liability and exploitation safety of structures towards seismic actions by using some energy dissipating devices

Mihaela Traistaru

Structural Mechanics Department, "Gh. Asachi" Technical University of Iasi, Romania

- ▶ Date of submission: (10.05.2002)
- ▶ PhD. Supervisor: IOAN PETRU CIONGRADI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - VIRGIL BRABAN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - IOAN POP, Faculty of Civil Engineering, Technical University of Cluj Napoca, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The paper presents different types of hysteretic dissipating devices, used both in passive and in active structural control, most of them having the role to reduce the structural response by increasing initial rigidity and damping.

These devices are grouped in two main categories: hysteretic dampers and tuned systems, and the thesis presents for each category the following: general characteristics, domain of application, and for the ones depending on displacements there has been detailed some case studies.

The paper is structured in 6 chapters, as follows:

Chapter 1 – General Aspects – presents the opportunity of using optimized procedures to increase buildings safety and liability towards seismic action. A synthesis of main methods for seismic control and of hysteretic dampers is made.

Chapter 2– Principles of Seismic Protection – describes, from mathematical point of view the behavior of systems with one degree of freedom both non-isolated and



Mihaela Traistaru

equipped with isolation devices, and finally the same for systems with „n” degrees of freedom using modal analysis. It is also discussed modal amortization, the chapter being finalized with energy dynamics equations.

Chapter 3 – Energy dissipating devices – presents main energy dissipating devices used both in passive and active control. They are structured taking in account several principles – like ways of energy dissipation, ways of generating damping forces, depending upon speed or displacements. Most of seismic protection devices were presented, the focus being upon the ones depending on displacements.

Chapter 4 – Mathematical Models regarding behavior of energy dissipating devices – presents the main mathematical models used in structural calculations, the focus being upon hysteretic non-linear models.

Chapter 5 – Analysis of structures equipped with hysteretic dampers – starts taking in account the non-linear model used for modeling the behavior of these devices, on which several case studies are made (with imposed yielding forces or displacements). The case studies take in account both models with 1 degree of freedom and „n” degrees of freedom, moved by harmonic excitations, by seismic actions (real or artificial), finally generating some designing criteria both for structural systems and for energy dissipating devices.

Chapter 6 – Conclusions – presents the main conclusions according to the analysis done, being generated design criteria for both structures and energy dissipating devices.

Keywords: energy dissipating devices, passive control, active control, non-linear behavior, design criteria.



The Optimisation of the Software Dedicated to Structures Subjected to Seismic and Dynamic Loads

Octavian Victor Roşca¹

¹Structural Mechanics Department, "Gh. Asachi" Technical University, Iaşi, Romania

- ▶ Date of submission: (15.06.2002)
- ▶ PhD. Supervisor: IOAN PETRU CIONGRADI, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iaşi, Romania
- ▶ President: RAILEANU PAULICA, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iaşi, Romania
- ▶ Scientific Board:
 - FLORIN MACAVEI, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - VIRGIL BREABĂN, Faculty of Civil Engineering, "OVIDIUS" University of Constanţa, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iaşi, Romania, Romania

Summary

The thesis deals with the improved methods used by modern structural software. It is mapped into eight chapters each containing references and two appendices in the end.

A general view of the numerical methods implied in the actual structural design software and the general analysis methods are depicted after the introductory chapter.

The optimisation methods are regarding towards the solution of the linear algebraic systems of equations, the memory models for the storage of data arrays, the assemblage of the stiffness matrices (also on multi-processor platforms), the generalized eigenvalue problem (acceleration techniques, numerical methods for large problems).

Afterwards there are studied methods for the integration of the differential sets of equations of motion for the dynamic structural systems (separately for the 1st order and 2nd order equations) in the time domain.



Octavian Victor Rosca

There are presented some advanced algorithms for the renumbering of the nodes/elements of the finite element meshes and finally there are emphasized the conclusions and the results of the research.

Keywords: structural analysis; finite elements; numerical methods.



Contributions on tunnel analysis for transportation using modern methods

Vasile Gheorghe Rovenschi¹

¹ State Inspectorate for Constructions, Focsani, Romania

- ▶ Date of submission: (05 07 2002)
- ▶ PhD. Supervisor: NICOLAE BOTI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - DAN STEMATIU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - TADEUS SCHEIN, Faculty of Civil Engineering, POLITEHNICA University of Timisoara, Romania
 - ANGHEL STANCIU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The modern methods of lining analysis for tunnels take into account the stress redistribution into the lining by the working front effect.

The calculation specific aspects are presented when considering the surround rock mass as an elastic or elastoplastic time depending medium whereas the lining stiffness is variable due to its thickness.

The convergence – confinement method is a calculation method that takes into account the interaction between two systems the lining and the rock massif.

The research outcome is a new model for the elastoplastic behaviour of materials together with pre and post processing modules for the FEAP pv computer program based on the convergence-confinement method.

A case study is presented to support these scientific contributions as benefits for the tunnel lining design practice. The tunnelling technologies using shotcrete lining



Vasile Gheorghe Rovenschi

and anchorages make the rock massif becoming gradually a partially self-supporting medium, interacting actively with the tunnel lining as presented herein.

Keywords: tunnel lining, convergence–confinement method, characteristic curve of the rock mass, characteristic curve of the lining



Contribution to the study of the composite and asociated materials joints

Livia Ingrid Groll ¹

Department of Concrete Structures, Building Materials, Faculty of Civil Engineering, Technology and Management, "Gh. Asachi" Technical University, Iași, Romania

- ▶ Date of submission: (25.07.2002)
- ▶ PhD. Supervisor: NICOLAE ȚĂRANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iași, Romania
- ▶ President: PAULICA RALEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iași, Romania
- ▶ Scientific Board:
 - BOB CORNELIU, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - ONET ȚRAIAN, Faculty of Civil Engineering and Building Services, Technical University of Cluj-Napoca, Romania
 - HARHUI IOAN, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iași, Romania

Summary

The PhD thesis is a synthesis material for calculus and design of composites joints, mainly of the fiber polymer matrix composites materials.

The thesis continues the researcher member's activity and brings some original issues as the study of some types of adhesive composites joints.

The study supposes an analytical study and a finite element analysis for single lap joins.

An experimental program is presented as well.

It is to underline the following:

- Critical evaluation of the joints that can be applied to structural composite with their advantages and disadvantages.



Livia Ingrid Groll

- The identification of different patterns of yielding for adhesive joints and also ways of rising of structural efficiency for some joint solutions through mechanical and geometrical parameter modifications

Keywords: adhesives, adhesive joints, composite materials, confinement, FRP, stress-strain models,



Modern solutions for strengthening of framing systems for industrial buildings

Gabriel Opreșan¹

¹ Department of Civil Engineering, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania

- ▶ Date of submission: (26.07.2002)
- ▶ PhD. Supervisor: NICOLAE ȚĂRANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ President, PAULICA RALEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ Scientific Board:
 - TRAN ONET, Faculty of Civil Engineering and Building Services, Technical University of Cluj-Napoca, Romania
 - VIRGIL BRABAN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania

Summary

Repair and strengthening of concrete structures with Fiber Reinforced Polymer composites (FRP) constitute a large area of research in construction industry. FRP composites of various matrixes (epoxy, polyester, vinylester) and fibers (carbon, glass, aramid) can provide solutions for strengthening of reinforced concrete beams, reinforced concrete columns, unreinforced masonry and/or for timber members.

This thesis particularly focuses on strengthening techniques applied to reinforced concrete beams and columns.

The experimental work has involved the confinement of 21 types of concrete cylinder specimens wrapped with 2, 3 and 4 layers of carbon and glass fabrics embedded in epoxy resin. The results have been compared with mathematical models and using finite element methods and proved that the prediction of proposed models closely agree with experimental results.



Gabriel Oprisan

The present research works described shortly in this paper have shown the efficiency of FRP confinement for RC column for strength and ductility enhancement. More composite layers contribute to better compressive strength of the concret column.

Keywords: confinement, FRP, stress-strain models, strength and ductility



Contributions to the Enhancement of the Structural Solutions and Computational Methods for the Structural Rehabilitation of the Masonry Buildings Subjected to Seismic Actions

Vitalie Florea¹

¹*Department of Structural Mechanics, "Gh. Asachi" Technical University Iassy, Romania*

- ▶ Date of submission: (31.10.2002)
- ▶ PhD. Supervisor: IOAN PETRU CIONGRADI, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iasi, Romania
- ▶ President, PAULICA RALEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iași, Romania
- ▶ Scientific Board:
 - VIRGIL BREABĂN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - RADU VĂCĂREANU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - DOINA ȘTEFAN, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iasi, Romania

Summary

The paper is structured in 11 chapters which refer mainly to the actions in constructions, the realization and the properties of the masonry, the principles of the realization of the structures with the bearing walls, the calculus of the sections and masonry structures, the expertise of the constructions, the usage of the method of the finite element in the analysis of the structures with masonry walls.

The thesis is accompanied by an annex which contains the diagrams of the reaction force- displacement of a type of masonry proofs, to vertical and horizontal actions, depending on the variation of the physical-mechanical characteristics of the materials that are part of the masonry, the thickness of the binder layers, the type of the brick, the brand of the binder, the variation of the charge, Poisson's coefficient for bricks.

Keywords: masonry, cracks



Contribution at evaluation study of residual mechanical characteristics to reinforced concrete elements

Petru Mihai¹

Department Of Concrete Structures, Building Materials, Technology And Management, Faculty of Civil Engineering, "Gh.Asachi" Technical University of Iasi, Romania

- ▶ Date of submission: (28.02.2003)
- ▶ PhD. Supervisor: NICOLAE FLOREA, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - TRAIAN ONET, Faculty of Civil Engineering And Building Services Technical University of Cluj-Napoca, Romania
 - CORNELIU BOB, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - VIRGIL BREABĂN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania

Summary

Evaluation of residual mechanical characteristics for reinforced concrete structures is a actual problem in Romania where, a lot of buildings were designed and erected before year 1963 when the first seismic norms appear.

For these buildings, it is necessary to check the level of structural safety because the structures take-over more earthquakes without any intervention for rehabilitation between earthquakes.

To establish the structural safety, first must be determined the mechanical characteristics of materials and the paper present the most used methods, destructives or non-destructives, to find the mechanical characteristics of material.

Second step is to evaluate the capable efforts for structural elements and, finally, for entire structure. This step is very difficult cu perform because, under the



Petru Mihai

seismic actions, are developed a lot of damages, cracks, plastic hinges and the behaviour of the element is changed.

So, in evaluation of capable efforts for the structural elements must be included these structural damages. To solve the problem the author chooses to use the Finite Element Method because this method is very used in all engineering domains.

The most complicated problem is to insert the structural damages into the structural model. The author proposes a new approach of this problem with an original algorithm that permit to include in the structure damages specified for reinforced concrete elements.

This new original algorithm can be used in two ways. First way is to establish the capable stresses of existing damaged reinforced concrete elements; in this case the damages will be revealed from the structure and included in the model.

The second way is to find the yielding process for new elements with the simulation process. In this case, for a structural reinforced concrete element, the program shows the degradation process and the cracks and plastic hinges positions for any type of loads.

Keywords: residual characteristics, FEM, simulation, reinforced concrete elements.



Contributions about Processes Engineering for Strengthening the Brickwork Diaphragm Structure Buildings

Andrei Slonovschi¹

Descriptive Geometry and Technical Drawing Department, Faculty of Civil Engineering, "Gh.Asachi" Technical University of Iasi, Romania

- ▶ Date of submission: (13.04.2003)
- ▶ PhD. Supervisor: NICOLAE GIUSCA, Faculty of Civil Engineering, "Gh.Asachi" Technical University of Iasi, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University, Iași, Romania
- ▶ Scientific Board:
 - MIHAI TEODORESCU, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - TIBERIU CHIOREAN, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - DAN PREDA STEFANESCU, Faculty of Civil Engineering, "Gh.Asachi" Technical University of Iasi, Romania

Summary

In the first part of the PHD thesis was analyzed the type 4658 project and the dwelling buildings who where built in Iasi town in the period 1962 -1968, comparing with P2-85 norm.

Type 4658 project was elaborated in the year 1961 by the Central Study, Scientific research and Design in Construction, Architecture and Systematization Institute (I.S.C.A.S.) and stood as basis for elaborating of almost all dwelling buildings projects realized in Iasi in the period 1962 -1968.

Afterwards an inventory of the decays noticed after the 1977 earthquake at the previously mentioned buildings was done.



Andrei Slonoschi

A comparative analysis was also done between the dwelling buildings projects built in Iasi after the 1963 Skopje earthquake and the type 4658 project and the P2-85 norm.

Afterwards a critical analysis of the existing consolidating solutions referring to a brick structure was done, presenting the advantages and disadvantages of the existent solutions.

After the registering of the decays noticed at dwelling buildings who where built in Iasi town in the period 1962 -1968, having as basis type 4658 project, new possibilities of ensuring the mentioned buildings at seismic actions were proposed:

- Rebuilding or consolidation of the self-sustaining wall from B axis, realizing of the rigid washer effect at the floors level and consolidation of the whole structure.

For the first problem was proposed the remaking of the self-sustaining wall simultaneous with the erecting of some small pillars and straps from concrete steel and of a pre-stressed coupling bars system.

For the realizing of the rigid washer effect was proposed the developing of a pre-stressed metallic coupling bars system placed on transversal direction, the realization of some sockets between the pre fabric bands for taking of the relatives slips and realizing of a new concrete steel floor.

For consolidating the whole structure was proposed the coating of all carrying and not carrying walls, the rigid washer effect being realized by over concreting the floors' pre fabric bands and inputting of some pre-stressed metallic coupling bars.

Keywords: Earthquake, Concrete steel, Brickwork, Consolidate, Consolidating solutions, Brick structure, Self-sustaining, Rigid washer effect.



About the Parametric Analysis of Some Nonlinear and Hysteretic Models on Structural Response Under Static and Dynamic Actions

Violeta Elena Chițan¹

*Structural Mechanics Department, Faculty of Civil Engineering, "Gh. Asachi" Technical University
of Iași, Romania*

- ▶ Date of submission: 26 09 2003
- ▶ PhD. Supervisor: LUCIAN STRAT, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ President: PAULICA RAILEANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ Scientific Board:
 - IOAN POP, Faculty of Civil Engineering And Building Services
Technical University of Cluj-Napoca, Romania
 - VIRGIL BREABAN, Faculty of Civil Engineering, "OVIDIUS"
University of Constanta, Romania
 - CONSTANTIN AMARIEI, Faculty of Civil Engineering, "Gh.
Asachi" Technical University of Iași, Romania

Summary

This paper deals with the researchers' work in the field of building mechanics. The PhD thesis has its contribution in the study of the building behaviour under dynamic and seismic action, both in the elastic margin and in the post-elastic one, until yielding.

I also approached the problem of the quantification of the energy dissipations that take place in the time-history process, especially in case of structures under seism of different intensity and periodical harmonic actions.

I have processed and interpreted a large amount of data and information gathered after research, in order to characterize the behaviour of hysteretic type. Logically, the study was extended to the evaluation of degradation of the structural elements, using hysteretic models.



Violeta Elena Chitan

Some models of bilinear type with and without degradation were the object of some parametric analyses of the sizes that quantify the hysteretic damping, the response of the system with a degree of freedom and of the systems having more degrees of dynamic freedom.

The equivalent system with a degree of dynamic freedom influence the post-elastic behaviour of some multi-storeyed structures, with more degrees of freedom, placed under dynamic and/or seismic actions in order to obtain equivalent parameters, using the energetic equivalence.

The mechanical work in an oscillation cycle will be the same for a hysteretic behaviour characteristic to the functions effort-deformation that describe the non-linear relation corresponding to different oscillation cycles, until yielding in the time-history process in both systems. It is calculated the equivalent rigidity for a tri-linear behaviour, changeable to an elastically perfectly plastic, with the delimitation of the point of beginning of flowing on diagram.

Keywords: hysteretic model, time-history process, degrees of freedom, oscillation cycle, periodical harmonic actions



Contributions concernant la stratégie d'entretien et de dimensionnement des renforcements routiers

Florica Pădure¹

¹ Expert SC Consilier Consult SRL București

- ▶ Date of submission: (29.03.2004)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil Engineering, Technical University of Civil Engineering Bucuresti, Romania
 - GHEORGHE LUCACI, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara
 - NICOLAE VLAD, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

La thèse de doctorat se place dans le cadre des recherches pour l'élaboration des systèmes de gestion des chaussées, qui sont définis comme des procédés de coordination / contrôle de l'ensemble des activités pour l'entretien routier, afin d'obtenir pour la société un coût global minimum.

On synthétise les méthodes modernes pour le contrôle / l'acquisition des données / l'entretien d'un réseau routier (équipements, indices d'état technique, critères d'intervention et stratégies). Les technologies modernes d'entretien sont synthétisées dans des annexes.

L'étude d'environ cinq cents secteurs routiers, représentatifs pour les solutions de renforcement, l'état technique et la durée de service, est finalisé par trois indices de comportement structural / la quantification de la durée de vie résiduelle.

Par le calage du HDM 4 (les modèles d'évolution de l'état technique / les effets sociales pour les utilisateurs et à l'égard de l'environnement) pour un réseau routier



Florica Padure

(représentatif pour les routes locales - communales / départementales) on propose la stratégie de gestion routière et les alternatives des études économiques.

La méthodologie du nombre structural corrigé - évalué par le bassin de déflexions FWD-est proposée pour le dimensionnement des renforcements des chaussées souples et semirigides.

Mots clefs: gestion routière, HDM, nombre structural corrigé, entretien, étude économique.



The analysis of the quality criteria of the reinforced concrete strength structures

Mihai Cristian Nenov ¹

¹ *Department of Concrete Structures, Building Materials, Faculty of Civil Engineering, Technology and Management, "Gh. Asachi" Technical University, Iași, Romania*

- ▶ Date of submission: (16.07.2004)
- ▶ PhD. Supervisor: SERGIU COROBCEANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ President: NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania
- ▶ Scientific Board:
 - TRAIAN ONET, Faculty of Civil Engineering And Building Services Technical University of Cluj-Napoca, Romania
 - VIRGIL BREABAN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - ALEXANDRU SECU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iași, Romania

Summary

In the thesis entitled "The analysis of the quality criteria of the reinforced concrete strength structures", it has been analyzed the concept of quality and it's components, the damages in reinforced concrete strength structures, departure from design and execution, with the negative effects that derive from this.

The author conceived an experimental programme to improve the concrete quality, the main building material used in the mentioned structures; the results obtained indicates a reduction in concrete consumption with 8-12% for the same class of concrete.

Both idea of perquisite cement hydration and deepening it – solution that leads to concrete consumption reduction in obtaining the same concrete quality – demands simple and low-cost arrangements inside a concrete centralized preparation unit which gives the paper a directly practicability.

Keywords. reinforced concrete, quality criteria, strength



Contributions to the Design and Structural Rehabilitation of the Industrial Chimneys

Ioana Sorina Nica (Entuc)

¹ *Department of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania*

- ▶ Date of submission: (29.09.2004)
- ▶ PhD. Supervisor: IOAN PETRU CIONGRADI, Department of Structural Mechanics, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President, NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - TRAIAN ONET, Faculty of Civil Engineering and Building Services, Technical University of Cluj-Napoca, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
 - TUDOREL POPA, National Institute for Building Research Branch of Iasi, Romania

Summary

The objective of this thesis is to investigate the issues encountered by the behaviour of industrial concrete chimneys under seismic and wind actions, technologic and climatic temperature variations. In time, normal usage and environmental influences the industrial chimney may affect the strength and the functionality of these slender structures.

The thesis presents both traditional and modern methods for structural rehabilitation of chimneys with their advantages and disadvantages.

The details regarding the types of polymeric composite material constituents, reinforcing products, their properties, location on the industrial chimney height and application procedures of the strengthening systems are also given in the work.



Ioana Sorina Nica (Entuc)

A numerical analysis using finite elements method has also been performed. Various models of the chimneys according to the expected behaviour and the type of action, have been utilised.

Keywords: structural repair, chimneys strengthening, numerical analysis.



Increasing the Safety of the Constructions placed in Seismic Regions through the Enhancement of the Energy Dissipation Capacity

Septimiu-George Luca¹

¹ *Department of Structural Mechanics, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania*

- ▶ Date of submission: (29.10.2004)
- ▶ PhD. Supervisor: IOAN -PETRU CIONGRADI, Department of Structural Mechanics, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President, NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - MIRCEA IEREMIA, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest,
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
 - ADRIAN-CONSTANTIN DIACONU, National Institute for Building Research, Branch of Iasi, Romania

Summary

The use of control systems of the structural response represented a radical discrepancy from the classical conception of design. From the point of view of the energetic "survey", we can find two ways of improving the behaviour of constructions to seismic action. The first can be done by increasing the structural energy dissipation capacity by means of special procedures and devices with role of dampers, and the latter by diminishing the energy induced by the seism in the structure, by placing between the structure and foundation devices that insure the decoupling of superstructures from the foundation; this is materialized in the concept of base isolation.

The paper presents different types of damper devices, used in the frame of passive, active and semi-active control. We focused especially on two general categories:



F. Familyname, S. Author, T. Author

dissipating devices based on the plastic deformation of metals and tuned systems; for each of them we presented general characteristics, the field of applicability, discussing in detail problems related to modelling. I described some numerical methods of solving the MDOF systems, presented the algorithms of programming these methods, and determined the response of some structures by the procedures mentioned, in order to underline the advantages and disadvantages of each method. I described the non-linear Wen model, used at producing a programme for solving the systems with MDOF having non-linear behaviour or equipped with hysteretic dampers. All the programmes produced were implemented in the MATLAB software. I underlined aspects related to the energy dissipating by internal damping, classifying the main types of damping and realize numerical simulations in order to calibrate the parameters necessary for evaluating the equivalent viscous damping to the SDOF systems.

We also realize numerical simulations on a structure with SDOF in order to evaluate its energetic response in several hypotheses (different damping ratios, field of post elastic behaviour, structure equipped with hysteretic devices). We realize a large number of case studies in order to analyze the behaviour of the structures with tuned mass dampers (TMD). In order to establish the optimal parameters of designing the TMD, the frequency response was studied, as well as the time response of some models with SDOF and 3 DOF having different dynamic characteristics; the representation of the dynamic system is in state spaces. In order to underline the dependence of the response of the structures equipped with such systems to the content of frequencies of the excitation, we elaborated the seismic response spectra and the Fourier spectra.

We studied, by means of the finite element method (programme ANSYS), the behaviour of a triangular metallic plate. The plate belongs to a damping device based on the plastic deformation of the metal TADAS (triangular-plate added damping and stiffness). We realize a parametric study on systems with 1 DOF and 3DOF, equipped with hysteretic devices having different characteristics, subject to different seismic actions.

The synthesis of the results performed on structures having the periods between 0.1s and 1.5s, with dampers having different parameters, at the seismic actions mentioned, was realized by comparative graphic presentation of the maximum response for all the analyzed cases. I finally presented the main conclusions drew from analytic and numerical studies carried out, underlining the author's main contributions in elaborating the paper.

Keywords: damping devices, dissipation, TMD, hysteretic, dynamic, numerical simulations



Research Concerning the Evaluation of the Degree of Homogeneity of the Mechanical Properties of Materials Experimentally Determined and of the Random Effects in the Structural Response

Florentina Chira¹

¹ National Institute for Building Research, Branch of Iasi, Romania

- ▶ Date of submission (29.10.2004)
- ▶ PhD. Supervisor: NICOLAE UNGUREANU, Department of Structural Mechanics, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - MIRCEA IEREMIA, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - LIVIU GROLL, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
 - TUDOREL POPA, National Institute for Building Research, Branch of Iasi, Romania

Summary

Homogeneity is an important property with many theoretical and practical significations. The research concerning the degree of homogeneity of some experimentally evaluated properties through the representative characteristic values enlarging availabilities for a more rigorous and economical design and an execution of constructions. A statistical and probabilistic analysis of the different material characteristics of homogeneity is imposed and the complementary research in the field allows a profound study and a refining of the measuring techniques of homogeneity.

The relation between the characteristics in the meaning of homogeneity and correlation analysis is important to study thoroughly the structural systems



Florentina Chira

behaviour. The way in which the homogeneity is described and the variation of the ideal homogeneity are a necessity that should not be ignored.

The studies, the analyses and the developments from this thesis aim at answering some problems and studying thoroughly some aspects less developed. In this thesis are made developments concerning the definition of homogeneity with mathematics basis and physical, technical and practical aspects. The examples of case study with values obtained experimentally are illustrated. The homogeneity coefficients are defined in ratio with the homogeneity interval. It has been made experimental study concerning homogeneity of the mechanical characteristics and correlation among these, the experimental tests of the author, the checking tests on samples of some materials, performed in the accredited laboratories and analysis of the measured data.

The analysis of the elasticity modulus and the sectional stiffness from an experimental, statistical and homogeneity point of view is illustrated on steel square tubular bars. The purpose was to determine the parameters of the statistical distribution, the distribution graphics, the homogeneity coefficients, the concentration coefficients.

In the chapter "The homogeneity on designing the structural systems" it has been analyzed the variation effects and chosen the way of elasticity modulus upon loads transformation into efforts on the elastic designing of the structural systems. The obtained results are illustrated on a case study.

Keywords: homogeneity, elasticity modulus, statistics, probabilistic, correlation



Contributions Regarding the Dimensioning of Airport Rigid Pavements

Maria Pirvu¹

¹*INCERTRANS Bucuresti*

- ▶ Date of submission: (11.03.2005)
- ▶ PhD. Supervisor: HORIA GH.ZAROJANU Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - CONSTANTIN ROMANESCU, Faculty of Civil Engineering, Technical University of Civil Engineering Bucuresti, Romania
 - GHEORGHE LUCACI, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The yearly increase, registered in the field of air merchandise and travelers traffic and also of the spaceships weight, leads to the fact that most airport rigid pavements that make up the runways and the cement concrete platforms existing in the patrimony of the internal and international airports of Romania (future member of the European Union), should be modernized based on some modern dimensioning measures, at international level.

The dimensioning methods of the new and reinforced airport rigid pavements, (the general/optimized method) presented in this paper are based on the calculation chart with finite element, the multi-layer procedure.

A special attention is also given to dimensioning criterion which has been approached, represented by the admitted tensile strength at bending of the cement concrete, of the hypotheses and of the calculation parameters. At the reinforcement



Maria Pirvu

of the rigid pavements, the admitted tensile strength at bending of the cement concrete refers to the concrete from the existing slab. The loading position is to the slab edge, with imprint tangent to the longitudinal joint. The real imprints are equivalent with the rectangular surfaces. The calculation loading is obtained both by the proportion of the real loading depending on the role of the airport surface, and also by taking into consideration the law of cement concrete tiring correlated with the number of superposing of the imprints.

Keywords: Runways and stationing platforms for spaceships, airport pavements, cement concrete surfacing, loadings, hypotheses, charts, calculation parameters and charts, dimensioning methods



Contributions to Integrated Programs Systems for Structural Analysis

Gheorghe Ionica¹

¹ ALTISCAD, Romania

- ▶ Date of submission: (25.03.2005)
- ▶ PhD. Supervisor: IOAN PETRU CIONGRADI, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Dean, Faculty Of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - VIRGIL BREABAN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
 - FERDINAND ZSONGOR GOBESZ, Faculty of Civil Engineering, Technical University Of Cluj-Napoca, Romania

Summary

The thesis presents an integrated design program that allows both structure design and optimization in one cycle, with minimum user intervention. This program includes an original hybrid algorithm for structural optimization, that uses finite element method and genetic algorithms. The description of the algorithm basis, working parameters and two case studies are also presented. The results show a reduced number of iterations, with a minimum computational effort in optimization process, that allow a geometrical optimization of structures.

The intelligent integrated system is realized using Finite Elements Method and Genetic Algorithms. In the mean time, the structure of the program calls mathematical programming methods for optimization, particularized for geometrical optimization of structures.

Chapter 1 makes an introduction to the purpose of the thesis, presenting the content of each chapter.



Gheorghe Ionica

Chapter 2 presents the Finite Elements Method and different ways of integrated calculation and systems. Calculation systems based on Finite Elements Method include different calculation types. Input data and results differ depending on the general enounce of the problem. Intelligent calculation modules can be linked to the calculation programs, using the input data and results.

Chapter 3 is centered on several intelligent computational methods that can be applied into structural engineering field. Genetic algorithm method is presented in detail.

Chapter 4 presents briefly the characteristics of integrated calculation systems. Integrated calculation programs for structural engineering are widely spread, but there is a poor literature that describes them. Therefore, the problematic moves to computer science and programming fields.

Chapter 5 presents classical mathematical optimization methods. Optimization problems were divided in two types: with restrictions and without restrictions.

Chapter 6 describes in detail the original algorithm for integrated intelligent optimization, as well as the original proposed program. The architecture of the elaborated algorithm is based on a set of observations on structure design problematic and on optimization in general.

Chapter 7 presents two relevant case studies, for 2D and 3D Truss Structure Optimization.

Chapter 8 is reserved to conclusions and reveals the original contribution to Integrated Programs Systems, as well as future research directions.

This thesis contributes to the calculation integrated systems development, by developing a new intelligent integrated design system, applied to the structural optimization field. The integrated optimization system proposed has the following general characteristics: it works integrated, and it uses the finite elements method for structure calculation, and genetic algorithms for finding the optimum.

The optimization algorithm proposed is a strong optimization method. It reaches the optimum criteria after a reduced number of iterations, with a minimum computational effort. Genetic Algorithms can be used together with traditional calculation methods, in order to improve both methods' performances. Implementing an optimization algorithm that functions integrated brings significant design benefits.

Keywords: optimization, integrated system, genetic algorithm.



Environmental Impact Indicators for Buildings

Laura Dumitrescu¹

¹*Department of Civil and Industrial Engineering, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania*

- ▶ Date of submission: (20.05.2005)
- ▶ PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President, NICOLAE TARANU, Dean, Faculty of Civil Engineering "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - DAN GHIOCEL, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest Romania
 - HORIA ANDREICA, Faculty of Civil Engineering Technical University of Cluj-Napoca, Romania
 - IRINA BLIUC, Faculty of Architecture, "Gh. Asachi" Technical University of Iasi, Romania

Summary

By consuming energy, materials, and land, construction and housing is responsible for a considerable proportion of the environmental impact. The present trend in research in sustainable construction focuses on achieving better environmental performance of buildings.

The main goal is to reduce the negative impact that the building has on the environment, and to decrease the amount of energy consumed in order to decrease the capital and environmental costs. Therefore, it is important to define basic parameters and to create a group of useful indicators to define the sustainable degree of a construction.

This thesis provides a methodology for assessing environmental performance of buildings based on sustainability indicators, structured in five performance issues: resource consumption (energy, land, water, materials), environmental loadings, indoor environmental quality, quality of service and economics.



Laura DUMITRESCU

For the energy performance evaluation, computer programs were used and a simplified method for the calculation of the extra heat losses due to the thermal bridges effect was proposed.

Keywords: sustainable development, buildings, environmental impact, indicators.



Contribution to the Earth Slopes and Earth Works Stability with a View to Environmental Protection

Daniela Ioana Mitrofan¹

¹*Ministry of Agriculture, Forest and Rural Development*

- ▶ Date of submission: (10.06.2005)
- ▶ PhD. Supervisor: PAULICA RAILEANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - SANDA MANEA, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest, Romania
 - MARIN MARIN, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - ION GIURMA, Faculty of Hydrotechnics, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The thesis approaches the topic of the earth slopes stability through theoretical and practical methods from scientific domains like engineering, construction, geo-techniques and environmental protection.

The thesis comprises an introductory chapter referring to the basic aspects of the earth slopes stability as characteristics of the slopes subject to instability, the stress status, factors causing and favoring the slope instability and classification of earth slopes displacements.

The chapter dedicated to the impact of the slope instability on the environment is structured in two parts, one regarding the impact of the natural slopes displacement and sliding on environment, and the other referring to the impact of landfills and tailings sliding on environment.



Daniela Ioana Mitrofan

As part of the theoretical part, a comprehensive and well structured synthesis of the technical solutions for ensuring the slopes and earth works stability and hazard mitigation is presented (reshaping the area, soil moisture reducing, earth retaining walls, special measures for soil consolidation, using the geo-synthetics, etc). An entire chapter deals with modern principles and specific devices for monitoring the earth slopes subject to instability. Within the aforementioned chapter, several Geographical Information Systems (GIS) - based techniques for mapping the landslides hazard and mitigation are dealt with.

Another part of the thesis comprises case studies for waste disposal facilities and their impact on the environment.

The thesis is concluded by general conclusions with perspectives for scientific solutions for protecting the environment factors subject to instability.

Keywords: earth slopes and earth works stability, impact on environment, geo-synthetics, landslides monitoring, mapping.



On resistance and stability of the structural elements subjected to temperature variations with application in construction and industrial installations

Ana Diana Gorbanescu (Ancas)¹

¹ *Compania Constructii Montaj Instalatii Iasi, Romania*

- ▶ Date of submission: (24.06.2005)
- ▶ PhD. Supervisor: NICOLAE UNGUREANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President, NICOLAE TARANU, Dean, Faculty of Civil Engineering "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - CORNEL TRAIAN BIA, Faculty of Civil Engineering, Technical University of Cluj-Napoca, Romania
 - EUGEN PANTEL, Faculty of Civil Engineering, Technical University of Cluj-Napoca, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering "Gh. Asachi" Technical University of Iasi, Romania

Summary

The master's degree paper analysis the behavior of the strength elements for constructions and installations from the point of view of strength and stability to high temperatures, fire included, objective of great actuality on the world level, especially in the present context of the spectacular return of steel in constructions.

In our country there is an intense preoccupation concerning the fire behavior of the structural elements such that one can distinguish three levels regarding the precision of the utilized methods: simplified approximate methods, determination of mechanical resistance at high temperatures, and global structure behavior. Yet, if at an international level there are advanced analytical stipulations for the estimation of fire resistance of the elements, sub- assemblies and structures, in our country the present norms do not include any stipulations concerning the analytical evaluation of fire resistance.



Ana Diana Gorbanescu (Ancas)

One of the utilized criterion is that of the experimental tests or the utilization of normative proposals. Yet, these present a lot of shortcomings, determined either by the lack of precisions of the presented relationships, or by the impossibility to classify a significant number of practical problems within these norms.

These last facts occurs since the present computational norms do not present the theoretical basis of the problem in order to offer the design engineers the design instrument for each kind of component element and mainly to intervene on the parameters that condition the fire resistance and stability of elements and structures. In order to monitor the efficiency of a urban zone from the standpoint of fire safety, it is necessary, first of all, to make complete the calculation of structural and non-structural elements with adequate modern methods, based on numerical and automated calculation methods concerning the resistance and stability of structures subjected to large temperature variations.

The study of the resistance structures behavior at high temperatures developed especially during fires is a highly complex problem.

Assuring **through computation**, the resistance and stability of elements and structures for constructions represents an essential demand that request a first priority solution., without underestimating the esthetics and operability, largely developed at the present moment, even taking the chance of creating a prejudice to a proper utilization, sometimes even under normal conditions of exploitation. Yet, it is necessary to ensure a good exploitation of the structures even when they are subjected to extreme actions, not compulsorily during the catastrophes, with reference in this context, to the **fire phenomenon**. The resistance structures must ensure, even in these unwanted conditions, a necessary minimum protection of goods and human lives.

From a theoretical point of view, the problem of the thermal- mechanical behavior of structures and elements has to be divided in two distinctive parts:

- The evaluation of the heat exchanges within a idealized medium and the computation of the material temperature evolution;
- The computation of the elements resistance and stability at high temperatures, namely at fire, based on the results from point 1.

The doctoral thesis is structured in seven chapters which develop logically aspects connected to the conduct of structural elements at big variations of temperature (fire). The main approaches of fire conduct study are critically presented- experimental studies, theoretical analyses on designs/examples-pointing out the



Ana Diana Gorbanescu (Ancas)

advantages and disadvantages of each of them, defining the actual study of researches in this domain.

The paper is made up of various theoretical and numerical case studies upon the conduct of strength thermo-mechanical steel elements under high temperatures.

Keywords: thermo-physical features, thermo-elastic and thermo-mechanical of materials at high temperatures, fire, methods for the study of thermic transfer, critical temperature and fire resistance



Contributions concernant l'étude de la rhéologie des liants bitumineux et des enrobés

Mihai Stasco¹

¹ S. C. Construcții Căi Ferate, Drumuri și Poduri, Ploiești, Romania

- ▶ Date of submission: (30.09.2005)
- ▶ PhD. Supervisor: HORIA ZAROJANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - ION GIURMA, Faculty of Hydrotechnics, "Gh. Asachi" Technical University of Iasi, Romania
 - CONSTANTIN ROMANESCU, Faculty of Civil Engineering, Technical University of Civil Engineering Bucuresti, Romania
 - GHEORGHE LUCACI, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania

Summary

Dans la partie ayant du caractère monographique, on synthétise les notions fondamentales de la rhéologie, la structure et les propriétés rhéologiques des liants bitumineux et des enrobés.

Un chapitre de la thèse est réservé à l'exposé des modèles mécaniques (simples et généralisés), à l'analyse de leurs limites d'admissibilité et à l'analogie entre les modèles mécaniques et électriques.

L'auteur propose la modélisation électrique, en utilisant un logiciel spécifique et en complétant les éléments caractéristiques (résistances / condensateurs) avec une diode, pour modeler l'élément Saint Venant -Coulomb du modèle mécanique. On assure des coefficients de corrélations unitaires avec les diagrammes Burgers, Jeffreys - Laetersich, Zenner et Huet - Sayegh.

Pour optimiser la composition des enrobés, en tenant compte du critère de la déformabilité / du comportement rhéologique, on propose l'utilisation du modèle



Mihai Stasco

Burgers, avec des paramètres qui résultent des corrélations Gerritsen. Le critère du module complexe G^* est proposé pour compléter les prescriptions techniques au sujet des caractéristiques des bitumes dans le domaine des températures représentatifs pour le procès technologique et pour l'exploitation.

Mots clefs: rhéologie, visco - élasticité, modèle rhéologique, modèle électrique, analogie, mécanique- électrique.



Contributions à l'étude des systèmes constructifs de protection des façades

Cristina Busuioc¹

¹ *Département de Génie Civile, Faculté de Bâtiments, Université Technique "Gh. Asachi", Iași, Roumanie*

- ▶ Date of submission: (28.10.2005)
- ▶ PhD. Supervisor: ADRIAN RADU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Doyen, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - DAN GHIOCEL, Faculty of Civil, Industrial and Agricultural Buildings, Technical University of Civil Engineering Bucharest Romania
 - HORIA ANDREICA, Faculty of Civil Engineering Technical University of Cluj-Napoca, Romania
 - DAN PREDĂ STEFANESCU, Faculty of Civil Engineering "Gh. Asachi" Technical University of Iasi, Romania

Résumé

La thèse de doctorat en ingénierie civile à un caractère pluridisciplinaire et se réfère au comportement des principaux systèmes constructifs de protection des façades, dans les conditions climatiques de Roumanie, ayant pour but de contribuer à l'identification des mécanismes, pouvant causer des dégradations et d'assurer la durabilité.

Dans les conditions du progrès technique actuel, les parements des bâtiments ont gagné une importance spéciale et impliquent la contribution des architectes et des ingénieurs. À côté des aspects liés à l'esthétisme et l'expressivité, il existe un grand nombre de conditions et de phénomènes physiques qu'il faut prendre en considération pour l'analyse scientifique. La réalisation des parements sur des bases exclusivement empiriques ne satisfont plus aux exigences actuelles.



Cristina Busuioc

La littérature spécialisée existante est relativement limitée et si les problèmes spécifiques ont commencé à être étudiés sur le plan mondial, ils peuvent être encadrés, conformément à la terminologie CIB, dans la discipline plus générale de la "pathologie de la façade".

La synthèse documentaire présentée, et les observations sur des constructions situées dans la région de Iași, où on a constaté beaucoup de dégradations significatives, ont démontré l'importance des phénomènes physiques, la nécessité d'utiliser des modèles mathématiques adéquats et des expérimentations dans des conditions économiques avantageuses.

La thèse étudie le comportement de la partie extérieure de la façade d'une construction, en se basant sur les éléments de hygrothermique avancée, la mécanique des éléments de fermeture et en tenant compte des exigences du projet technique d'architecture. On analyse les phénomènes qui apparaissent sur la partie extérieure de la façade et qui est exposée aux dégradations provoquées par des variations de température et d'humidité. Dans la thèse, on poursuit les recherches commencées par Grunau, E. B., Logeais, L. și Gheorghiu, F., ainsi que celles réalisées au Département de Constructions Civiles et Industrielles de Iași.

Ce sujet est très actuel dans le contexte du progrès technique accéléré et dans les conditions des nouvelles exigences concernant la conservation de l'énergie, de nouveaux matériaux et technologies de construction qui sont apparus. Bien de fois ils sont appliqués sans être suffisamment étudiés provoquant de nombreuses dégradations, voire même des accidents par le détachement et la chute des éléments de façade. Par conséquent une analyse détaillée des causes et l'établissement de solutions efficaces s'imposent. Les problèmes apparus sont d'importance scientifique, technique, mais aussi économiques. A cause des difficultés de réalisation des expérimentations à l'échelle naturelle, pratiquement irréalisables dans le cadre d'une thèse, on a proposé de nouvelles méthodes simplifiées de vérification du comportement à la diffusion de la vapeur d'eau et on a effectué des simulations numériques pour évaluer le risque de condensation et pour déterminer les tensions qui peuvent apparaître dans la partie extérieure des parois de façade.

La thématique de la thèse a été établie pour satisfaire les exigences actuelles concernant le développement durable dans les constructions, qui s'exprime par:

- la réduction des émissions de CO₂, conformément à l'accord de Kyoto, pour diminuer l'effet de serre, par des mesures efficaces de maîtrise de l'énergie en construction;



Cristina Busuioc

- la réalisation des systèmes constructifs adaptés aux anomalies climatiques très diverses (pluie, tempête, canicule) déjà apparues en Roumanie, par l'élimination des solutions incompatibles avec de telles actions.

Le problème abordé dans la thèse a été insuffisamment étudié jusqu'à présent, fait prouvé par de nombreuses dégradations apparues après plus de 10 années de fonctionnement des constructions respectives. On a analysé le comportement des systèmes modernes de type ETICS, généralisé maintenant dans tout le pays, sans qu'il soit toutefois suffisamment vérifié dans des stations hygrothermiques et sur des constructions en exploitation.

On a effectué des recherches avec des méthodes modernes par observation in situ, sur des éprouvettes en laboratoire et par simulation avec des programmes de calcul performants. Des expérimentations visant à mettre en évidence les phénomènes hygrothermiques et mécaniques ont été réalisées. On a obtenu des résultats qui peuvent être utiles dans le projet technique des bâtiments. Les méthodes d'étude abordées peut aider pour développer et analyser les systèmes constructifs nouveaux.

Suite à l'étude effectuée dans la thèse, on clarifie les modalités de fonctionnement des parements des constructions. En même temps on identifié les causes qui provoquent des dégradations et on a choisi des solutions favorables basées sur des consommations réduites d'énergie.

Mots clés: systèmes constructifs, protection des façades, pathologie des façades, variations de température et d'humidité, maîtrise de l'énergie, détachement et chute des éléments de façade, méthodes simplifiées de vérification du comportement à la diffusion de la vapeur d'eau, le risque de condensation, phénomènes hygrothermiques et mécaniques, consommations réduites d'énergie.



Study about the masonries realised with low-strength mortars

Daniel Covatariu¹

¹ *Department of Concrete Structures, Building Materials, Faculty of Civil Engineering, Technology and Management, "Gh. Asachi" Technical University, Iași, Romania*

- ▶ Date of submission: (31.10.2006)
- ▶ Ph.D. Supervisor: LIVIU GROLL, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: NICOLAE TARANU, Dean, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - ONET TRAIAN, Faculty of Civil Engineering, Technical University of Cluj-Napoca, Romania
 - BOB CORNELIU, Faculty of Civil Engineering, "POLITEHNICA" University of Timisoara, Romania
 - ALEXANDRU SECU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

Masonry is one of the oldest construction elements. In present day, the utilisation area was restrained, but taking into account the diversification of the constructions systems and materials, the masonry remain the main associated building material for the walls and civil buildings. Also, for the no-industrialised countries, all over the world, the masonry remain the most used material.

The consolidations of a damaged building impose knowledge involving building materials properties, about the constructions techniques, about elaboration and realisation of the consolidation project and, also, important knowledge in order to realise a strength calculus of the consolidated building. Re-evaluation and damaged building consolidation represent an engineering complex problem and, in the same time, a problem different from to build a new one.



Daniel Covatariu

It is necessary to understand and to realise the difference between **mascrete** (mass – masonry & crete – concrete / masonry based by the cement mortars) and **masonry** (classical masonry made from the aerial binder mortars – clay, lime, gypsum). The thesis is concentrated to the **classical masonries**. Because of the differences between the physico-mechanics properties of the stone/bricks and of the low-strength mortars is it quit necessary to know what are most important: the adherence between the mortars and bricks or the mechanical strengths?

Taking into account the lack of the information looking to deformability and strength characteristics of the “old – masonries”, made from bricks and bounded with the low-strength mortars, in the case of the existent building and heritages, the thesis could contribute by an elaborate analyse regarding the characteristics of the compounded elements and the its time – history evolution. The Ph. D. thesis has some important contributions to the improvement of the testing methods of the masonry structures and its components.

The Ph. D. thesis is structured by 8 chapters, as follows:

- Chapter I – General Notions, present a masonry definition, a short time-history of the masonry evolution, discuss the advantages and the disadvantages of the masonry-based structures using and review the actual knowledge in this domain (national and world levels).
- Chapter II – Masonries Classification, presents multi-criteria classification of the masonry's elements (bricks and mortars), used binders.
- Chapter III – Masonries Structural Mechanics present the computation methods of the masonries elements subjected to the axial compression, local compression (crushing), bending, shearing and elasticity modulus determination
- Chapter IV – Masonry Structures Rehabilitation – describes the main steps in order to restoring and rehabilitate a masonry structure, insisting to the expert's report stage.
- Chapter V – Masonry Testing Methods – present the testing methods of the old masonries (realised with low-strength mortars) emphasizing the testing methodology *in situ* and in laboratory, destroying and non-



Daniel Covatariu

destroying the proves, and a extended description of the devices and apparatus needed.

➔ Chapter VI – Laboratory Tests. Experimental Program. Are presented the personal testing program realised in The Civil Engineering Faculty of Jassy Laboratories, obtained results, and conclusions.

➔ Chapter VII – Computational Models Based On Finite Element Method, present simulation program realized with F.E.M. of the damage which could appear and a comparative study between results from numerical simulation and experimental test.

➔ Chapter VIII – Final Conclusions – contain the main conclusion from each chapter, enhance the author personal contributions and propose the future direction in order to continue the research.

Keywords: Masonry, Mortars, Masonry Testing Methods, Computational Model.



Contributions in the Field of Composite Materials Uses for Strengthening of Industrial Buildings

Codrin Valentin Saftiuc ¹

S.C.ValCon ,Bacau, Romania

- ▶ Date of submission: (31.10.2005)
- ▶ PhD. Supervisor: NICOLAE TARANU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ President: THEODOR MATEESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania
- ▶ Scientific Board:
 - ONET TRAIAN, Faculty of Civil Engineering, Technical University of Cluj-Napoca, Romania
 - VIRGIL BREABAN, Faculty of Civil Engineering, "OVIDIUS" University of Constanta, Romania
 - MIHAI BUDESCU, Faculty of Civil Engineering, "Gh. Asachi" Technical University of Iasi, Romania

Summary

The use of composites materials in strengthening of industrial buildings is part of a primary research area, of timely interest for meeting the safety requirements in service of engineering structures and elements. The objective of this work is to establish efficient structural rehabilitation solutions based on the use of modern state-of-the-art composite materials in case of engineering structures.

A brief review is performed first, focusing on the evolution of composite materials uses in structural rehabilitation purposes. The author makes a general presentation upon the composite materials, the classification criteria for easing their use in engineering applications, the role of each constituent in defining the final mechanical properties of the fiber reinforced composite systems and description of the technological aspects related to forming of composite materials and products with polymeric matrix that are fit for structural rehabilitation of traditional materials made members. There are also analyzed specific problems related to the



Codrin Valentin Saftiuc

use of polymeric composites in civil engineering and other fields where they are recommended for application, in comparison to the service requirements.

Another step in the present work is dealing with the selection of analytical material models used in micromechanics aiming a proper evaluation of material properties in case of long fibers reinforced composites. A critical evaluation of the relations existing in the literature has been performed in order to allow a proper evaluation of the elastic constants, namely of the longitudinal elasticity modulus, the transversal elasticity modulus, the shear elasticity modulus, Poisson's coefficients, properties that are necessary for establishing of composite and hybrid systems. There have been pointed out and analyzed the possible failure modes likely to occur in case of reinforced concrete beams strengthened with FRP composite materials, with composite bands attached on the tensile zones. There have been selected the analytical models suitable for evaluation of stresses in the marginal areas, considering the strengthening solution parameters.

A complex experimental program has been carried out in order to evaluate the behaviour of RC beams that were strengthened using FRP materials based solutions. It was described the technological application procedure specific to the FRP composite material sheets as well as their "wetting" with thermoset resins, a solution that is mainly used in case of shear bearing capacity enhancement. Working stages of the strengthened beams were established and failure modes have been identified. A Finite Element Analysis has been performed both in case of the unstrengthened and the strengthened beams. The obtained results confirmed the quality of the experimental program and the possibility of using the computational instruments in the study of FRP composite strengthened beams.

Keywords: fiber reinforced polymeric composites, enhancement of bending bearing capacity; enhancement of shear bearing capacity; carbon fiber reinforced polymeric bands; finite element analysis.

