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RESEARCH CENTRE FOR MECHANICS OF MATERIALS AND STRUCTURES SAFETY – *CEMSIG*

Centrul de cercetari pentru mecanica materialelor si siguranta structurilor
http://cemsig.ct.upt.ro/

GENERAL PRESENTATION

CEMSIG research centre was founded in 1999, and was accredited in 2001 by National University Research Council (CNCSIS) as Centre of Excellence. In 2006 it was reaccredited as Centre of Excellence, being the only such centre at the Politehnica University of Timisoara and one of the two excellence centres accredited in the field of engineering in Romania. Significant achievements in past years included participation to the IC15-CT96-0201/1997 European project COPERNICUS (FP4) "RECOS" - "Reliability of Moment Resistant Connections of Steel Building Frames in Seismic Areas", and the World Banc/CNCSIS project C16 "Reliability of Buildings Located in Strong Seismic Areas in Romania". Currently, the FP6 project "Earthquake protection of historical buildings by reversible mixed technologies", CEEX MATNANTECH "Structural systems and advanced technologies for structures from high-performance steels for buildings located in high-seismicity areas - STOPRISC" and EUREKA "SEFIE" projects are underway. The master course "New technologies and structures for construction" is closely connected to the CEMSIG research centre. Members of the research centre are actively involved in teaching and tutoring of master student research.

OBJECTIVES

CEMSIG research centre pursues development of the structure, competence and acting capability necessary to promote new technologies, research services, expertise, technical assistance and training of qualified specialists in the field of materials used in engineering structures, especially from the point of view of their mechanical characteristics that affect structural response and safety under static and dynamic loading. Research competence and capabilities are to be strengthened through national and international partnership, especially through cooperation with universities in the frame of European Union Programmes. CEMSIG offers research services and technology transfer for industry partners, and aims to support doctoral and master activities by integrating them into research activities and providing the necessary financial and material support.
Developing and diversifying of consulting activity and industry oriented research in partnership with national and international private companies.

MAIN RESEARCH FIELDS

- ***Performance of steel, timber and composite steel-concrete structures and characterisation of their response under exceptional actions***

Keywords: steel, composite, structural systems, seismic, fire, impact, explosions, performance-based design, moment-resisting frames, eccentrically braced frames, connections, ductile materials, high-performance steel

- ***Light gauge steel structures***

Keywords: thin-walled cold-formed elements, stability, shear walls, numerical simulations, connections, lightweight pitched roof portal frames

- ***Sustainable building design and technology***

Keywords: sustainability, environment, energy consumption, technological solutions, life-cycle

Research in *PERFORMANCE OF STEEL, TIMBER AND COMPOSITE STEEL-CONCRETE STRUCTURES AND CHARACTERISATION OF THEIR RESPONSE UNDER EXCEPTIONAL ACTIONS*

FIELD DESCRIPTION

Performance of steel and composite steel-concrete structures is regarded in terms of strength, stiffness, and ductility at global and local levels, including material behaviour. Exceptional actions refer to earthquakes and fire. Earthquake resistant design of structures improves continuously as a result of experimental and analytical research, as well as experience and observations gained after new earthquakes. One of the latest trends in seismic design of structures is the Performance-Based Design, which requires assurance of a set of controlled performance levels under a corresponding set of earthquake intensities. Performance-Based Design aims at reducing both structural and non-structural damage under multiple performance objectives. Strengthening of historical buildings in seismic areas using reversible mixed technologies, mainly based on metal devices is a new research area addressed by the CEMSIG team. Analytical and experimental investigations on high-performance steel for use in earthquake-resistant structures are underway.

ACTIVITIES

- Use of high-performance steel for earthquake-resistant multistorey steel structures.

- Strengthening of existing masonry and reinforced concrete buildings with steel-based reversible mixed technologies.
- Fire resistance of steel and composite steel-concrete structures.
- Drafting of SR EN 1994-1.2 (Fire design of composite structures)
- Drafting of National Annexes of SR EN 1993-1.2 (Fire design of steel structures), SR EN1993-1.8 (Joints in steel structures).
- Numerical and experimental study on the connecting systems between steel and concrete for buildings with composite structure in seismic areas.
- Seismic performance of steel eccentrically braced frames with removable dissipative elements.

RESEARCH TEAM

- Prof. Dan Dubina, PhD., Dr.HC., FIStructE (Steel and composite steel-concrete structures and characterisation of their response under exceptional actions)
- Prof. Daniel Grecea, PhD (Performance-Based Design, beam-column joints in moment-resisting frames, rehabilitation of existing buildings))
- Assoc.Prof. Raul Zaharia, PhD (Fire design, High-Performance Steel)
- Assoc.Prof. Florea Dinu, PhD (Performance-Based Design, High-Performance Steel)
- Sen.lect. Aurel Stratan, PhD (Earthquake-resistant steel structures, dual structures, eccentrically braced frames)
- Sen.Lect. Adrian Ciutina, PhD (Steel and composite structures)
- PhD student Adrian Dogariu (Strengthening of masonry and reinforced concrete structures with steel materials)
- PhD student Sorin Bordea (Strengthening of masonry and reinforced concrete structures with steel materials)
- PhD. student. Nicolae Muntean (Welded and bolted connections realised using high-strength steel)
- PhD. student. Calin Neagu (Seismic performance of structures with steel plate shear walls)
- PhD. student. Gelu Danku (Plastic rotation capacity of composite steel-concrete members and connections)
- PhD. student. Norin Filip-Vacarescu (Seismic performance of steel concentrically braced frames equipped with friction dampers)

RESEARCH OFFERS

- Monotonic and cyclic testing of materials and structural subassemblies
- Advanced static and dynamic analysis of structural systems
- Consulting and design
- Technical expertise for seismic strengthening of existing building structures

RESULTS

RESEARCH PROJECTS

1. FP6 INCO-CT-2004-509119 / 2004-2008 *Earthquake protection of historical buildings by reversible mixed technologies*, Financing authority / Beneficiary: European Union, Value: 26,385.2 EUR
2. RFCS-CT-2007-00050 STEELRETRO / 01.07.2007-31.06.2010 *Steel solutions for seismic retrofit and upgrade of existing constructions*, Financing authority / Beneficiary: European Commission - Research Fund for Coal and Steel, Value: 15,000 EUR (Total value: 87,600 EUR)
3. 29/10.10.2005, 2005-2008 CEEX MATNANTECH: *Structural systems and advanced technologies for structures from high- performance steels for buildings located in high-seismicity areas - STOPRISC*, Financing authority: Ministry of Research and Education, Value: 171,600 RON
4. 3153/13.10.2005: 2005-2007 CEEX-ET, *Numerical and experimental study on the connecting systems between steel and concrete for buildings with composite structure in seismic areas*, Financing authority: Ministry of Research and Education, Value: 30,000 RON
5. 1434/27.04.2006: 2006-2008 CEEX-ET, *Dual steel structures with removable dissipative elements for buildings located in seismic areas*, Financing authority: Ministry of Research and Education, Value:89,010 RON
6. 04/15.09.2006., 2006-2008 *Advanced training and research interdisciplinary platform "Centre for advanced studies and research in material and structural engineering"*. Financing authority / Beneficiary: Ministry of Education and Research. Value: 1,143,500 RON
7. 73/2006 CEEX – PROMETECH. *Activities promotion, increase of visibility and harmonization of Romanian research and development teams engaged in activities concerning technology transfer and development of European norms for steel structures in seismic areas.* Financing authority / Beneficiary: CNCSIS. Value 122,000 RON
8. 184/01.10.2007 TD-407. *Solutions for consolidation and rehabilitation of masonry and reinforced concrete buildings placed in*

seismic areas using metallic materials. Beneficiary: UEFISCSU, Value: 2,745 RON (Total Value: 15,670 RON)

9. 611/2007 *Drafting of the National Annex to EN 1993-1-2 "Design of Steel Structures – Structural Fire Design" and EN 1993-1-8 "Design of connections"*, Financing authority / Beneficiary: ASRO (Romanian Standards Association). Value: 100,000 RON
10. DIFISEK RFCS-CT-2007-00030, 01.07.2007. *Dissemination of structural fire safety engineering knowledge throughout Europe*. Financing authority / Beneficiary: European Union, Value: 14,710 EUR (Total value: 722,149 EUR)
11. 90/13.09.2007 INSTRUCT PN II "Capacities". *Structural assessment laboratory for large scale tests*, Financing authority: ANCS, Value: 11,000 RON (Total value: 1,998,000 RON)

BOOKS PUBLISHED

1. Ciutina A.: *Behavior of Steel-Concrete Composite Frames and their Joints*, Ed. Orizonturi Universitare, Timisoara, 2007. ISBN 978-973-638-337-3. 221 pages.
2. Stratan, A.: *Dynamics of Structures and Earthquake Engineering*, Ed. Orizonturi Universitare, Timisoara, ISBN 978-973-638-388-0, 223 pages (in Romanian).
3. Wald, F., Mazzolani, F., Byfield, M., Dubina, D., Faber, M. (Editors): *Urban Habitat under Catastrophic Events*, Proc. of the Workshop in Prague, 30-31 March 2007, ESF, COST C 26, Prazka Technika, CTU Prague, 2007, ISBN 978-80-01-03583-2, 386 p.

PUBLISHED PAPERS

1. Bordea, S., Stratan, A., Dogariu, A. and Dubina, D.: *Seismic upgrade of non-seismic r.c. frames using dissipative braces*. Proceedings of Workshop in Prague 30-31/3/2007 "Urban habitat constructions under catastrophic events". COST Action C26. Ed. Wald, F., Mazzolani, F., Byfield, M., Dubina, D., Faber, M., ISBN 978-80-01-03583-2, p.211-220.
2. Bordea, S., Stratan, A., Dogariu, A., Dubina, D.: *Seismic upgrade of non-seismic r.c. frames using steel dissipative braces*. Proceedings of COST C26 Workshop in Prague March 30 – 31 2007, Ed. Wald F., Mazzolani F., Byfield M., Dubina D., Faber M., ISBN 978-80-01-03583-2, p. 211-220.
3. Bordea, S.: *Retrofitting of Reinforced Concrete Frames in Seismic Areas with a Buckling Restrained Bracing System and Fibre Reinforced Polymers*, Scientific Bulletin of "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, Vol. 52 (66) 2007, No. 1, ISSN 1224-6026, p. 55-64.
4. Bordea, S.: *Strengthening of non-seismic RC frames located in seismic areas with combined Steel Buckling Restrained Bracing (BRB) systems and Fibre Reinforced Polymers (FRP) techniques*. Third International PhD Symposium, Pecs, Hungary, October 25 – 26 2007 (in print).
5. Byfield, M.P., De Matteis, G., Dinu, F.: *Robust design of steel framed buildings against extreme loading*, in Proc. of COST C26 Workshop "Urban Habitat Constructions Under Catastrophic Events, Prague, March 30-31, 2007, Ed. Wald F, Mazzolani M, Byfield M, Dubina D, Faber M, ISBN 978-80-01-03583-2, p. 295-302.
6. Ciutina, A., Dogariu, A.: *Behaviour of Different Connectors under Monotonic and Cyclic Loading*, proceedings of ICSCS '07 Conference – Steel and Composite Structures, 30.07-01.08 2007, Manchester, United Kingdom, published by Taylor and Francis, Leiden, The Netherlands ISBN 978-0-415-45141-3, p. 779-787.
7. Ciutina, A.: *Seismic Response of Moment Resisting Composite Frames Including Actual Behaviour of Beam-To-Column Joints*, proceedings of International Symposium on Strong Vrancea Earthquakes and Risk Mitigation, Bucharest, 4-6 October 2007, Matrix Rom Bucharest, ISBN 978-973-755-247-1, pp. 407-411.
8. Dinu, F., Grecea, D., Dubina, D.: *Performance-based criteria for design of steel frame structures in seismic areas*, in Proc. of International Symposium on Seismic Risk Reduction The JICA Technical Cooperation Project in Romania, 26 – 27 April 2007, Bucharest, Romania, p. 651 – 659.
9. Dogariu, A., Stratan, D., Dubina, T., Gyorgy-Nagy, C., Daescu, V., Stoian: *Strengthening of masonry walls by innovative metal based techniques*. COST 26 – Urban Habitat Construction under Catastrophic Events – Proceedings Workshop Prague, March 30-31, 2007, ISBN 978-80-01-03583-2, p. 201-210.
10. Dubina, D., Dinu, F., Stratan, A, Ciutina, A.: *Tower Center International Bucureşti – proiectul structurii metalice*. AICPS Review, nr. 1/2007. ISSN 1454-928X, p. 2-8
11. Dubina, D., Dinu, F., Stratan, A., Marcu, A., Marcu, D., Coman, M.: *Proiectarea clădirilor înalte cu structură metalică (II) - Studiu de*

caz: cladirea Bucharest Tower Center, Revista Constructiilor, March, 2007, ISSN 1841-1290, p. 98-102

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13. Dubina, D., Dinu, F., Ungureanu, V., Zaharia, R., Grecea, D.: *High strength steel for seismic resistant building frames*, COST C26 Workshop "Urban habitat constructions under catastrophic events" Prague, 30-31.03.2007, ISBN 978-80-01-03583-2, 2007, pp. 193-201
14. Dubina, D., Dinu, F., Ungureanu, V., Zaharia, R., Grecea, D.: *High strength steel for seismic resistant building frames*, Proc. of Workshop on Urban habitat Constructions under Catastrophic Events, Prague 30-31, March 2007, COST C 26, CTU Prague, p. 193-200.
15. Dubina, D., Dinu, F., Ungureanu, V., Zaharia, R., Grecea, D.: *High strength steel for seismic resistant building frames*. COST C26 - Proceedings of the Workshop: Urban habitat constructions under catastrophic events. ISBN: 978-80-01-03583-2, Prague, March 30-31 2007, p. 193-200.
16. Dubina, D., Dinu, F., Zaharia, R., Grecea, D., Ungureanu, V.: *Studiul solutiilor de aplicare a otelurilor de inalta rezistenta in structura cladirilor multietajate amplasate in zone seimice cu risc ridicat*, AICPS Journal, New Edition, 1/2007, on CD, ISSN 1454-92/8X, p. 1.1-1.21 (in Romanian)
17. Dubina, D., Dinu, F.: *High Strength Steel frames in seismic resistant building frames*, Proc. of 6th Int. Conf. Steel and Aluminium Structures - ICSAS'07, Oxford Brookes University, 2007, p. 133-140.
18. Dubina, D., Dinu, F.: *Seismic performance of dual-steel multistorey building frames*, in Proc. of Int. Seminar devoted to the activity of Prof. Rene Maquoi, Liege, Belgium, December 14-15, 2007, p. 109 – 119.
19. Dubina, D., Dogariu, A., Stratan, A., Stoian, V., Nagy-Gyorgy, T., Dan, D., Daescu, C.: *Masonry wall strengthening with innovative metal based techniques*, Int. Conference on Steel and Composite Structures ICSCS07, Manchester, UK, Steel and composite structures, editors Y.C. Wang & C.K. Choi, ISBN 978-0-415-45141-3, p. 1071-1077
20. Dubina, D., Grecea, D.: *Implementarea Eurocode-urilor structurale, componentă a integrării României în Uniunea Europeană*, Buletin AGIR Ediţie nouă, Anul XII, nr.2, aprilie-iunie 2007, ISSN 124-7928
21. Dubina, D., Muntean, N., Stratan, A., Grecea, D., Zaharia, R.: *Performance of Dual Steel Connection and Moment Resisting Joints*, Scientific Bulletin of "Politehnica" University of Timisoara, Transactions on Civil Engineering and Architecture, Vol. 52 (66) 2007, No. 1, ISSN 1224-6026, p. 65-78.
22. Dubina, D., Stratan, A., and Bordea, S.: *Seismic retrofit of r.c. frames with hysteretic bracing systems*. Proc. of the 3rd Intl. Conf. on Steel and Composite Structures (ICSCS07), Manchester, UK, 30 July - 1 August 2007, Eds. Wang and Choi. Taylor&Francis, ISBN: 978-0-415-45141-3, p. 833-839.
23. Dubina, D., Stratan, and Dinu, F.: *High Strength Steel EB Frames with Low Strength Bolted Links*. Proc. of the 5th International Conference on Advances in Steel Structures, Singapore, 5 – 7 December 2007, Research Publishing Services, JY Richard Liew & YS Choo (Eds.), ISBN 978-981-05-9365-0, Vol. III., p. 249-254.
24. Grecea, D., Bordea, S., Stratan, A., Dogariu, A., Dubina, D.: *Soluţii moderne pentru consolidarea şi reabilitarea clădirilor amplasate în zone seismice*, Revista AICPS Ediţie nouă, 2/2007, on CD-ROM, ISSN 1454-92/8X, p. 2-14 (in Romanian)
25. Mistakidis, E., Apostolska, R., Dubina, D., Graf, W., Necevska-Cvetanovska, G., Nogueiro, P., Pannier, S., Simoes da Silva, L., Stratan, A., and Terzic, U.: *Typology of seismic motion and seismic engineering design*. Proceedings of Workshop in Prague 30-31/3/2007 "Urban habitat constructions under catastrophic events". COST Action C26. Ed. Wald, F., Mazzolani, F., Byfield, M., Dubina, D., Faber, M., ISBN 978-80-01-03583-2, p. 130-157.
26. Pintea, D., Zaharia, R.: *Fire design of composite steel-concrete columns under natural fire*, COST C26 Workshop "Urban habitat constructions under catastrophic events" Prague, 30-31.03.2007, ISBN 978-80-01-03583-2, 2007, pp. 76-80
27. Stratan, A., Dogariu, A. and Dubina, D.: *Bolted links for eccentrically braced frames: influence of link stiffness*. Proc. of the 3rd Intl. Conf. on Steel and Composite Structures (ICSCS07), Manchester, UK, 30 July - 1 August 2007, Eds. Wang and Choi. Taylor&Francis, ISBN: 978-0-415-45141-3, p. 847-853.
28. Zaharia, R., Pintea, D., Dubina, D.: *Fire analysis and design of a composite steel-concrete structure*, "Steel and Composite structures" ICSCS07, Manchester, UK, Taylor

& Francis/Balkema, ISBN978-0-415-45141-3, 2007, p. 725-731

ONGOING PhD THESES

- Adrian Dogariu: *Solutions for consolidation and rehabilitation of masonry and reinforced concrete buildings placed in seismic areas using metallic materials*, PhD supervisor Prof. Dan Dubina
- Calin Neagu: *Seismic performance of steel building frames of dissipative shear walls*, PhD supervisor Prof. Dan Dubina
- Gelu Danku: *Development of plastic zones and evaluation of rotation capacity in composite steel-concrete members and connections*, PhD supervisor Prof. Dan Dubina
- Mihai Muţiu: *Structural configurations, functional and technical-economical parameters of steel-framed buildings*, PhD supervisor Prof. Dan Dubina
- Nicolae Muntean: *Behaviour of connections of realised from high-strength steel subjected to seismic loading*, PhD supervisor Prof. Dan Dubina
- Norin Filip-Vacarescu: *Seismic performance of steel centrically braced frames equipped with friction dampers*, PhD supervisor Prof. Dan Dubina
- Sorin Bordea: *Dual frame systems with buckling-restrained braces*, PhD supervisor Prof. Dan Dubina

OTHER RESULTS

- ERASMUS programmes promoting student and teaching staff mobility with INSA-Rennes, University Blaise Pascal of Clermont-Ferrand, Athens, Naples, Salerno and University of Liege
- Organisation of the International Seminar COST C26 "Urban Habitat Constructions under Catastrophic Events", Timisoara, October 26 – 27, 2007.
- Membership in the European Programme COST C25: Sustainability of Constructions - Integrated Approach to Life-time Structural Engineering. Two members of the CEMSIG research center (Dan Dubina and Viorel Ungureanu) are members in the management committee of the COST C26 programme.
- Membership in the European Programme COST C26: *Urban Habitat Constructions under Catastrophic Events*. Two members of the CEMSIG research center (Dan Dubina and Florea Dinu) are members in the management committee of the COST C26 programme.
- Membership in the European Programme COST TU0601: Robustness of Structures.
- "ECCS European Award for Steel Structures 2007" for the design of the Tower Center International building (D. Dubina, F. Dinu, A. Stratan, A. Ciutina).
- AICPS 1st award for 2007 for the design of the Tower Center International building (D. Dubina, F. Dinu, A. Stratan, A. Ciutina).
- Bilateral Romanian-Greek research program (2006-2007): *Strengthening and rehabilitation of historical buildings by reversible technologies(UPT coordinator: sen.lect. Aurel Stratan)*. Financing authority / Beneficiary: Ministry of Research and Education.
- Bilateral Romanian-Slovenian research program (2006-2007): *Qualification criteria for the joints of moment resistant steel frames of multi-storey buildings in seismic areas. (UPT coordinator: prof. Daniel Grecea).* Financing authority / Beneficiary: Ministry of Research and Education.
- Bilateral Romanian-Hungarian research program (2006-2007): *Sustainable building and bridge technologies based on light metal, composite materials and structural connections. (UPT coordinator: sen.lect.. Ludovic Fulop)*. Financing authority / Beneficiary: Ministry of Research and Education.
- Drafting of *SR EN 1993-1-2/NA: Eurocod 3: Proiectarea structurilor din oţel. Partea 1-2: Calculul structurilor la foc. Anexa naţională*. ASRO – Romanian Standards Association, 2007, 6 p and design examples (in Romanian).
- Drafting of *SR EN 199- 1-8/NA Eurocod 3: Proiectarea structurilor din oţel. Partea 1-8: Proiectarea îmbinărilor*. National Annex, ASRO – Romanian Standards Association, 2007, 6 p. and design examples (in Romanian).

FURTHER DEVELOPMENTS

- Performance-based design of braced frames
- Dissipative systems for strengthening of masonry and reinforced concrete buildings with metallic systems
- Development of analytical procedures for prediction of rotation capacity beam-column joints in moment-resisting frames
- Earthquake performance of steel structures realised from high-performance steel
- Seismic protection of structures using additional damping devices

CONTACT PERSONS

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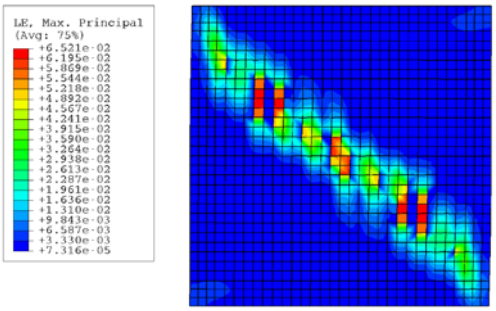
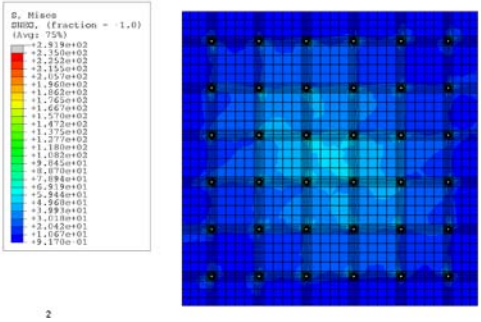
EXAMPLES

1. PROHITECH project: *Earthquake protection of historical buildings by reversible mixed technologies.*

In the frame of FP6 PROHITECH project, innovative solutions for seismic consolidation of historical masonry buildings were proposed and developed. These solutions were developed in order to accomplish two major demands: first to be easily removable and second to use mixed technologies. Numerical investigations have been performed with ABAQUS code in case of retrofitted panels using an innovative technique based on sheeting the walls with metallic plates.

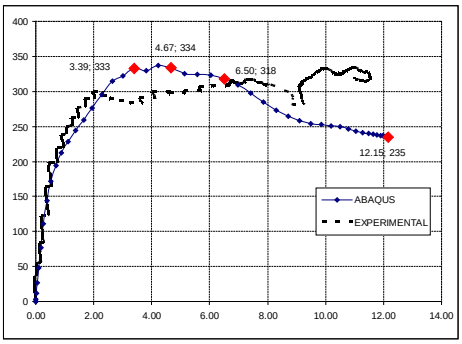


Logarithmic strain in masonry panel at 11mm



Von Misses stress in steel plate at 11 mm displacement

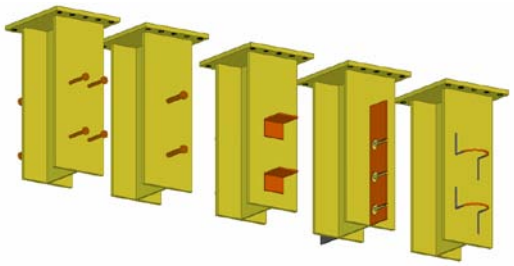
Assuming a Concrete Damage Plasticity material model for the retrofitted masonry panel a new and complete finite element model has been developed. This model was build referring to the real geometry of the system (1.5x1.5x0.25 m masonry wall, 2 mm thickness of the steel plate applied on one side). Some simplifications were used: shell elements were used for steel plate and the link between connector and masonry was simplified node to surface constrain.



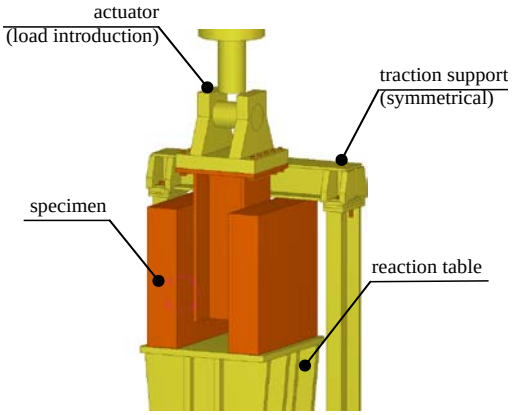
General shear-displacement behaviour of the system

2. CEEX-ET 3153 project: *Numerical and experimental study on the connecting systems between steel and concrete for buildings with composite structure in seismic areas.*

The research refers to a set of 10 experimental tests on five different types of connectors (angle profiles, Φ16mm and Φ22mm shear connectors, perfobond connectors and reinforcement hooks), subjected to cyclic and monotonic loading, through push-out and respectively push-pull tests.



Arrangement of connectors on steel profiles



Testing set-up

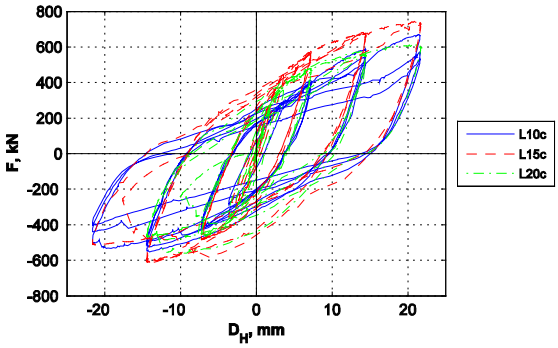
The experimental results are discussed in terms of resistance, ductility and stiffness, and compared to analytical formulae used for strength determination.

Differences in monotonic and cyclic envelopes

3. CEEX-ET project 1434: *Dual steel structures with removable dissipative elements for buildings located in seismic areas.*

Eccentrically braced frames are widely used as lateral-force resisting system for multi-storey buildings located in seismic areas. They have the advantage of both high stiffness and excellent ductility. Capacity design principles used in modern seismic design codes are deemed to constrain plastic deformations to dissipative elements only, which in eccentrically braced frames are represented by links.

Experimental set-up



Cyclic performance of bolted link specimens

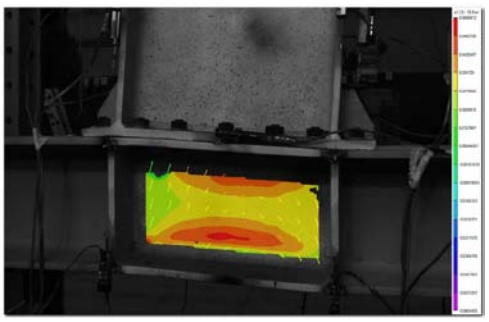
On the other hand, it is likely that eccentrically braced frames designed for high energy dissipation will experience significant yielding even under moderate seismic events. In order to reduce the cost of repairing damaged links, a bolted connection between the link and the beam is suggested, which will facilitate replacement of damaged links. In order to constrain inelastic deformations to link alone, making them act as a structural "fuse", links can be realised from lower-yield steel then the rest of the structure.

Failure mode of specimen L20m1

Monotonic and cyclic tests were performed on eccentrically braced portal frame with removable bolted links in order to assess cyclic performance and technical feasibility of the complete system. The main parameter was end-plate thickness of the bolted connection between the link and the beam. Experimental tests demonstrated that the solution can be applied successfully in design practice. Further developments will include study of interaction of the bolted link with reinforced concrete slab.

4. CEEX MATNANTECH project: *Structural systems and advanced technologies for structures from high- performance steels for buildings located in high-seismicity areas – STOPRISC.*

Seismic resistant building frames designed as dissipative structures must allow for plastic deformations in specific members, whose behavior has to be predicted by proper design.

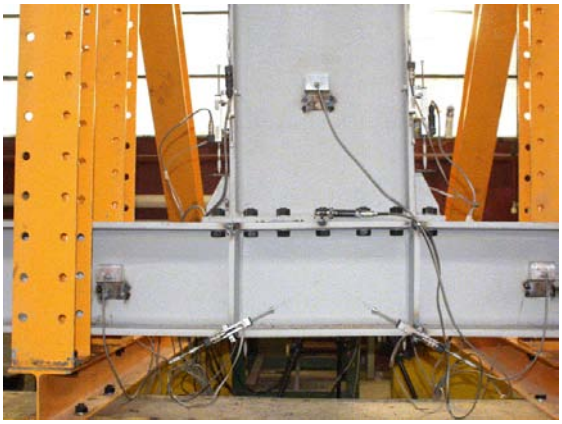


VIC measurements of the C460-EP16-M1 specimen

In Dual Frames (e.g. MRF + CBF or EBF) members designed to remain predominantly elastic during earthquakes, such as columns for instance, are characterized by high strength demands. Dual steel structural systems, optimized according to a Performance Based Design Philosophy, in which High Strength Steel is used in "elastic" members

and connection components, while Mild Carbon Steel in dissipative members, can be very reliable and cost effective.

Based on this idea, a targeted testing program on the purpose to evaluate the performance of Moment Joints of HSS and MCS components, under monotonic and cyclic loading was carried out.



Experimental test of the C460-EP16-M1 specimen

Close-up view of the C460-EP16-M1 specimen

Research in *LIGHT GAUGE STEEL STRUCTURES*

FIELD DESCRIPTION

Light-gauge steel profiles are class 3 and 4 welded sections and cold-formed members and sheeting. Beside the classical structural problems characterising hot-rolled profiles, light-gauge steel sections are prone to local instability phenomena, involving reduction in section strength, poor post-elastic capacity and ductility, and high sensivity to geometrical imperfections. However, these materials have important technical and economical advantages, and the sector of light-gauge steel structures is one of the most dynamic in the field. In order to promote light-gauge steel structures, instability problems and connecting technology and performance have to be carefully managed. These problems are even more important in case of structures located in seismic areas, such as Romania.

The research activity on light-gauge profiles is focused in three main directions: (1) buckling of members under compression and/or bending; (2) performances of structures made of light-gauge profiles under earthquake loading and (3) the promotion of new structural solutions where the advantages of light-gauge profiles can be fully exploited.

ACTIVITIES

- Seismic performance of pitched-roof portal frames with elements of class 3 and 4 cross-sections.
- FE modelling of the buckling phenomenon for compression and bending members
- FE investigations on the seismic performance of light-gauge steel houses
- Evaluation of post-elastic strength and ductility of cold-formed steel members and joints.

RESEARCH TEAM

- Prof. Dan Dubina, PhD., Dr.HC., FIStructE (Light gauge steel structures)
- Assoc.prof. Mircea Georgescu, PhD (Stability of cold-formed steel members)
- Assoc.prof. Raul Zaharia, PhD (Connections in cold-formed steel structures)
- Assoc.prof. Daniel-Viorel Ungureanu, PhD (Buckling of thin-walled cold-formed members)
- Assist. Ionel-Mircea Cristutiu (Lightweight steel portal frames)
- PhD. student. Daniel Ticle (Post-elastic capacity of Z purlins with overlapped joints)
- PhD. student. Bogdan Neagoie (Built-up cold-formed steel beams with corrugated web)
- PhD. student. Nicolae Muntean (Post-elastic capacity of Z purlins with overlapped joints)

RESEARCH OFFERS

- Advanced stability and nonlinear static and dynamic analysis of thin-walled steel members and structures
- Buckling and material testing
- Testing of structural subassemblies and connections

RESULTS

RESEARCH PROJECTS

CEEX – M3, Nr. 234/2006 - AVANTECH, *Promotion and Increase of Visibility of Integrative Structures of Education – Research - Production type*, Financing authority: Ministry of Research and Education, Value: 30,000 RON

PUBLISHED PAPERS

1. Bambach, M.R., Rasmussen, K.J.R., Ungureanu, V.: *Inelastic behaviour and design of slender I-sections in minor axis bending*. Journal of Constructional Steel Research, Vol. 63/2007, No.1, p. 1-12

2. Dubina, D., Stratan, A., Nagy, Zs.: *Full – scale testing of cold-formed steel pitched-roof portal frames of back-to-back channel sections and bolted joints*. Proc. of the Sixth Intern. Conf. on Steel and Aluminium Structures, 24-27 July 2007, Oxford, UK. Beale, R.G. (Ed.), Oxford Brookes University, ISBN: 978-0-9556254-0-4, p. 931-939.

3. Dubina, D.: *Behaviour and performance of cold-formed steel framed houses under seismic action*. Special Issue on Cold-formed Steel Structures, Progress in Steel Building Structures, Tongji University, China Vol. 9, No.1, ISSN 1671-9379, p. 1-17.

ONGOING PhD THESES

- Daniel Ţicle: *Behaviour of cold-formed steel structural elements in post-elastic domain*, PhD supervisor Prof. Dan Dubina
- Bogdan Neagoie: *Structural detailing of steel girders with flanges made of cold-formed sections and corrugated sheet web*, PhD supervisor Prof. Dan Dubina

OTHER RESULTS

- Drafting of *SR EN 1993-1.12 Eurocod 3: Proiectarea structurilor de oţel. Partea 1-12: Reguli suplimentare pentru aplicarea prevederilor standardului EN 1993 la mărci de oţel până la S 700*, ASRO – Romanian Standards Association, 2007, 12 p. (in Romanian)
- Drafting of *SR EN 1993-1-3 Eurocode 3: Proiectarea struturilor de otel. Partea 1-3: Reguli suplimentare pentru elemente structurale şi table formate la rece*, ASRO – Romanian Standards Association, 2007, 135 p. (in Romanian).

FURTHER DEVELOPMENTS

- Influence of residual stresses on the ultimate capacity of cold-formed steel members
- Strength and ductility of thin-walled steel sections and structural systems under monotonic and cyclic loading
- Built-up cold-formed steel beams with corrugated web
- Post-elastic capacity of Z purlins with overlapped joints
- Shear walls from cold-formed steel cassettes

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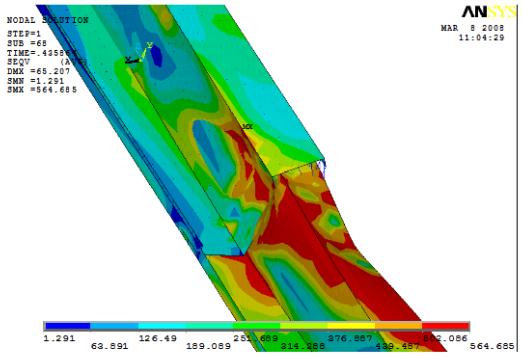
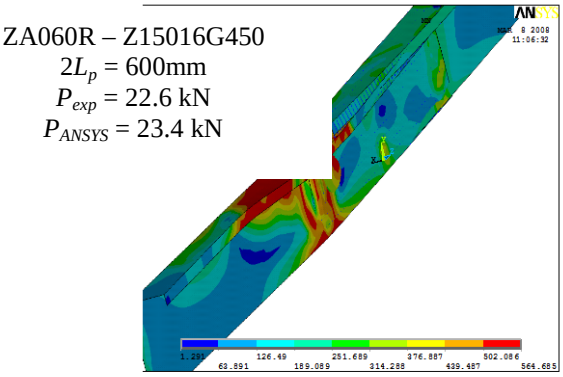
EXAMPLES

1. Behaviour of continuous purlins of lapped cold-formed Z – sections and bolted on intermediate supports.

In practice, multi-span purlins of cold-formed Z-sections with overlaps and bolted connections over internal supports are very popular owing to their high structural efficiency, but also to their low transportation cost with effective stacking and highly productive installing.

Traditional design methodology considers the lapped bolted zone does not affect the continuity of purlin and the bending moments and shear forces are correspondingly obtained. The strength and stability checking for this zone, for bending, shear or local transverse forces, considering single or coupled effects, are performed taking a homogeneous section, of which properties are calculated as sum of the two component sections.





FE model for calibration; experiment vs. numerical results

However, the actual behaviour of such a purlin is different because (1st), the lapped zone does not work like a homogenous section, and (2nd), the usual fastening system does not provide the continuity of purlin between single and lapped sections. Obviously, the traditional model is really optimistic, both for ULS and SLS design criteria.

Experimentally it was observed that the failure of such purlins usually occurs at the edge of the lap zone by the local buckling of compression flange and, additionally, the failure of purlins are influenced by the shear buckling of the web of single section at the edge of the lap.

Based on these observations and considering the semi-continuous connections between single and lapped sections the ULS criterion is regarded as an interaction between bending moment and web crippling in the single section at the edge of the lap.

Research in *SUSTAINABLE BUILDING DESIGN AND TECHNOLOGY*

FIELD DESCRIPTION

The theory of sustainability is relatively new and in continuous development. The increased interest for sustainability in civil engineering had determined a series of measures and specific actions, such as the reduction and even elimination of some polluting methods, detrimental, high energy consumption, the use of regenerative resources, avoiding to use materials that cannot be reused after the demolition of structures or cannot be assimilated by the environment, re-equilibration of the ecological balance by design, production, use, dwelling. The cost of measures of ecological order will be taken into consideration for the preliminary determination of the price of the products, in order to build just what is necessary, so that the man is stimulated to think to next generations and the preservation in good conditions of the environment.

ACTIVITIES

- Requirements on building performance and sustainability
- Methods of Performance-based and sustainable design and construction
- Social, cultural and economic aspects in sustainability evaluation
- Clean and lean construction processes
- Performance – based design approach vs. Robustness – based design approach for new and existing buildings subjected to extreme actions
- Sustainable design procedures: interactive and holistic design methods and decision-making tools

RESEARCH TEAM

- Prof. Dan Dubina, PhD., Dr.HC., FIStructE (sustainability of constructions, degradation models, life-time structural engineering)
- Prof. Daniel Grecea, PhD (sustainability of constructions, LCA databases)
- Assoc. prof. Daniel-Viorel Ungureanu, PhD (life-cycle performance, design for durability, demolition and deconstruction, life-time structural engineering)
- Sen. Lect. Adrian Ciutina, PhD (sustainability of constructions, life cycle assessment – LCA, methodologies)

RESEARCH OFFERS

- Consulting for sustainable design of buildings
- Life-cycle assessment (LCA)
- Life-cycle cost analysis (LCC)
- Study-cases

RESULTS

RESEARCH PROJECTS

31042/2007 PNCDI2 – PROACTEX. *Structural systems and innovative technologies for protection of buildings under extreme actions taking into account sustainable design criteria*. Financing authority / Beneficiary: ANCS-CNMP. Value: 67,400 RON

BOOKS PUBLISHED

Braganca, L., Koukkari, H., Blok, R., Gervasio, H., Veljkovic, M., Plewako, Z., Landolfo, R., Ungureanu, V., Silva, L.S. (Editors): *Sustainability of Constructions. Integrated Approach to Life-time Structural Engineering.* Proceedings of the First Workshop. Cost Action C25. Lisbon, Portugal, September 13-15, 2007, ISBN: 978-989-20-0787-8, Published by Multicomp, Lda., COST Publication, 336 pages

PUBLISHED PAPERS

1. Dubina, D., Ungureanu, V., Mutiu, M.: *Sustainable mixed building technologies applied to residential buildings: some Romanian examples.* Cost C25 - Proceedings of the first Workshop: Sustainability of Constructions, Integrated Approach to Life-time Structural Engineering, ISBN: 978-989-20-0787-8, Lisbon, Portugal, September 13-15, 2007, p. 3.93-3.102.
2. da Silva, L.S., Grecea, D., Krigsvoll, G., Gervasio, H., Blok, R., Aktuglu, Y.: *LCA databases (EPD vs Generic data)*, Cost C25 - Proceedings of the first Workshop: Sustainability of Constructions, Integrated Approach to Life-time Structural Engineering, ISBN: 978-989-20-0787-8, Lisbon, Portugal, September 13-15, 2007, p. 0.13-0.22.

3. Dubina, D., Ungureanu, V., Mutiu, M: *Sustainable building structures for housing*. International Conference on Sustainable Buildings 2007: Sustainable Construction. Materials and Practices, Vol. 2, ISBN: 978-1-58603-785-7, IOS Press, Lisbon, Portugal, September 12-14, 2007, p. 1096-1103.

FURTHER DEVELOPMENTS

- Verification methods for durability of steel constructions
- Demolition and deconstruction of buildings
- Sustainable construction assessment and classification system

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EXAMPLES

1. Sustainable building solutions for housing.

Four examples of sustainable mixed building technologies, which combine steel and timber in the framing and different materials for cladding, roofing and flooring, in order to obtain highly performance thermo-energetic properties are studied. Some innovative design solutions have been used in these projects. Three examples present single family houses and one a block of flats, all of them built in Romania. All the buildings are located in medium and high seismic regions. There are analyzed aspects related to design and detailing, as well as solutions for cladding and roofing, including structural features, thermo-energetic performance and cost efficiency analysis.

Bulzesc's family house

Constantin's family house

Carmen's family house

Block of flats

NATIONAL RESEARCH CENTRE IN CIVIL ENGINEERING AND FATIGUE – *CNCCO*

GENERAL PRESENTATION

CNCCO - This research centre has been created in 2002, as a consequence of a grant co-financed by the Romanian Government and the World Bank. It is a multi-user research centre. We are in relations of partnership with the Technical University of Civil Engineering Bucharest, Technical University of Iaşi, Technical University of Cluj-Napoca, "Eftimie Murgu" University of Reşiţa, "Lucian Blaga" University of Sibiu, University of Petroşani.

OBJECTIVES

CNCCO - The main objective of the centre is the developing of highly qualified human resources for higher education and scientific research.
Special attention is given to youth training, by attracting students to major research programs performed by our experienced team, in which they are making use of our high-performance research infrastructure,
CNCCO - offers research, expertise, consulting design and testing services for structures and materials used in civil and mechanical engineering.

MAIN RESEARCH FIELDS

- ***Nonlinear analysis of structures***

Keywords: nonlinear, static, dynamics, stability, rigid, semi-rigid connections

- ***Computational Methods, Computer Aided Design, Computer Aided Engineering***

Keywords: finite elements, boundary elements, design, CAD, CAE, training center

- ***Earthquake Engineering***

Keywords: multistory steel frames, earthquake, global performance, ductility, beam-to-column connections, reliability, bearing capacity, safety, damaged elements, seismic events, maintenance

- ***Fatigue and fracture of materials***

Keywords: fatigue, fracture

Researches in *NONLINEAR ANALYSIS OF STRUCTURES*

FIELD DESCRIPTION

Nonlinear elastic and elastic-plastic analysis of structures under static and dynamic loads is treated. The influence of beam-to-column joint flexibility on the structural behaviour is evaluated. Post critical analysis is performed. Several connection types are taken in consideration. An optimum response of the entire structure is the final goal.

ACTIVITIES

- Intensive numerical and experimental investigations were performed on the behaviour of steel frames, plane plates and shells in both pre and post-buckling domains
- Experimental tests were performed in order to find the mechanical characteristics of materials

RESEARCH TEAM

- Prof. dr. eng. Marin IVAN
- Prof. dr. eng. Mircea IEREMIA
- Ass. prof. dr. eng. Adrian IVAN
- As. eng. PhD student Dumitru FLORESCU
- PhD student eng. Viorel POPA-ALBU
- PhD student eng. Teodor LEŢ
- Eng. PhD student Dănuţ CĂLUGĂR
- Eng. PhD student Vinicius PRECUPAŞ

RESEARCH OFFERS

- Advanced static and dynamic finite element analysis of civil engineering structures
- Expertise, consulting, design checking services
- Design activities for steel, concrete and timber structures
- Experimental testing services

RESULTS

RESEARCH PROJECTS

1. Complex project-partnership, Contract no. 31-099/2007: *Modern technology for enhancing the durability of steel structures*, Beneficiary: National Center for Project Management, Bucharest, Value: 1,951,062 RON
2. Contract no. 729/2007: *Technical expertise of the former cast house from Azoma*, Beneficiary: S.C. Atelierele Architech S.R.L.,Timisoara, Value: 10,000 RON

PUBLISHED PAPERS

A. Ivan, M. Ivan, *The rehabilitation of the 160 kN overhead travelling crane from the machine room of Iron Gates I*, The Scientific Session on Constructions and Installations, CIB 2007, Transilvania University Publishing House, Brasov, 2007, 6 pages, ISSN 1843-6617

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Researches in *COMPUTATIONAL METHODS, COMPUTER AIDED DESIGN, COMPUTER AIDED ENGINEERING*

FIELD DESCRIPTION

Finite element models together with CAD tools are highly required in order to obtain optimal structural solutions. The problem is important for both civil and mechanical engineering. The next step in this domain consists in the development of some expert systems for design and expertise.

ACTIVITIES

- Developing of small computer programs dedicated to specific civil engineering problems
- Creating interfaces between large specialized computer programs and the ones previously mentioned
- Testing of the new versions of complex computer programs for accuracy
- Developing numerical procedures to evaluate the bearing capacity of the damaged structures

RESEARCH TEAM

- Ass. prof. dr. eng. Adrian IVAN
- As. eng. PhD student Dumitru FLORESCU
- As. eng. PhD student Eugen DOGARIU
- Eng. PhD student Dănuţ CĂLUGĂR
- As. eng. PhD student Dan COSMA

RESEARCH OFFERS

- Consulting, design, training services
- CAD/CAE services
- Finite element analysis software checking

RESEARCH PROJECTS

Contract no. 438/2006, addendum no. 1, *Design projects for the steel structures of the waste water treatment plant of HOCHLAND,* Beneficiary: S.C. SIMONT S.A., Sibiu, Value: 10,000 RON

FURTHER DEVELOPMENTS

- Testing of the new versions of complex computer programs for accuracy
- Developing numerical procedures to evaluate the bearing capacity of the damaged structures

CONTACT PERSON

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Fax: +40-256-403931
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Researches in *EARTHQUAKE ENGINEERING*

FIELD DESCRIPTION

The main objectives of the range are: keeping the safety of the new civil engineering works through designing, cladding and maintenance, assessment of the residual bearing capacity of damaged elements of a structure, recovering the initial bearing capacity of the damaged structures to resist to the new seismic events, new resistant systems for the high-raised steel buildings.

ACTIVITIES

- Linear and non-linear dynamic response analysis of civil engineering structures subjected to seismic loads
- New seismic protection solutions for structures (base isolation, dampers)
- Evaluation of the bearing capacity of the strengthened structures

RESEARCH TEAM

- Prof. dr. eng. Marin IVAN
- Prof. dr. eng. Mircea IEREMIA
- Prof. dr. eng. Iuliu DIMOIU
- Prof. dr. eng. Zoe REGEP
- Ass. prof. dr. eng. Adrian IVAN
- Eng. PhD student Octavian MOCIAN

RESEARCH OFFERS

- Non-linear dynamic response analysis of civil engineering structures subjected to seismic loads
- Expertise, consulting, design checking services

PUBLISHED PAPERS

1. Ivan, M. Ivan, M. Stanciu, V. Popa, I. Both, *Advanced analysis of steel communication tower's behaviour using F.E.M.*, The Scientific Session on Constructions and Installations, CIB 2007, Transilvania University Publishing House, Brasov, 2007, 8 pages, ISSN 1843-6617

2. Ivan M., Ivan A., Both I., *Modern solutions to increase the metal structures safety to seismic actions,* The National Technical-Scientific Conference "Modern Technologies for the Third Milenium", University of Oradea Publishing House, Oradea, 2007, 9 pages, ISSN 1454-4067

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RESEARCH CENTRE FOR MATERIALS AND STRUCTURES *CES-MAST*

GENERAL PRESENTATION

The research centre was founded in 2000. Significant achievements of the centre researches are obtained in the field of new materials, structural design and rehabilitation of different constructions types: reinforced and prestressed concrete, masonry, wooden, composite steel-concrete.
Researches are in close relation with practice and the present and future needs of construction industry.

MAIN RESEARCH FIELDS

- **Flexural strengthening of RC beams with FRPs**

Keywords: RC beams; FRP; retrofitting; strengthening.

- **Structural strengthening of RC columns**

Keywords: RC structures; FRP; rehabilitation procedures

- **Innovative Structural Systems Using Steel-Concrete Composite Materials and Fiber Reinforced Polymer Composites**

Keywords: composite joints, composite structural walls, numerical analysis, experimental research, FRP composites

- **RC Walls Strengthened by FRP composites**

Keywords: reinforced concrete walls, fiber reinforced polymer composites, seismic retrofit, cut-out openings.

- **Protection against corrosion of steel reinforcement in concrete, using porphyrins and metalloporphyrins**

Keywords: porphyrins, corrosion inhibitors, surface nanolayers

- **Composite steel-concrete structures**

Keywords: steel-concrete composite beam, moment resisting frame, stiffness, reinforced concrete

- **Checking the quality of the construction materials using destructive and nondestructive methods**

Keywords: Physico-mechanical materials; concrete;cement; reinforcement; masonry materials.

- **Lab studies concerning the composition of the selfcompacting concrete**

Keywords: Cement; aggregates; additives; technology; physico-mechancial characteristics; optimal composition

- **Multifunctional nanocomposits for advanced materials mavoptel**

Keywords: Multifunctional nanocomposits; supramolecular architectures; optoelectrical, photochemical, electrochemical and biological properties.

- **The durability and strengthening of the existing bridges. Experimental researches on reinforcement and prestressed concreted**

Keywords: concrete bridges; experimental research, concrete, steel reinforcement, technical expertise.

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Researches in *FLEXURAL STRENGTHENING OF RC BEAMS WITH FRPS*

FIELD DESCRIPTION

Behavior of different types of FRP strengthening systems for RC beams.

ACTIVITIES AND RESULTS

The objective of this research was to clarify some aspects regarded to the influence of some special anchorage and there influences to the overall behaviour of the RC beams subjected to flexure. Based on the performed experiment, respectively on the behaviour of the tested specimens, the favourable effects of mechanical as well as chemical anchorage were experimentally demonstrated, both for bottom and laterally applied composites.

RESEARCH TEAM

- Lect. Tamás NAGY-GYÖRGY, PhD
- Prof. Valeriu STOIAN, PhD
- Assoc. Prof. Daniel DAN, PhD
- Dan DIACONU, PhD stud.
- Assist. Cosmin DĂESCU, PhD stud.
- István DEMETER, PhD Stud.
- Codruț FLORUȚ, PhD Stud.

Researches in *STRUCTURAL STRENGTHENING OF RC COLUMNS*

FIELD DESCRIPTION

Behavior of different types of consolidation systems for RC columns.

ACTIVITIES AND RESULTS

- experimental tests undergoing for RC columns strengthened with FRP
- The main objective is to establish the interaction between the components of rehabilitation systems.
- the retrofitting method studied can lead to a significant increase in the ultimate horizontal load.
- the ductility increase ranges between 8.5% and 75% for the monotonically tested specimens and between 26% and 46% in the case of the cyclically tested columns.

RESEARCH TEAM

- Assist. Cosmin DĂESCU, PhD stud.
- Prof. Valeriu STOIAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Assoc. Prof. Daniel DAN, PhD
- István DEMETER, PhD Stud.
- Dan DIACONU, PhD stud.
- Codruț FLORUȚ, PhD Stud.

Researches in *INNOVATIVE STRUCTURAL SYSTEMS USING STEEL-CONCRETE COMPOSITE MATERIALS AND FIBER REINFORCED POLIMER COMPOSITES*

FIELD DESCRIPTION

In the last years, the use of the composite steel-concrete structures extended a lot in common design and practice. This solution is ideal for multistory buildings, which require a higher degree of detailing in common design. Recent earthquakes revealed an inadequate structural behaviour of these types of structures, this meaning that an extensive research program is required in the field of composite elements. This task continues a program of experimental testing on composite steel-concrete joints that have a unique structure. The proposed joints are to be tested for asymmetrical loads. One part of the project will be dedicated for the study of the structural composite steel-concrete shear walls in multistory buildings.

ACTIVITIES AND RESULTS

- research activity in the field of the steel concrete structures, mainly for those placed in seismic area;
- the comparative design of structural joins, both metallic and composite ones.
- numerical analyses for the calibration of experimental elements.
- experimental testing of asymmetrical loaded composite joints.
- comparative study between symmetrical and asymmetrical loaded composite joints.
- numerical analysis and design of the structural composite steel-concrete shear walls.
- experimental testing of the structural composite steel-concrete shear walls.
- rehabilitation of the structural composite steel-concrete shear walls, using composite polymeric materials.
- new innovative solutions for the design of the composite shear walls, using polymeric composites.
- high performance composite joins, made out of polymeric materials.

RESEARCH TEAM

- Assoc. Prof. Daniel DAN, PhD
- Prof. Valeriu STOIAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Alexandru FABIAN, PhD stud.
- Assist. Cosmin DĂESCU, PhD stud.
- Codruț FLORUȚ, PhD Stud.
- István DEMETER, PhD Stud.

Researches in *RC WALLS STRENGTHENED BY FRP COMPOSITES*

FIELD DESCRIPTION

Reinforced concrete (RC) walls, due to their high stiffness, attract significant lateral forces in seismic loading conditions. The shear capacity loss caused by a cut-out opening can be regained through various strengthening solutions. The retrofit technique of externally bonded (EBR) or near surface mounted (NSM) fiber reinforced polymer (FRP) composites represents a novel and efficient method to re-establish and further increase the shear capacity.

ACTIVITIES

Experimental research on precast reinforced concrete wall panels (PRCWP) with cut-out openings strengthened by FRP composites. The research program's objective is to investigate the efficiency of the EBR-FRP strengthening solution applied on RC walls with cut-out openings, subjected to in-plane, cyclic lateral loading conditions.

RESEARCH TEAM

- Prof. Valeriu STOIAN, PhD
- Assoc. Prof. Daniel DAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Assist. Cosmin DĂESCU, PhD stud.
- Dan DIACONU, PhD stud.
- István DEMETER, PhD Stud.
- Codruț FLORUȚ, PhD Stud.

RESULTS

The experimental elements were constructed, experimental test set-up was prepared, a literature review was performed, and analytical and numerical models were established.

Researches in *PROTECTION AGAINST CORROSION OF STEEL REINFORCEMENT IN CONCRETE, USING PORPHYRINS AND METALLOPORPHYRINS*

FIELD DESCRIPTION

The abilities of porphyrins and derivatives to inhibit the steel corrosion are based on their properties to adsorb on the metal surface and to block the access

of aggressive agents, both for the anodic and cathodic reactions. These properties were illustrated by potentiodynamic curves obtained on carbon steel in 1N H2SO4, indicating a decrease of the current in the active region of the anodic polarization curve. The inhibiting effect was verified on steel fibers, directly by determining the mass loss of the metal and indirectly by measuring the hydrogen evolved in the cathodic reaction. The corrosion inhibition was between 35-88%.

ACTIVITIES AND RESULTS

Studies of corrosion inhibition using the polarization curves obtained on the potentiostat. Determination of the corrosion rate by mass loss in different aggressive solutions. Determination of the corrosion rate by measuring the hydrogen volume. Effect of porphyrinic corrosion inhibitors on the adherence of concrete on steel fibers.

RESEARCH TEAM

- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Prof. Corneliu BOB, PhD
- Prof. Iosif BUCHMAN, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Lect. Sorin DAN, PhD
- Lect. Cătălin BADEA, PhD
- Assist. Liana IUREŞ, PhD candidate

Researches in *COMPOSITE STEEL-CONCRETE STRUCTURES*

FIELD DESCRIPTION

Behavior of composite steel-concrete beams part of moment resisting frames placed in seismic areas; assessment of concrete slab behavior.

ACTIVITIES AND RESULTS

- tests on portal frames at full scale, when the reinforcement is changed

RESEARCH TEAM

- Assoc. Prof. Daniel DAN, PhD
- Prof. Valeriu STOIAN, PhD
- Lect. Tamás NAGY-GYÖRGY, PhD
- Alexandru FABIAN, PhD stud.
- Assist. Cosmin DĂESCU, PhD stud.
- Codruţ FLORUŢ, PhD Stud.
- István DEMETER, PhD Stud.

Researches in *CHECKING THE QUALITY OF THE CONSTRUCTION MATERIALS USING DESTRUCTIVE AND NONDESTRUCTIVE METHODS*

FIELD DESCRIPTION

Quality verification of: concrete, road concrete, cement, reinforcement, ceramic materials-delivered by different contractors

ACTIVITIES AND RESULTS

Establishing the density and resistances of concretes

-Establishing the physico-mechanical characteristics of cements

-Establishing of mechanical characteristic of the reinforcement

-Establishing the density and compression resistances of the ceramic elements for masonries

Supplying testing certificates for the tested characteristics to the contractors (The “Holcim” concrete station , SC Cristian Andronic Timisoara and others).

RESEARCH TEAM

- Prof. Iosif BUCHMAN, PhD
- Lect. Cătălin BADEA, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- M. Boabes
- I. Mihalache

Researches in *LAB STUDIES CONCERNING THE COMPOSITION OF THE SELFCOMPACTING CONCRETE*

FIELD DESCRIPTION

Lab testing of many different compositions of selfcompacting concrete in order to find the optimal compositions

ACTIVITIES AND RESULTS

The testing of different compositions of selfcompacting concretes;

- Characteristics’ verification;

-Establishing the optimal compositions

Establishing the optimal compositions in the CEEX where the research team acts as a partner

RESEARCH TEAM

- Prof. Corneliu BOB, PhD
- Prof. Iosif BUCHMAN, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Lect. Cătălin BADEA, PhD
- Assist. Liana IUREŞ, PhD candidate

Researches in *MULTIFUNCTIONAL NANOCOMPOSITS FOR ADVANCED MATERIALS MAVOPTEL*

FIELD DESCRIPTION

Nanocomposits based on supramolecular architectures with optoelectric, photochemical, electrochemical and biological properties are studied- forerunners for the advanced materials MAVOPTEL.

ACTIVITIES AND RESULTS

Theoretical studies and experimental research concerning in the field of nanocomposits for advanced materials MAVOPTEL. The goals of a CEEX where the research team acts like a partner have been accomplished.

RESEARCH TEAM

- Assoc. Prof. Gheorghe FĂGĂDAR, PhD
- Prof. Iosif BUCHMAN, PhD

- Lect. Cătălin BADEA, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Prof. Corneliu BOB, PhD
- Assist. Liana IUREŞ, PhD candidate
- Lect. Sorin DAN, PhD

Researches in *THE DURABILITY AND STRENGTHENING OF THE EXISTING BRIDGES. EXPERIMENTAL RESEARCHES ON REINFORCEMENT AND PRESTRESSED CONCRETED*

FIELD DESCRIPTION

Non-destructive tests realized on infrastructure and structure of concrete bridges. Technical expertise realized on reinforcement and prestresed concrete bridges

ACTIVITIES AND RESULTS

Research contract to made non-destructive tests on concrete from infrastructure and structure of 3 (three) concrete bridges which are existing on national roads from west country.
Research contract to elaborated 10 (ten) technical expertise regarding roads on national roads from west country

RESEARCH TEAM

- Prof. Cornel Jiva, PhD
- Assoc. Prof. Eugen JEBELEAN, PhD
- Lect. Cătălin BADEA, PhD

RESEARCH PROJECTS

1. COST International Project: *Sustainability of Constructions. Integrated Approach to Life-time Structural Engineering*, Director: Prof. Valeriu STOIAN
2. CEEX National Project: *Innovative Solution for Optimisation of Self-Compacting Concrete Composition for Performance Using at Prefabricated Concrete Elements - SICOBET*, Director: Prof. Corneliu BOB
3. CEEX National Project: *Multifunctional Nanocomposites Based on Supramolecular Architectures Having Optoelectronic, Photochemical, Electrochemical and Biologic Properties – Precursors for Advanced Materials - MAVOPTEL*, Director: Assoc. Prof. FĂGĂDAR-COSMA G.
4. CEEX National Project: *Advanced Systems for Strengthening Reinforced Concrete Structural Elements as Beams, Columns, Walls and Slabs Using Fibre Reinforced Polymer Composite Materials*, Director: Lect. Tamás NAGY-GYÖRGY
5. CNCSIS National Grant: *Strengthening Reinforced Concrete Structural Walls and Slabs with Cut-Out Openings Using Fiber Reinforced Polymer Composites*, Director: Prof. Valeriu STOIAN

PUBLICATIONS

BOOKS

1. T. Clipii, V. Stoian, D. Pintea, L. Fekete-Nagy, G. Sas; *Calculul elementelor din beton armat. Metode clasice si alternative (Reinforced concrete elements calculation. Clasic and alternative methods)*; Editura Orizonturi Universitare; Timisoara
2. E. Jebelean, *Materials and technologies*, Orizonturi Universitare, Timisoara, 2007, 284 pag.
3. D. Vlascici, E. Fagadar-Cosma, O. Bizerea, A. Chiriac, Gh. Fagadar-Cosma, *Elemente de teoria si aplicatiile porfirinelor*, Ed. Universitatii de Vest, Timisoara 2006, 135 p., ISBN (10): 973-125-008-5, ISBN (13): 978-973-125-008-3

PUBLISHED PAPERS

1. C. Bob, S. Dan, C. Badea, Liana Iureş, A. Gruin, *Life assessment and structural rehabilitation for extreme actions*, FIB Symposium - Concrete Structures-Simulators of Development, May 20-23, pag. 747-754, Dubrovnik, Croatia, 2007, ISBN 978-953-95428-3-0
2. I. Buchman, C. Badea, G. Fagadar, *Shrinkage and chemical resistance of industrial special concrete*, Timis Academic Days, Composite Materials, elements and structures for construction, 24-25 May, Timisoara, pag. 25-28, 2007, ISSN 1843-0910
3. S. Dan, C. Bob., C. Badea, A. Gruin, *Efficient techniques for strengthening of masonry structures*, Timis Academic Days, Composite Materials, elements and structures for construction, 24-25 May, Timisoara, pag. 81-88, 2007, ISSN 1843-0910
4. C. Enuica, C. Bob., S. Dan, C. Badea, Liana Bob, *Behaviour of reinforced concrete columns strengthened by jacketing*, Timis Academic Days, Composite Materials, elements and structures for construction, 24-25 May, Timisoara, pag. 81-88, 2007, ISSN 1843-0910
5. L. Iureş, C. Bob, C. Badea, I. Buchman, E. Jebelean, D. Sorin, *Test regarding the self-compacting concrete*, Timis Academic Days, Composite Materials, elements and structures for construction, 24-25 May, Timisoara, pag. 275-284, 2007, ISSN 1843-0910
6. I. Buchman, L. Iureş, C. Badea, *Reactive powder concretes for army structures and*

equipment, Conferinta Stiintifica Internationala, a XII-a Editie "Organizatia bazata pe cunoastere", 11-14 Iunie 2007, Sibiu

7. C. Badea, F. Balcu, I. Buchman, S. Dan, L. Iures, *Experimental researches regarding the use of fly ash to roads*, Proceedings of the IXth International Symposium, Timisoara 2007, ISSN:1843-6609
8. C. Badea, C. Bob, F. Balcu, I. Buchman, S. Dan, *Experimental study regarding the accelerated carbonation of concrete*, Proceedings of the IXth International Symposium, Timisoara 2007, ISSN:1843-6609
9. I. Buchman, G. Fagadar, C. Badea, *Obtinerea si unele caracteristici ale betoanelor de inalte si ultra inalte performante*, Simpozion International „Betoane de inalta si foarte inalta rezistenta", 24-25 mai, Bucuresti, pag. 55-66, ISBN 978-973-755-202-2, 2007
10. V. Stoian, T. Clipii, D. Pintea, *Reinforced concrete elements design using alternative methods*; Proceedings of the International Conferince Precast Reinforced Concrete Structures in Central & Eastern Europe; Cluj_Napoca
11. V. Stoian, T. Clipii, D. Pintea, *Numerical applications of the strut-and-tie method*; Proceedings of the International Symposium Composite Materials, Elements and Structures for Construction; Timisoara
12. Demeter, I. *Short history of large panel structures in Romania*, Scientific Bulletin of the Politehnica University of Timişoara, Vol. 51(65), No. 1, 87-94.
13. Demeter, I., Nagy-György, T., and Stoian, V. *Strengthening methods of RC walls with externally bonded fiber reinforced polymer composite materials. Literature review of experimental researches*, Proc. Composite Materials, Elements and Structures for Construction, UPT Civil Engineering Department, 95-106.
14. Demeter, I., Nagy-György, T., and Stoian, V. *Experimental program description concerning the strengthening and seismic retrofit of RC wall panels with cut-out openings using FRP composites*, 11th International Conference of civil Engineering and Architecture, EMT
15. G. Făgădar-Cosma, E. Făgădar-Cosma, I. Popa, I. Tăranu, *Electrochemical and Spectroscopic Studies of 5,10,15,20-Tetrakis(4-hydroxyphenyl)-21H,23H-porphine* Chem. Bull. "POLITEHNICA" Univ. (Timişoara) - in print
16. C. Jiva, E. Jebelean, *Determinări asupra betoanelor şi armăturilor la podurile existente în exploatare*, Timis Academic Days, Timisoara, 10th Edition, 25-26 May 2007, "Infrastructuri eficiente pentru transporturi terestre", Solness Publish House, Timisoara 2007, ISBN 978-973-729-101-1
17. C. Jiva, D. Nita, *Traversarea caii ferate Bucuresti-Arad pe DN 7 la Arad*, Timis Academic Days, 10th Edition, 25-26 May 2007, "Infrastructuri eficiente pentru transporturi terestre", Solness Publish House, Timisoara 2007, ISBN 978-973-729-101-1
18. C. Jiva, H. Simion, P. Zglimbea, *Starea tehnica a podurilor pe reteaua drumurilor nationale administrate de D.R.D.P. Timisoara*, Timis Academic Days, 10th Edition, 25-26 May 2007, "Infrastructuri eficiente pentru transporturi terestre", Solness Publish House, Timisoara 2007, ISBN 978-973-729-101-1
19. C. Jiva, *Starea tehnica a podurilor de pe reteaua drumurilor nationale administrate de D.R.D.P. Timisoara*, Road and Bridge from Romania, no. 45(114). A.P.D.P. Romania, Published by Road and Bridge Media, Romania, ISBN 1222-4235
20. D. Dan, V. Stoian, T. Nagy, C. Dăescu - *Tentative approach for the design formula of steel concrete composite joint*, 9th Internatonal conference on Steel, Space & Composite Structures, Yantai –Beijing, China 2007, ISBN 978-981-05-7589-0, P525-533
21. D. Dan, V. Stoian, T. Nagy, C. Dăescu - *Composite joint for buildings placed in seismic areas theoretical and experimental studies*, 9th Internatonal conference on Steel, Space & Composite Structures, Yantai, Beijing, China, ISBN 978-981-05-7589-0
22. D. Dan, V. Stoian, T. Nagy-Gyorgy, C. Daescu, D. Pavlou, *Numerical analysis and experimental studies on welded joint for buildings*, 3rd WSEAS Int. Conference Applied and Theoretical Mechanics, 572 – 664, Tenerife 2007
23. Marina Lute, V. Stoian, *Principii de armare a placilor din beton armat in zone ce apartin grinzilor compozite otel – beton*, Timis Academic Days, X-th edition, 2007
24. Marina Lute, Agneta Tudor, *Composite steel-concrete beams. Comments on concrete behaviour*, International Symposium Interdiscilpinary Regional Research ISIRR-2007, Novi-Sad, 2007
25. A. Florea, D. Popescu, *Dispersed concrete reinforced with steel fibers*, Timis Academic

Days, X-th edition, Timişoara, ISSN 1843-0910

26. Dăescu C., Nagy-György T., Stoian V., Dan D., *Studiul teoretic şi experimental asupra ductilităţii stâlpilor de beton armat consolidaţi cu materiale composite*, Composite Materials, Elements and Structures for Construction - International Symposium, Timisoara, 2007, ISSN 1843-0910
27. Nagy-György T., Stoian V., Dan D., Dăescu C., Diaconu D., Moşoarcă M., *Seismic retrofit of masonry and RC elements with FRP composites – research and application*, ISSR07, Bucharest, 2007, ISBN 978-973-638-312-0
28. Nagy-György T., Dăescu C., Diaconu D., Stoian V., Sas G., Dan D., *Prestressed concrete beam support zone strengthened with composites – Experimental results*, Int. Conference on Civil Engineering and Architecture - EPKO 2007, Miercurea Ciuc, 2007, ISSN 1843-2123
29. Diaconu D., Stoian V., Nagy-György T., Dan D., Dăescu Al. C., Demeter I., *FRP bars application in construction area*, Composite Materials, Elements and Structures for Construction - International Symposium, Timisoara, 2007, ISSN 1843-0910
30. Ianca S., Nagy-György T., Diaconu D., Dăescu C., *Influenţa tehnologiei de reabilitare asupra rigidităţii elementelor din zidărie*, Composite Materials, Elements and Structures for Construction - International Symposium, Timisoara, 2007, ISSN 1843-0910
31. Floruţ S. C., Nagy-György T., Stoian V., *RC slabs strengthened with externally bonded FRP composite materials - Literature review*, Composite Materials, Elements and Structures for Construction - International Symposium, Timisoara, 2007, ISSN 1843-0910
32. Dăescu C., Nagy-György T., Stoian V., Dan D., *Studiul teoretic şi experimental asupra ductilităţii stâlpilor de beton armat consolidaţi cu materiale compozite*, Composite Materials, Elements and Structures for Construction - International Symposiunm, Timisoara, 2007, ISSN 1843-0910
33. Nagy-György T., Stoian V., Dan D., Dăescu C., Diaconu D., Sas G., Moşoarcă M., *Research Results on RC Walls and Dapped Beam Ends Strengthened with FRP Composites*, FRPRCS-8, Patras, Greece, July 16-18, 2007, ISBN 978-960-89691-0-0, pp.320-322
34. Nagy-György T., Stoian V., Diaconu D., Dăescu C., Dan D., Sas G., Moşoarcă M, *Pereţi din beton armat şi capete de grinzi consolidate cu materiale compozite – rezultatele încercărilor*, Bulletin AICPS, 1/2007
35. Nagy-György T., Dan D., Stoian V., Dăescu C., Diaconu D., Floruţ C., *RC beams and columns retrofitted with FRP composites – Experimental Investigations*, 3rd WSEAS International Conference MECHANICS'07, Tenerife, Spain, 2007, ISBN 978-960-6766-19-0, ISSN 1790-2769, p112-117.
36. Dan D., Nagy-György T., Stoian V., Moşoarcă M., Pavlou D., *Experimental Study on Reinforced Concrete Shear Walls Retrofitted with CFRP Composites*, Computational & Experimental Analysis of Damaged Materials, Transworld Research Network, Kerala, India, 2007, ISBN 987-81-7895-308

PhD THESIS

1. LUTE Marina: *Contribution to composite steel-concrete structures design and composition*. PhD advisor: Prof. Stoian V.
2. DĂESCU Cosmin: *Rehabilitation of structural elements using composite materials*. PhD advisor: Prof. Stoian V.
3. DEMETER István: *RC walls strengthened by FRP composites*. PhD advisor: Prof. Stoian V.
4. FABIAN Alexandru: *Contribution to the calculus of the structural composite steel-concrete shear walls with rigid reinforcement*. PhD advisor: Prof. Stoian V.

CERTIFIED LABORATORIES

REINFORCED CONCRETE LABORATORY

- Tests concerning behaviour of the reinforced concrete and prestressed elements and structures under service loads
- Tests concerning durability of concrete and/or prestressed elements.

MATERIALS LABORATORY

- Tests concerning mechanical, physical and chemical characteristics of building materials (building stone, sand and aggregates, mineral binders, mortars and concretes, bricks and tiles, building timber)
- Non-destructive tests concerning concrete resistances.

BUILDINGS LABORATORY

- Tests concerning the thermal conductivity of building materials and thermal insulation materials.

FURTHER DEVELOPMENTS

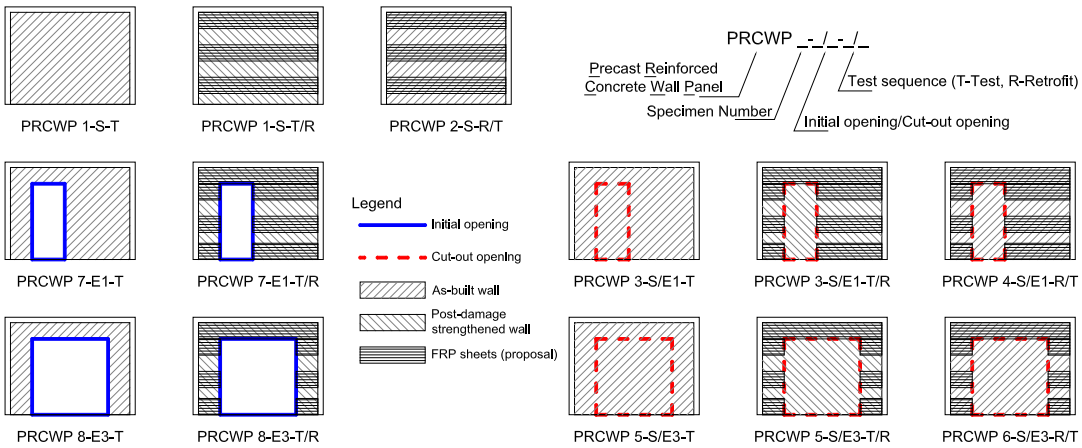
- In the field of construction materials will be developed new materials like high performance concrete, high performance concrete additives,

fly-ash, phosphogypsum, self-compacting concrete, etc.

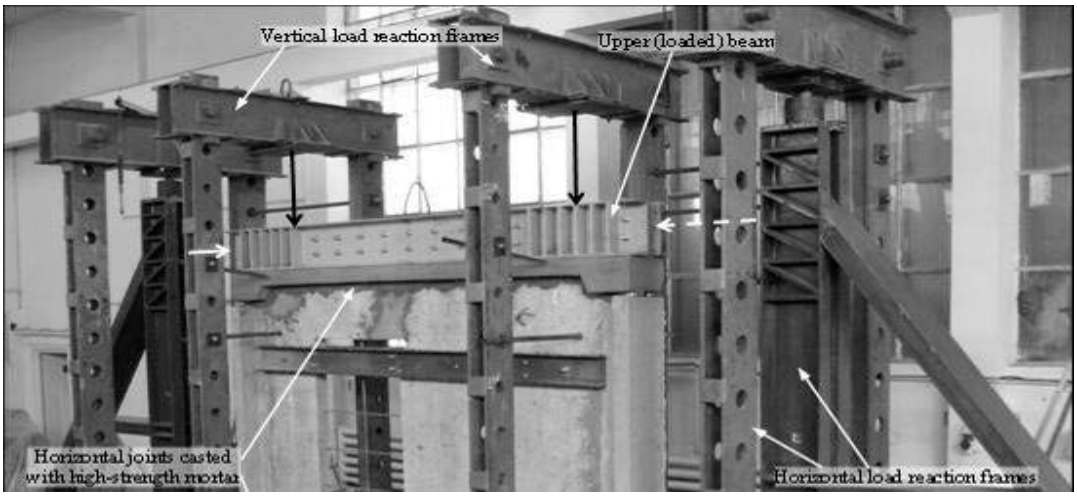
- In the field of structural rehabilitation of reinforced concrete and masonry structures new modern and efficient solutions are studied, tested and used in practice
- Behaviour and rehabilitation of masonry shear walls at seismic actions will be developed and new solutions will be studied
- New alternative methods for design of reinforced concrete structural elements are developed and proposed for different reinforced concrete structural elements
- Further optimization of composite steel-concrete building structures in seismic area will be performed
- Non-destructive research on concrete and steel reinforcement of structure and infrastructure bridges
- Bridges technical expertise
- Concrete dispersed reinforced with short fibers.

REMARKABLE ACHIEVEMENTS

1. **Precast RC wall panels with cut-out openings strengthened by FRP composites** – Ongoing research

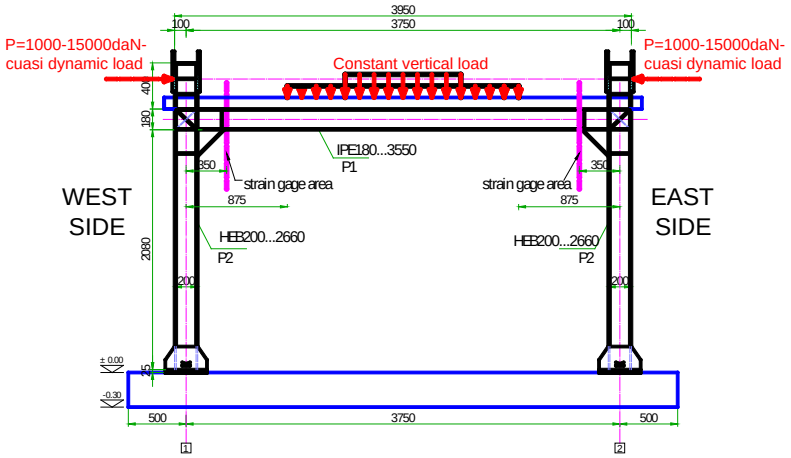


Experimental specimens



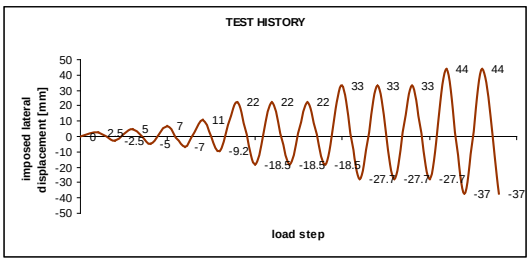
Experimental test set-up

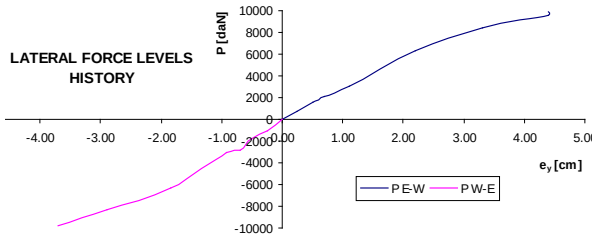
2. Composite steel-concrete structures



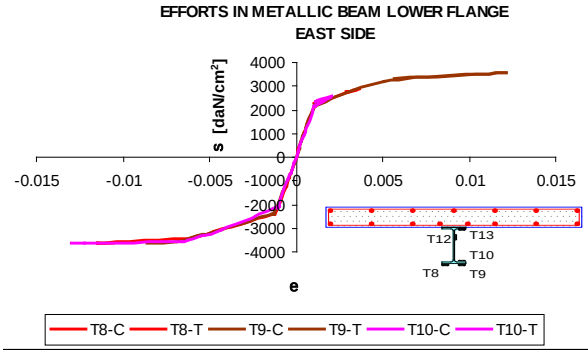
Stand design

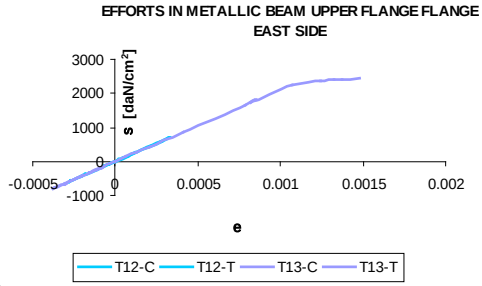
Photo during test

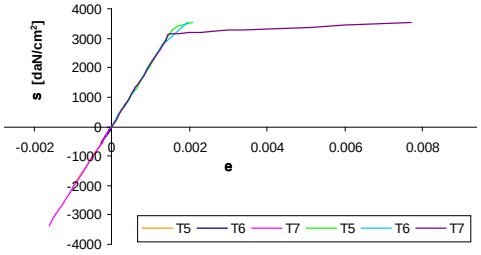




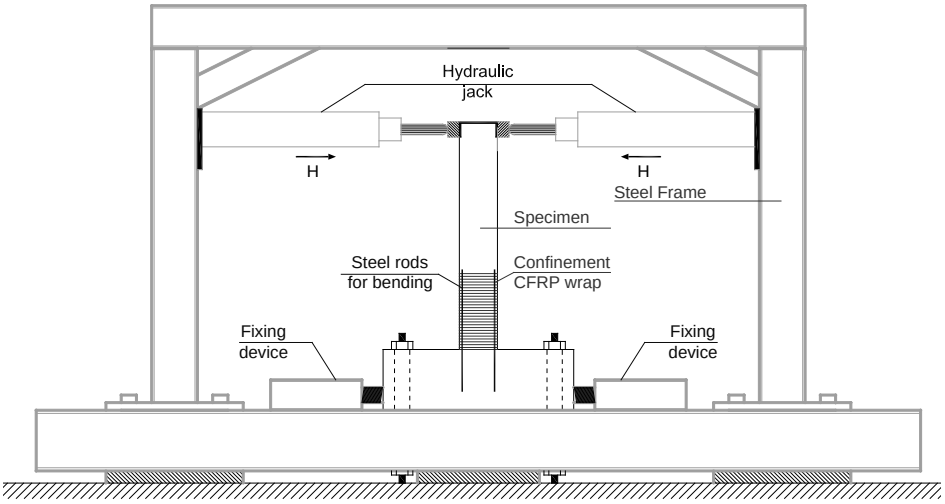
Load Cycles with corresponding lateral displacements



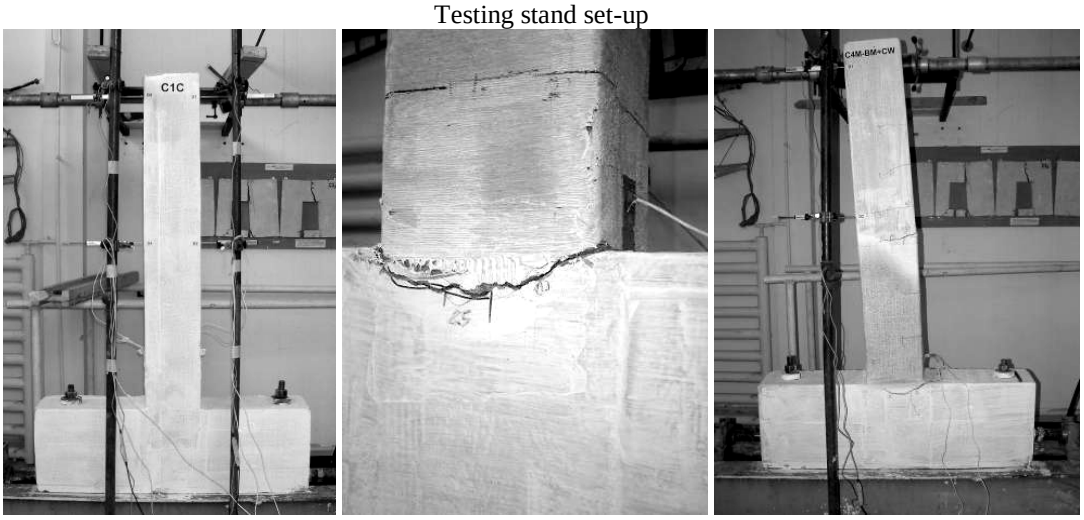




3. Structural strengthening of RC columns



Testing stand set-up



Tested elements

RESEARCH CENTRE FOR BUILDING SERVICES

GENERAL PRESENTATION

In the Department of Building Services is functioning the Research Center for Building Services (CCIC), approved by CNCSIS in the year 2001 (certify with the number 57/CC-C) and the National Building Services Laboratory, abilities by MLPAT (authorization number 1019.04.08/2006) to effect technical agreements for products, proceeds and equipments for building services.

The Research Center for Building Services is structured in three compartments: *Sanitary Installations and Gases* (coordinator Prof. Dr. eng. Adrian Retezan), *Thermal Installations* (coordinator Prof. Dr. eng. eur. eng. Ioan Sârbu), *Electrical Installations and Automation* (coordinator Prof. dr. eng. Ioan Borza).

OBJECTIVES

The objectives of CCIC are the improvement of the complex specialization activities for building services, contributing with the obtained results to their perfection/modernization, efficiencies, renewing and to raise the qualification level of their members.

MAIN RESEARCH FIELDS

- ambient comfort

Keywords: comfort, heating, ventilation, water supply, electrical energy, temperature, humidity, air velocity

- buildings energy

Keywords: energy economy, energy management, heat transfer, buildings envelop, installations

systems, certification energetically audit, thermal rehabilitation

- reducing energetically consumptions and looses in the transport and distribution systems of water and thermal energy

Keywords: pipes, networks, hydraulic analysis, dimensioning, optimization, numerical modeling and simulation, recovery systems

- utilization of renewable energy resources

Keywords: unconventional energies, solar energy, thermal energy

- computational methods, computer assisted design

Keywords: numerical simulation, dimensioning programs, planning methods, energetically analysis's

- technical agreements for installations

Keywords: components, technical agreement, heating systems, cooling systems, lightening, water distribution

ACTIVITIES

- Tests and proofs for sanitary, heating, ventilation, conditioning, cooling and electrical installations, based on collaboration contracts with firms in this domain
- Tests and elaborate of documentation in order to obtain the technical agreements for products and equipments for installations
- Initialization and sustaining a program for preparing specialists to by authorized auditors in buildings energy
- Organizing the conference with international participation "Building Services and Ambient Comfort"
- Participation to national and international scientific manifestations

RESULTS

RESEARCH PROJECTS/CONTRACTS

1. Contract no. 666 / 2007, *Fez ability study in order to modernize the public lightening system in Ludus town,* Beneficiary: Town hall of Ludus, 8,375 RON
2. Contract no. 697 / 2007, *Fez ability study in order to modernize the public lightening system in Brad town,* Beneficiary: Town hall of Brad, 6,512 RON
3. Contract no. 736 / 2007, *Elaboration of the fez ability study, of technical project and execution details for thermal rehabilitation of two bloc of flats placed in Resita,* Beneficiary: Town hall Resita, 120,000 RON
4. Contract no. 770 / 2007, *Assistance, specialty consultancies and effectuations of pressure proofs for heating-, sanitary- and gas installations,* Beneficiary: INSTGAT Timisoara, Value: 5,712 RON
5. Contract no. 1639 / 2007, *Elaboration of the fez ability study for realizing the canalization network and filtering station in the Carand commune,* Beneficiary: Town hall of Carand, District Arad Value: 38,437 RON
6. Contract no. 0406 / 2007, *Professional perfecting program of engineers for building services, in order to obtain the certification as energetically auditor in buildings,* Beneficiary AIIR Timisoara, Value: 6,400 RON

BOOKS

1. Retezan, A., Sârbu, I., Borza, I., Cinca, M. (ed.) Proceedings of the International Conference "*Building Equipment and Ambient Comfort*", Politehnica Publishing House, Timişoara, 2007, ISBN 973-625-305-8, 528 pages
2. Sârbu, I., Kalmar, F., Cinca, M. *Thermal building equipment,* Ed. „Politehnica" Timişoara, 2007, ISBN 978-973-625-529-8, 330 pages
3. Bancea, O., Dorhoi, S. *Buildings ventilation and air conditioning,* Ed. "Politehnica" Timişoara, 2007, ISBN 978-973-625-451-2, 150 pages

PUBLISHED PAPERS

1. Sârbu, I., Ceausescu, I., *Model for thermal comfort evaluation in buildings,* Tehnica instalaţiilor nr.2(43), 2007, ISSN 1582-6244, pp. 20-24
2. Sârbu, I., Popină, O., *Economical-energetically efficiency of heating systems,* Tehnica instalaţiilor nr.2(43), 2007, ISSN 1582-6244, pp. 26-28
3. Sârbu, I., Ostafe, G., *Optimal design of complex supply networks,* Hidrotehnica nr. 4-5, 2007, ISSN 0439-0962, pp. 31-37
4. Sârbu, I., Ostafe, G., *Dynamic simulation of water distribution networks,* Hidrotehnica nr. 41-2, 2007, ISSN 0439-0962, pp. 20-28
5. Cinca, M., *Devices for thermal energy prices distribution,* Tehnica instalatiilor nr. 7, 2007, ISSN 1582-6244, pp. 27-28
6. Iosif, A., Sârbu, I., *Numerical simulation of hydrodynamic field from pump-turbine runner,* Fifth Intern Symposium on Environmental Hydraulics, 2007, Tempe Arizona, SUA, 2-4 Dec., pp. 56-62
7. Bancea, O., Cinca, M., *Criterions for heating system choose,* International Conference

”Building installation and ambient comfort” Timisoara, 2007, pp. 12-20

8. Dorhoi, S., Bancea, O., *Ventilation for comfort with heat recovering and low energy consumption*, International Conference ”Building installation and ambient comfort” Timisoara, 2007, pp. 136-142
9. Sârbu, I., Ostafe, G., *Optimization model of complex water distribution systems*, Fifth Intern Symposium on Environmental Hydraulics, 2007, Tempe Arizona, SUA, 2-4 Dec., pp. 112-120
10. Sârbu, I., Popină, O., *Dimensioning of the length for vertical ground heat exchanger associated with a heat pump in closed circuit*, International Conference ”Building installation and ambient comfort” Timisoara, 2007, pp. 213-224
11. Brata, S., *Analogical electrical modeling of heat transfer in unidirectional stationary state*, International Conference ”Building installation and ambient comfort” Timisoara, 2007, pp. 7-11
12. Iosif, A., *Numerical solution of liquid flow in radial separator using the method of dual reciprocity*, International Conference ”Building installation and ambient comfort” Timisoara, 2007, pp. 259-268
13. Retezan, A., Dorhoi, S., Dobosi, I., *The duality comfort- energetically consumption*, Conference “Building installation and energy economy” Iasi, 2007, pp. 123-143
14. Dobosi, I., Retezan, A., Duna, St., *Limits of adaptive temperature – estimation of buildings performance regarding the interior climate*, Conference “Building installation and energy economy” Iasi, 2007, pp. 20-27

CERTIFIED LABORATORY

National Building Services Laboratory, abilitated by MLPTL (authorization number 1019.04.08 / 2006)

PhD RESEARCH ACTIVITIES

1. *Prof.dr.eng.eur.eng. Ioan SÂRBU*, supervisor in the field of *Civil Engineering*

PhD students:
- Oana POPINA: *Modeling and optimization of thermal systems in civil buildings in order to reduce energy consumption*
- Horea BURA: *Study, research an optimizing of installations using heat pumps for energetically efficient buildings*

2. *Prof.dr.eng. Ioan BORZA*, supervisor in the field of *Civil Engineering*

PhD students:
- Florin LĂCĂTUŞ: *Optimizations of energetically consumption for building services with high comfort degree*
- Remus FILIP: *Contributions to the studies for the utilization of renewable energies in building installations*

3. *Prof.dr.eng. Adrian RETEZAN*, supervisor in the field of *Civil Engineering*

PhD students:
- Simona BĂDĂLUŢĂ: *Contributions for estimating water quality evolution in the water supply systems*
- Mariana GAVRIŞ: *Contributions for the study and optimizing hydraulic installations fiability for the urban sewerage systems*

FURTHER DEVELOPMENTS

- to continue solving some research and designing themes, as well as with national research institutions and through collaborations with companies from our country
- realization of the research program “Annual energetically consumptions of heating, cooling and warm water supply in buildings” included in the professional – scientific collaboration program with U.T.E. Budapest
- creation of informatics system of type Internet at surrounding level and of some expert systems in the domain of installations for buildings, that will allow to promote specific information’s for Romania and for countries that use already this systems development, complete and modernizing of the research base in order to achieve increased perform ability and competitively.

RESEARCH TEAM

- Prof. dr. eng. Adrian Retezan: *Ambient comfort, Water treatment, Environment protection*
- Prof. dr. eng. eur. eng. Ioan Sârbu: *Buildings energy, Energy economy, Optimization, modeling and numerical simulations*
- Prof. dr. eng. Ioan Borza: *Electrical installations, Lightening systems, Energy economy*
- Prof. dr. eng. Dumitru Podrumar: *Thermal comfort, Energetically balances, Unconventional energies*
- Assoc. prof. dr. eng. Olga Bancea: *Thermal comfort, Modern air conditioning systems, Unconventional energies*
- Assoc. prof. dr. eng. Silviana Brata: *Thermotechnique for installations and buildings, Buildings energy, Hydraulic for thermal network*
- Assoc. prof. dr. eng. Mihai Cinca: *Thermal comfort, Heat recovering in industrial processes, Applications for informatic calculus*

- Lecturer dr. eng. Anton Iosif: *Hydraulic, Air and water pollution reducing systems, Numerically models and simulations*
- Assist. eng. Ladislau Kardos: *Water and heat supply of buildings, Water treatment, Environment protection*
- Assist. eng. Gabriel Ostafe: *Thermo technique for installations and buildings, Energy economy*
- Prep. eng. Cristian Păcurar: *Optimizing the heating systems, Energy management in buildings*
- Prep. eng. Florin Lăcătuș: *Electrical installations, Lightening systems*

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RESEARCH TEAM: GEOTECHNICAL ENGINEERING

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- Studies and research regarding investigation of ground in laboratory and site

Keywords: laboratory device, data processing, geotechnical investigation

- Studies and research concerning isolation and protection solutions for buildings against vibrations transmitted by the soil

Keywords: isolation, buildings, vibration, soil

- Studies regarding slipping processes of soil massifs and consolidation solutions

Keywords: instability, site investigation, consolidation methods

- Execution technologies of foundation works based on vibration technique, horizontal drilling

Keywords: under-crossing, drilling, vibration technique

MAIN ACTIVITIES

- Investigation of the foundation ground and verification of the fills compaction
- Exploitation of some industrial wastes in constructions.

Researches in *INVESTIGATION OF THE FOUNDATION GROUND AND VERIFICATION OF THE FILLS COMPACTION*

FIELD DESCRIPTION

Except studies and laboratory tests, for geotechnical investigation works, there have been applied some efficient techniques of “in situ” investigations like: dynamic penetration, cone penetration, load plate tests and so on.

ACTIVITIES

- Geotechnical investigations were carried out for establishing the foundation conditions for constructions on difficult soils
- Verification of the quality of the compaction for fills under floors
- Construction and rehabilitation of the roads

RESEARCH TEAM

- Prof. dr. eng. Virgil HAIDA: *Foundations in special conditions*
- Prof. dr. eng. Agneta GRUIA: *Laboratory and field geotechnical tests*
- Assoc. prof. dr. eng. Petru PANTEA: *Laboratory and field geotechnical tests*

Researches in *EXPLOITATION OF SOME INDUSTRIAL WASTES IN CONSTRUCTIONS*

FIELD DESCRIPTION

The research theme from above pursued the study and determination of the physical and mechanical characteristics of the fly ashes for reducing the pollution of the environment and for using this kind of material in the embankment works.

ACTIVITIES

The laboratory tests carried out on fly ash samples, prepared using different formulas regarding water: fly ash ratio, respectively water; fly ash-clay ratio showed greater resistances of the tested samples. In this manner, the use of these wastes is recommended that have a special efficiency for different construction works, especially for roads.

RESEARCH TEAM

- Assoc. prof. dr. eng. Ion BOGDAN: *Improvement of weak foundation soils*

- Assoc. prof. dr. eng. Ioan Petru BOLDUREAN: *Foundations in special conditions*
- Assist. eng. Alexandra BOLDUREAN: *Laboratory and field geotechnical tests*

RESEARCH PROJECTS

1. *Statical load test on pilots at FNC Vinga placing*, Beneficiary: S.C. CARA S.R.L.. , Value: 5,000 RON Team Assoc. prof. dr. eng. Ion BOGDAN, Assist. Eng.Alexandra CIOPEC
2. *Field and laboratory tests for road structure in Timis county*, Beneficiary S.C. CARA S.R.L. BUCURESTI , Value: 6,900 RON, Team: Assoc. prof. dr. eng. Ion BOGDAN, Assist. Eng.Alexandra CIOPEC
3. *Field and laboratory tests for clinker study at steel factory Otelu Rosu*, Beneficiary: S.C. LINDE GAZ S.R.L., Value: 6,000 RON, Team: Prof. dr. eng. Virgil HAIDA, Tehn. Ana BAICU.
4. *Technical assistance for geotecnical research tests of the foundation soil*, Beneficiary S.C. ATELIER S.R.L. Total value: 4,000 RON, Team: Prof. dr. eng. Virgil HAIDA.
5. *Geotechnical study for bituminous pavements improvement in Archis and Groseni*, Beneficiary: S.C. SEARCH CORPORATION BUCURESTI Value: 6,500 RON, Team: Prof. dr. eng. Virgil HAIDA
6. *Geotechnical study for street rehabilitation in Gataia city*, Beneficiary: S.C. SEARCH CORPORATION BUCURESTI, Value: 7,000 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU
7. *Geotechnical study for comunal streets inprovement in Sandra*, Beneficiary: S.C. SEARCH CORPORATION BUCURESTI, Value: 6,000 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU
8. *Geotechnical study road bypass option Zimandu Nou on DN79*, Beneficiary: S.C. SEARCH CORPORATION BUCURESTI, Value: 3,000 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU
9. *Geotechnical study forcomunal road and streets in Hasmas* Village, S.C. SEARCH CORPORATION BUCURESTI, Value: 5,000 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU
10. *Geotechnical study for comunal streets improvements in Chizatau and Belint*, S.C. SEARCH CORPORATION BUCURESTI, Value: 5,500 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU.
11. *Geotechnical study for modernization DJ609, Cladova–Ohaba Lunga, L=5,8*, S.C. SEARCH CORPORATION BUCURESTI, Value: 5,000 RON, Team: Assoc. prof. dr. eng. Petru MIHU, Assoc. Prof. dr. eng. Tamara MIHU.

PUBLICATIONS

PUBLISHED PAPERS

1. I.P. Boldurean, I. Bogdan, *Pile load test for a fondation solution of an industrial buildings*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 29-35
2. C. Voicu, V. Haida, *Characteristics in causes of the landslide occurred on DN57, km 4+000…4+100*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 35-41
3. A. Ciopec, S. Herban, I.P. Boldurean, I. Bogdan, *Study and monitoring of potential landslides on a national road routing*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 41-47
4. O.Roman, L. Piesz, *Considerations about the seismic hazard in the area of Timisoara*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 51-57
5. P.Mihu, M. Mirea, *Evaluation of liquefaction potential using the cone penetration test*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 57-65
6. A. Ciopec, C. Costescu, *Foundation solution for a demolished preexisting building with basement*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 71-77
7. L.Piesz, A. Roman, *Geosintetics in Construction Engineering*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 77-81
8. M. Mirea, P. Mihu, *The Behaviour in Time of the Vertical Compression or Horizontal Tests for Piles of the Bypass Road of the City of Timisoara*, Scientific Bulletin Civil Engineering, vol. 53 , fasc. 1, pag. 81-93
9. G. Belea, *Testing the Vibrodrilling Installation IVA*, Scientific Bulletin Civil Engineering, vol. 53, fasc. 1, pag. 93-101
10. A. Ciopec, *Adaptation of Road Embankment to the local environment conditions*

PhD STUDENTS

Scientific coordinator: Prof. dr. eng. Virgil HAIDA

1. Eng. Ion Alexandrescu presented the thesis in June 2007: *Contributions concerning the action*

of dynamic solicitations on foundations and foundation ground

2. Eng. Gh. George Daniell Pană presented the thesis in June 2007, *Contributions to the study of vibrating action machines and technologies used for foundation works*
3. Eng. Carmen PEPTAN, *Contributions regarding the study of some efficient foundation systems for special constructions*
4. Eng. Alexandra BOLDUREAN, *Contributions regarding the study of soil slopes stabilization*
5. Eng. Marian Daniel GAINA, *Contributions regarding the study of some efficient technologies of execution for embankments of land communication ways*
6. Eng. Valeria SMARANDA, *Contributions regarding the study of roads stability and resistance in Gorj county*
7. Eng. Aurelian BORDOS, *Contributions regarding the study of behavior in exploitation of slopes on difficult soils*
8. Eng. Ciprian COSTESCU, *Contributions regarding the study of some influence factors upon technical state of roads in Banat area*
9. Eng. Mihaela Cecilia CHEZAN, *Contributions regarding the efficiency of cadastral works in construction field*
10. Eng. Adrian Ciprian MAYER, *Contributions regarding the behavior in time of railway embankments*
11. Eng. Valentin Sorin VLADASEL, *Contributions regarding the study of some consolidation solutions for foundations and foundation ground*
12. Eng. Luiza PIESZ, *Contributions regarding the study of geo-synthetics reinforced embankments stability*
13. Eng. Marius LUCACIU, *Contributions regarding the study of some realization solutions for road structures on difficult soils*
14. Eng. Nicolae Ion BABAUCA, *Contributions regarding the efficiency of survey works in constructions field*

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RESEARCH TEAM: ROADS AND RAILWAYS

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- Study and research concerning the use of local materials in building and maintenance of roads

Keywords: maintenance of roads, building roads, local materials, road structures.

- Study of the operational behaviour of road structures and determination of certain reinforcements or rehabilitation solutions

Keywords: road structures, road investigation, technical condition, index for the technical condition, bearing capacity, dimensioning

MAIN ACTIVITIES

- Investigation of technical condition on the rehabilitated national road sections for assessing the operational behaviour and for determining the possible intervention solutions
- Laboratory tests on different road materials used in building and the maintenance of roads

Researches in *THE INVESTIGATION OF THE TECHNICAL CONDITION ON THE REHABILITATED NATIONAL ROAD SECTIONS FOR ASSESSING THE OPERATIONAL BEHAVIOUR AND FOR DETERMINING THE POSSIBLE INTERVENTION SOLUTIONS*

FIELD DESCRIPTION

The field description follows the determination of the technical condition indices on the investigated sections and of the causes which produced the possible degradations. These data are quantified to determine the efficient intervention solutions.

ACTIVITIES AND RESULTS

The activity of assessing the condition indices is realized every year and the results lead to the evaluation of time interval when the maintenance intervention should be applied.

RESEARCH TEAM

- Prof. dr. eng. Ion COSTESCU: *road materials, realization technologies*
- Prof. dr. eng. Gheorghe LUCACI: *road structures, asphalt mixtures, road maintenance*
- Prof. dr. eng. Florin BELC: *road materials, road structures, operation behaviour*
- Chemist dr. Ileana STELEA: *asphalt mixtures, road investigations, operation behaviour*

LABORATORY TESTS ON DIFFERENT ROAD MATERIALS USED IN BUILDING AND THE MAINTENANCE OF ROADS

FIELD DESCRIPTION

Laboratory tests are realized on different road materials (natural aggregates, binders, asphalt mixtures, cement concrete, cement stabilized aggregates) at the request of road contractors.

ACTIVITIES AND RESULTS

The results are offered to the beneficiaries through test reports and sometimes technical assistance is supplied for improving the site works.

RESEARCH TEAM

- Prof. dr. eng. Ion COSTESCU: *tests on asphalt mixtures and bituminous binders*
- Prof. dr. eng. Florin BELC: *tests on natural aggregates and stabilized materials*
- Lecturer dr. eng. Cornel BANCEA: *tests on stabilized soils and compaction on site*

RESEARCH PROJECTS

1. *Performance bituminous pavements using composite asphalts in order to incris the transport safety*, Beneficiary: AMTRANS BUCURESTI, Value: 20,000 RON, Team: Prof. dr. eng. Florin BELC
2. *Laboratory tests on crushed stones 40 – 63 and for estabilish of the rock rank from stone quarry Pietroasa, jud. Bihor*, Beneficiary: S.C. CONSTRUCT MOD S.RL., Value: 2,800 RON Team: Prof.dr.eng. Florin Belc, Betea S.
3. *Laboratory verifications for phisical – mechanical characteristics of the asphalts used at the experimental section execution*, Beneficiary: CESTRIN BUCURESTI, Value: 22,000 RON, Team: Prof dr. eng. Florin BELC, Prof dr. eng. Gheorghe LUCACI, Prof dr. eng. Ion COSTESCU
4. *Laboratory Test on asphalt samples from DN 57*, Beneficiary: S.C. STAICONS S.R.L., Value: 4,800 RON, Team: Prof dr. eng. Florin BELC, Betea S.
5. *Laboratory tests on natural aggregates and asphalt dosages* Beneficiary: S.C. AXELA CONSTRUCTII S.R.L., Team: Prof dr. eng. Gheorghe LUCACI, Value: 9,120 RON
6. *Tests on asphalt samples* Beneficiary: S.C. TIPA S.R.L. Team: Prof dr. eng. Florin BELC Value: 10,000 RON
7. *Translation adaptation and publishing of the "Road Security Manual"* Beneficiary: CESTRIN Bucuresti, Team: Prof dr. eng. Ion COSTESCU, Assist. Eng. Ciprian COSTESCU, Value : 10,000 RON
8. *Geotechnical studies project for "light bituminous pavements for roads in Timis county"* Beneficiary : S.C. TRISKELE S.R.L., Team: Prof dr. eng. Ion COSTESCU, Value: 3,500 RON
9. *Physical mechanical tests on natural aggregate stabilised with binder materials, asphalts, dosages conceptions for asphalt factories and quality verification for road works realised by Office Construct S.R.L.*, Beneficiary: S.C. OFFICE CONSTRUCT S.R.L., Team: Prof dr. eng. Ion COSTESCU, Assistant Eng. Ciprian COSTESCU, Value : Frame contract
10. *Geotechnical studies project for "street modernisation in Timisoara, Birda, Voiteg"*, Beneficiary: SC TRISKELE S.R.L. Team: Prof dr. eng. Ion COSTESCU, Tehn. D. Cornea, Tehn. I. Cornea, Value: 3,000 RON
11. *Geotechnical studies project for "street improvement in Foeni and Brestovat"*, Beneficiary: S.C. TRISKELE S.R.L., Team: Prof dr. eng. Ion COSTESCU, Tehn. D. Cornea, Tehn. I. Cornea, Value: 3,000 RON
12. *Material study and dosages elaboration for asphalts BA16, BAD25 with natural aggregate*, Beneficiary: Filiala CCCF Timisoara, Team: Prof dr. eng. Gheorghe LUCACI, Value: 4,500 RON
13. *Laboratory Tests on natural aggregates, binders and filer necessary for asphalts; Dosages elaboration and tests on asphalts prepared in laboratory*, Beneficiary: SC SAMCIF S.A. SATU - MARE, Value: 12,500 RON, Team: Lect. Cornel BANCEA, Stefan BETEA
14. *Tests on aggregates*, Beneficiary: S.C. MAMBO UTIL & CONSTRUCT S.R.L. ARAD, Value: 4,000 RON, Team: Prof dr. eng. Ion COSTESCU, Assistant Eng. Ciprian COSTESCU

PUBLICATIONS

PUBLISHED PAPERS

1. I. Costescu, C. Bota, *Asphalt mixtures with polyethylene added bitumen*, UPT Scientific Bulletin, vol. 53 fasc. 1, pag. 5-11

2. C. Costescu, C. Voicu, *Considerations on the consolidation of the road pavement on DJ665*, Scientific Bulletin, vol. 53 fasc. 1, pag. 11-15
3. F. Belc, G. Lucaci, *New trands in road structure compozition*. Scientific Bulletin, vol. 53 fasc. 1, pag. 15-23
4. G. Lucaci, F. Belc, *Considerations concerning the development of the road transportation system in Romania, Scientific Bulletin*, vol. 53 fasc. 1, pag. 23-29
5. A. Herman, *A new calculation method of stability in the joinfree track*, Scientific Bulletin, vol. 53 fasc. 1, pag. 47-51
6. D. G. Pavlou, G. Lucaci, G. Lambeas, F. Belc, F Mavrothanasi, D. Dan, C. Baera, *Numercal solution of cracked bimaterial half – space loaded by a twisted annular rigid stamp, using green's function and bem*, Transwoeld research network 37/661, Fort P.O., Trivandrum – 695023 computational & experimental analysis of damaged materials, pag. 1-16
7. G. Lucaci, F. Belc, R. Radoslav, M. Iuga, I. Malita, D. Suciu, *Integration du reseau routier de la zone metropolitaine de la ville de Timisoara dans le systeme national de transport*, 23rd World Road Congress, Paris, 17–21 sept. 2007, 10 pag
8. G. Lucaci, F. Belc, *Developpment durable et mondialisation les routes maillon de la chaine des transports*, 23rd World Road Congress, Paris, 17–21 sept. 2007, 10 pag
9. F. Belc, *Quality conditions for natural aggregates recommended by the European standards*, Timis Academic Days, 10th edition Timisoara, may 2007
10. F. Belc, *Enviromental protection durable developpment concept*, Timis Academic Days, 10th edition, Timisoara, may 2007
11. I. Costescu, M. Ianosev, S. Lucaci, *Technical solution for rehabilitation works on DN6*, Timis Academic Days, 10th edition, Timisoara, may 2007
12. C. Bancea, M. Golosie, The Environment of Poiana Rusca Mountainous Road Area

PHD STUDENTS

Scientific coordinator: Prof.dr eng. Ion COSTESCU

1. Eng. Horatiu SIMION, *Contributions to the study and application of modern systems for road management and administration*
2. Eng. Marius BANICA, *Contributions regarding the technical state improvement for the roads from Gorj County*
3. Eng Mihaela IOVANOV, *Contributions regarding usage of the efficient technologies for roads realization*
4. Eng Romulus KOMOZ, *Contributions to the improvement of the urban roads management*
5. Eng Liviu TUDOR, *Contributions to the study and realizations of modern technologies for roads building*
6. Eng. Ionut VESA, *Research field: Civil Engineering*

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RESEARCH TEAM: SURVEYING, CADASTRE

GENERAL PRESENTATION

MAIN RESEARCH FIELDS

- **Implementation of modern technologies in Surveying**

Keywords: surveying, modern technologies

- **Modernizing geodetic networks using Global Positioning System (GPS)**

Keywords: geodetic networks, GPS

- **Using Geographic and Land Information Systems (GIS, LIS) for urban development**

Keywords: GIS, LIS, urban

- **Informatization of Cadastral work**

Keywords: cadastre, data basis.

- **Monitoring problems**

Keywords: monitoring.

Researches in
- DEVELOPMENT OF THE ROMANIAN GEODETIC CONTROL NETWORK USING PERMANENT GPS STATIONS
- VIRTUAL REFERENCE STATIONS
- AUTOMATION AND MONITORING LAND MANAGEMENT
- GEODETIC EVALUATION OF CRUSTAL MOVEMENTS IN BANAT AREA

FIELD DESCRIPTION

In order to have a better accuracy and a real evaluation of the geodetic measurements, there have been established a number of permanent GPS stations on different locations on Romanian territory; they provide accurate planimetric and altimetric information, leading to the improvement of the national control network.

With GPS geodesy can be defined the time and locate the area of increased geophysical activity by mapping crustal deformation, seismicity, and other factors. Integration of these spatial data with crustal seismicity, surface geology, and topography through a Geographic Information System (GIS) approach places critical constraints on the geodynamic settings for identifying the distribution, geometry, and type of active crustal faults, for elucidating the spatial relationship between the crustal structures and mantle seismicity.

ACTIVITIES

The measurements are performed in order to increase the reference network for the permanent stations using control points from Timisoara.

These are used for developing cadastral applications, topographic engineering projects, urbanistic evaluation and land management monitoring.

RESEARCH TEAM

- Assoc.prof.dr.eng. Carmen GRECEA
- Lecturer dr.eng. Mihaela STURZA
- Assist.eng. Viorica DAVID
- Lecturer dr.eng. Sorin HERBAN
- Lecturer dr.eng. Cosmin MUSAT
- Assist.eng. Alina BALA

RESEARCH PROJECTS/CONTRACTS

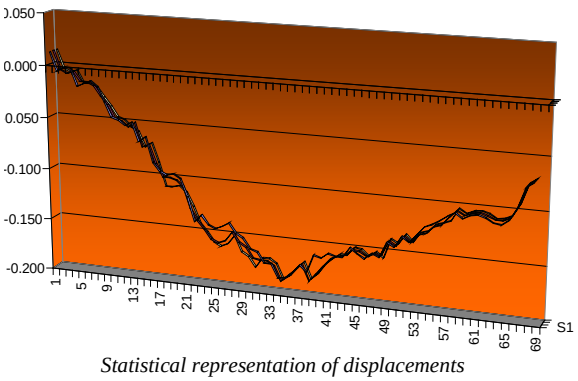
1. Contract no. 674 / 2007, *Studies and researches for cadastral mapping and individual estate management* Beneficiary: Town Hall of Timisoara, Value: 20,000 Lei
2. Contract no. 759, 760, 761 / 2007 – 3 stages, *Cadastral and topographical studies to implement urban masterplan in Dumbravita county* Beneficiary: Privat investor, Value: 4,500 Lei.

CERTIFIED LABORATORY

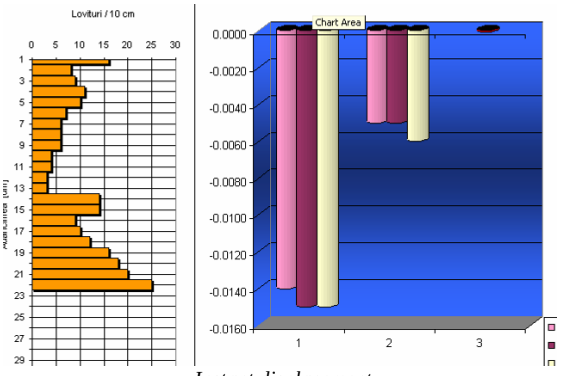
Land Measurement and Cadastre Laboratory, accredited by the National Agency of Cadastre and Real Estate (authorization B nr.289/11.02.2003)

ACHIEVEMENTS AND FURTHER DEVELOPMENT

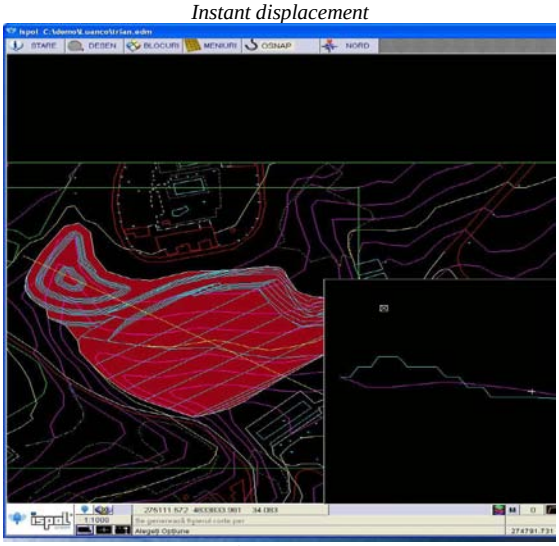
- Monitoring settlements for engineering projects
- Studies and geodetic solutions for future evaluations and monitoring crustal movements in Banat county
- Using GPS virtual stations for improving accuracy in cadastral applications
- Data basis for urban GIS



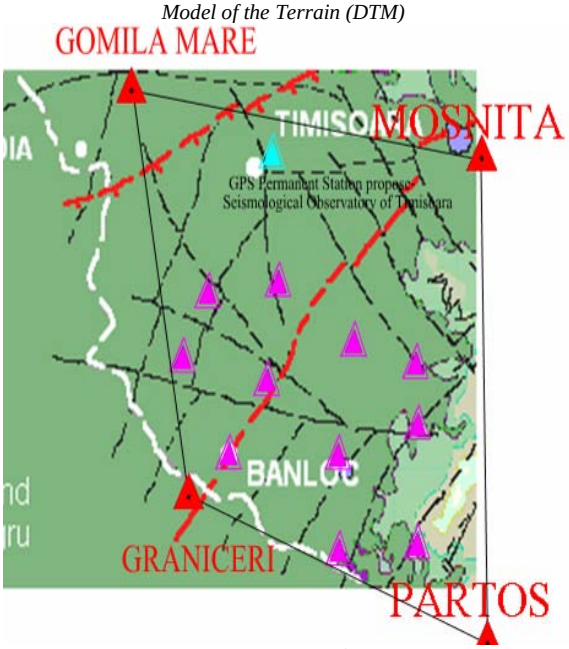
Statistical representation of displacements



Instant displacement



Displacement modeling for risk area represented by Digital Model of the Terrain (DTM)



GPS monitoring network (proposal) of the Banloc seismogenic area

PUBLISHED PAPERS

1. Grecea, Carmen, Bala, Alina, *High Performance Virtual GPS Permanent Station*, International Symposium "GeoCAD 2007", University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 25-31, Journal of Geodesy and Cadastre
2. Grecea, Carmen, *Cadastral Systems, new trends and experiences,* International Symposium "GeoCAD 2007", University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 19-24, Journal of Geodesy and Cadastre
3. Grecea, Carmen, Quality *ISO standards for Engineering Surveying*, Timis Academic Days, 10th Edition, 24 -25 May 2007, pp. 231-238
4. Grecea, Carmen, *Model of ecological and economic spatial analysis of environmental resources exploitation*, International Symposium Craiova, 26 oct. 2007, Annales of the University of Craiova, vol.XII, pp. 357-362
5. Grecea, Carmen, *Aspects of cadastral data processing in Romania,* International Symposium Craiova, 26 oct. 2007, Annals of the University of Craiova, vol.XII, pp. 363-368
6. Grecea, Carmen, Bala, Alina, *Perspective for the development of virtual GPS permanent stations network*, UPT Scientific Bulletin, Transaction on Civil Engineering and Architecture, Timisoara, 2007
7. Sturza, Mihaela, *Cartographical expression in digital cartography*, International Symposium "GeoCAD 2007", University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 105-112, Journal of Geodesy and Cadastre
8. David, Viorica, *The importance of photogrammetry in generating GIS database*, Revista de Geodezie, Cartografie şi Cadastru, Vol. 15, Nr. 1, 2, 2007, Bucharest
9. Bala, Alina, *The intake of virtual GPS reference stations in Romania,* International Symposium Craiova, 26 oct. 2007, Annals of the University of Craiova, vol.XII, pp. 337-340
10. Bala, Alina, *The organization works of keep the mining Cadastre*, International Symposium Craiova, 26 oct. 2007, Annals of the University of Craiova, vol.XII, pp. 341-344
11. Bala, Alina, *The GPS reference station solution to the future Cadastre*, UPT Scientific Bulletin, Transaction on Civil Engineering and Architecture, Timisoara, 2007, pp 135-136
12. Bala, Alina, *The concerning consideration method of measure to the study deformation and movement fields and buildings to the surface mining exploitation E.M.Petrila*, University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 81-86, Journal of Geodesy and Cadastre
13. Herban, Sorin, Musat, Cosmin, *Developing models in the study and the tracking of*

movement and buildings, University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 33-40, Journal of Geodesy and Cadastre

14. Musat Cosmin, Herban Sorin, *Actual status of subsides at sport center hall in city of Craiova*, University "1 Decembrie 1918" Alba Iulia, May 2007, pp. 97-105, Journal of Geodesy and Cadastre

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