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Research
Report 2014

**Research
Annual
Report**

Politehnica
University
of Timisoara
2014

Research
Report 2014

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Structure of the report

Introducing the Report

Research Report 2014

"It's not the walls that make a school, but the spirit living inside."
King Ferdinand I, 1923

The needs for a modern society, in the context of a competitive global market, require highly skilled human resource development. In this context, the role of universities in the innovation process has increased continuously over time because the development of new products or technologies depends increasingly on the findings of scientific research.

The mission of the Politehnica University of Timisoara is to offer nationally competitive and internationally recognized opportunities for Learning, Research, and Innovation at the highest levels of excellence. As a knowledge resource to the public, the university builds partnerships with other educational institutions, community organizations, government agencies, and the private sector to fulfill the requirements for competences of the societal environment through superior professional training for students and graduates.

The present Research Report of Politehnica University of Timisoara gathers the main results obtained through the research activities carried out within the university in 2014, Politehnica being renowned as a remarkable actor on the stage of scientific research, both at national and international level. Our research activity is facilitated by the existence of twenty-five research centres specialized in fields that are capital for the sustainable development of any modern society. Each of these research centres brings together various prestigious researchers, whom, by their effort and vision, provide UPT with the incentives needed to contribute to the progress of our society.

Most of the research activity carried out by our institution is financed through external sources, obtained either from national and international calls for projects, or through agreements with private companies. This represents a confirmation of the superior quality of the research, but also of the prestige and professional deontology of the researchers affiliated to our institution. Politehnica's reputation as an institution of advanced research is emphasized also by the patents obtained by its researchers, by the medals and prizes obtained in both national and international competitions, and by the collaborations with important research centres and institutes from Romania and from abroad.

Each year, we select the most talented young researchers for our doctoral school, providing them with the opportunity to transform their knowledge and ideas into the innovations of tomorrow. Many of them take part in peer learning programs consolidating the relationship between our university and similar partner institutions. They strive for becoming doctors in science and for making the world a better place.

This report is divided into thirteen sections, each one presenting a specific component of the research activity performed within the institution.

In the first section, the research infrastructure is presented, which comprises the twenty-five research centres hosted by the university. The order in which they are presented is given by the research fields. The important number of research centres, respectively teams of researchers constituted ad-hoc, on different themes, successfully put in practice the scientific research strategy of the university, within the framework of numerous grants and contracts won by competition. The results of the research are materialized in papers, patents and products, all bringing for the University prestige, as well as important funds.

The second section of the Research Report is dedicated to the Scientific Excellence Awards. This section has three subsections: the Romanian Academy Awards („Anghel Saligny"Award received by Prof. Dan Dubină, and Viorel UNGUREANU, and „Costin D. Nenițescu"

Award, received by Prof. Daniel HĂDĂRUGĂ, and Geza BANDUR), the IEEE Nikola Tesla Award received by Prof. Ion BOLDEA, and the UEFISCDI Awards granted for eighty-seven scientific papers.

The third and fourth sections include the research projects implemented by the university. The third section includes the projects supported by public funds, both national and international, while the fourth one includes the projects supported by private funds awarded by companies. For the purposes of this report, we have chosen the most relevant projects for our research capacity. Within each section, the projects are arranged by research fields.

The innovative capacity of the University Politehnica Timisoara is supported by teachers and scientific researchers through patents and utility models invented, presented in the fifth section.

Politehnica University of Timisoara recognizes scientific excellence by conferring the honorary degree of Professor Emeritus and Doctor Honoris Causa to distinguished Researchers for their contribution to the development of UPT and continuous support, as is shown in sections six and seven.

Sections eight and nine include habilitation theses and PhD theses held in 2014 in our University.

Section ten presents an overview of the most relevant scientific conferences that brought together professionals from Romania and from abroad, hosting and encouraging the dialogue, exchange of ideas and the opportunity for new collaborations.

The eleventh section gathers the scientific journals that have been edited by our institution. This category includes journals specialized in various fields like computer science, chemistry and environmental engineering, electronics and communications, economics and social sciences, electrical engineering, hydrotechnics, physical education and sport, modern languages etc.

The dissemination of research results and findings is an integral part of the research process and the career in academia. In section twelve are presented the most relevant scientific researches that have been published in 2014, comprising the results obtained by our researchers, papers that obtained recognition from some of the most prestigious journals, both from Romania, and from abroad.

And finally the thirteenth section comprises a collection of books written by our researchers, most of them published under Politehnica Publishing House, but not limited to it.

Through research we generate ideas, through ideas we generate innovation and through innovation we contribute to the improvement of the quality of life; this is why research is our priority.

Research Centres

Research Institute for Renewable Energy
Director: prof. Viorel UNGUREANU
Contact: viorel.ungureanu@upt.ro, www.icer.ro

Research Centre for Computers and Information Technology
Director: prof. Vladimir-Ioan CREŢU
Contact: vladimir.cretu@upt.ro, http://www.cs.upt.ro/~vcretu

Research Centre for Automatic Systems Engineering
Director: prof. Radu-Emil PRECUP
Contact: radu.precup@upt.ro, http://www.aut.upt.ro/centru-cercetare

Research Centre for Power Systems Analysis and Optimization
Director: prof. Ştefan KILYENI
Contact: stefan.kilyeni@upt.ro, http://www.et.upt.ro/index.php?sublink=1694&link=10&pag=2&lang=ro

Research Centre for Smart Energy Conversion and Storage
Director: prof. Nicolae MUNTEAN
Contact: nicolae.muntean@upt.ro, http://www.et.upt.ro/index.php?link=10&sublink=1695&pag=1&lang=en

Research Centre for Intelligent Electronic Systems
Director: prof. Marius OTEŞTEANU
Contact: marius.otesteanu@upt.ro, http://www.ccesi.etc.upt.ro/index.php/ro

Research Centre for Intelligent Signal Processing
Director: prof. Alexandu ISAR
Contact: alexandru.isar@upt.ro, http://www.tc.etc.upt.ro/isprc

Research Centre for Multimedia
Director: prof. Radu VASIU
Contact: radu.vasiu@upt.ro, http://www.cm.upt.ro

Research Centre for Environmental Science and Engineering
Director: prof. Rodica PODE
Contact: rodica.pode@upt.ro, http://www.chim.upt.ro/Facultatea-de-Chimie-Industriala-si-Ingineria-Mediului-Centru__GF.html

Research Centre for Inorganic Materials and Alternative Energies
Director: prof. Ioan LAZĂU
Contact: ioan.lazau@upt.ro, http://www.chim.upt.ro/Facultatea-de-Chimie-Industriala-si-Ingineria-Mediului-Centru_Zx.html

Research Centre for Organic, Macromolecular and Natural Compounds' Chemistry and Engineering
Director: prof. Corneliu DAVIDESCU
Contact: corneliu.davidescu@upt.ro, http://www.chim.upt.ro/Facultatea-de-Chimie-Industriala-si-Ingineria-Mediului-Centru_VT.html

Research Centre for Mechanics of Materials and Structural Safety
Director: prof. Dan DUBINĂ
Contact: dan.dubina@upt.ro, http://www.ct.upt.ro/centre/cemsig/

Research Centre for Hidrotechnics
Director: prof. Teodor Eugen MAN
Contact: eugen.man@upt.ro, http://www.ct.upt.ro/centre/cchpm.htm

Research Centre for Building Services
Director: prof. Ioan BORZA
Contact: ioan.borza@upt.ro, http://www.ct.upt.ro/centre/ccic/

Research Centre for Retrofitting of Constructions
Director: prof. Valeriu STOIAN
Contact: valeriu.stoian@upt.ro, http://www.ct.upt.ro/centre/reco.htm

Research Centre for Construction and Transportation Substructures
Director: prof. Marin MARIN
Contact: marin.marin@upt.ro, http://www.ct.upt.ro/centre/ict/index.htm

Research Centre for Mechatronics and Robotics
Director: prof. Inocenţiu MANIU
Contact: inocentiu.maniu@upt.ro

Research Centre for Medical Engineering
Director: -
Contact: http://cmpicsu.upt.ro

Research Centre for Integrated Engineering
Director: prof. George DRAGHICI
Contact: george.draghici@upt.ro, http://www.eng.upt.ro/imf/ccii/index_en.html

Research Centre for Processing and Characterization of Advanced Materials
Director: conf. Bogdan RADU
Contact: bogdan.radu@upt.ro, http://eng.upt.ro/ccpcma

Research Centre for Complex Fluid Systems Engineering
Director: prof. Romeo SUSAN-RESIGA
Contact: romeo.resiga@upt.ro, http://mh.mec.upt.ro/cnisfc

Research Centre for Thermal Machines and Equipments, Transportation and Environmental Pollution Control
Director: prof. Ioana IONEL
Contact: ioana.ionel@upt.ro, http://mettcp.mec.upt.ro/

Research Centre for Engineering and Management
Director: prof. Monica IZVERCIANU
Contact: monica.izvercianu@upt.ro, http://www.mpt.upt.ro/pag/centru%20cercetare.html

Research Centre for Urban Planning
Director: prof. Radu RADOSLAV
Contact: radu.radoslav@upt.ro, http://ccddt.blogspot.ro

Research Centre for Advanced Study Methods for Physical Phenomena
Director: prof. Dumitru TOADER
Contact: dumitru.toader@upt.ro, http://www.et.upt.ro/etf/index.php?sublink=24&link=2&lang=ro

Scientific Excellence Awards

ANGHEL SALIGNY ROMANIAN ACADEMY AWARD - For the book:
Dubina, D., Ungureanu, V., Landolfo, R. DESIGN OF COLD-FORMED STEEL STRUCTURES

Summary

The book, of more than 650 pages, is concerned with design of cold-formed steel structures in building based, mainly, on the Eurocode 3 package, particularly on EN 1993-1-3. It contains the essentials of theoretical background and design rules for cold-formed steel sections and sheeting, members and connections for building applications. The peculiar behaviour characteristics of thin-walled cold-formed steel sections and their implication in design approaches are emphasised and clearly explained. Both theoretical and relevant technical contributions of the authors are integrated within the book chapters. Elaborated examples and design applications - more than 200 pages, accompanied by design oriented flow charts - are included in the respective chapters in order to provide a better understanding to the reader.

Purpose and Motivation of the book:

The use of cold-formed steel members in building construction began in the 1850s in both the United States and Great Britain. In the 1920s and 1930s, acceptance of cold-formed steel as a construction material was still limited because there was no adequate design standard and there was limited information on material use in building codes. One of the first documented uses of cold-formed steel as a building material is the Virginia Baptist Hospital, constructed around 1925 in Lynchburg, Virginia, USA. 20 years later, only, Lustron Corporation built in Albany, New York, 2500 steel-framed homes, with the framing, finishes, cabinets and furniture made from cold-formed steel. These inexpensive houses were built for the veterans returning from the World War II. This was the beginning of cold-formed steel adventure in building.

In recent years, cold formed steel sections are used more and more as primary framing components. Wall stud systems in housing, trusses, building frames or pallet rack structures are some examples. As secondary structural systems they are used as purlins and side rails or floor joists, as well as in building envelops. Cassette sections in modern housing systems play simultaneously the role of primary structure and envelope. Profiled decking is widely used as basic components in composite steel-concrete slabs.
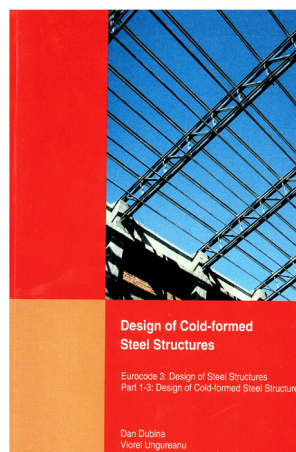
Cold-formed steel members are efficient in terms of both their stiffness and strength. Additionally, because the base steel is thin, even less than 1 mm thick when high strength steel is used, the members are lightweight. The use of thinner sections and high strength steel leads to design problems for structural engineers which may not normally be encountered in routine structural steel design. Further, the shapes which can be cold-formed are often considerably more complex than hot-rolled steel shapes, such as I sections and plain channel sections. The cold-formed sections commonly have mono-symmetric or point symmetric shapes, and normally have stiffening lips on flanges and intermediate stiffeners in wide flanges and webs. Both simple and complex shapes can be formed for structural and non-structural applications.

Cold-formed steel design is dominated by two specific problems, i.e. (1) stability behaviour, which is dominant for design criteria of thin sections, and (2) connecting technology, which is specific and influences significantly the structural performance and design detailing. Special design standards have been developed to cover the specific problems of cold-formed steel structures. In the USA, the Specification for the design of cold-formed steel structural members of the American Iron and Steel Institute was first produced in 1946 and has been regularly updated based on research to the most recent 2007 edition, AISI S100-07, entitled North American Specification for Design of Cold-Formed Steel Structural Members. In Europe, the ECCS Committee TC7 originally produced the European Recommendations for the design of light gauge steel members in 1987 (ECCS, 1987).

This European document has been further developed and published in 2006 as the European Standard Eurocode 3: Design of steel structures. Part 1-3: General Rules. Supplementary rules for cold-formed thin gauge members and sheeting (EN 1993-1-3, 2006). In Australia and New Zeeland, the last version of specification for the design of cold-formed steel structures, AS/NZS 4600, was published in December 2005, and the review of cold-formed steel design specification could be continued around the world.

The market share of cold-formed structural steelwork continues to increase in the developed world. The main reasons can be found in the improving technology of manufacture and corrosion protection which leads, in turn, to an increased competitiveness of resulting products as well as new applications. Recent studies have shown that the coating loss for galvanized steel members is sufficiently slow, and indeed slows down to effectively zero, than a design life in excess of 60 years can be guaranteed. The range of use of cold-formed steel sections specifically as load-bearing structural components is very wide. Besides building applications, cold-formed steel elements can be met in the Automotive industry, Shipbuilding, Rail transport, in Aircraft industry, Highway engineering, Agricultural and Industry equipment, Office equipment, Chemical, Mining, Petroleum, Nuclear and Space industries.

Interested Public

The book was conceived primarily as a technical support for structural engineers in design and consulting offices, but it is expected to be of interest and useful for students and staff members of structural engineering faculties, as well as, for engineers working in steelwork industry.

Reviews

The authors are clearly extremely experienced in the structural design and behaviour of cold-formed steel and they are also deeply knowledgeable about the content of EN 1993-1-3. The credentials of the authors and fact that the book forms part of the ECCS series of Eurocode Design Manuals means that this will become an authoritative text for engineers with an interest in the design of cold-formed steel (The Structural Engineer, 1 July 2013).

The authors

Dan Dubina, corresponding Member of Romanian Academy, is professor and head of the Department of Steel Structures and Structural Mechanics at the Politehnica University of Timisoara, Romania. He has published more than 400 scientific papers and 25 books in the field of cold-formed steel structures, steel structures in seismic areas, structural connections, and structural analysis. He is a member of the ECCS Technical Committees TC 7 (Cold Formed Thin Walled Sheet Steel in Building), TC 8 (Stability), TC 10 (Connections), and TC 13 (Seismic Design). He has been awarded with the ECCS European Steel Design Award twice.

Viorel Ungureanu is professor at the Politehnica University of Timisoara, Romania. His experience in the field of steel structures, light steel structures, rehabilitation and sustainability of constructions is reflected in more than 200 scientific papers and 15 books and edited volumes. He participated in the drafting teams for the Romanian design code and technical regulations for steel structures. He is a member of the ECCS TC 7 (Cold Formed Thin Walled Sheet Steel in Building) and TC 14 (Sustainability and Eco-Efficiency of Steel Buildings).

Raffaele Landolfo is professor of structural engineering and head of Head of Department of Structures for Engineering and Architecture University of Naples "Federico II". He is external examiner for MSc in earthquake engineering and structural steel design at the Imperial College London and he also teaches in several PhD and master courses. He was engaged in the activities of both national working groups and European project teams dealing with the conversion from ENV to EN of the EN 1993-1-3, and he is chairing the ECCS Technical Committee TC 13 (Seismic Design).

According to WorldCat data base, the 2012 and 2013 editions of the book are already present in 121 libraries Worldwide.

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COSTIN D. NENIŢESCU ROMANIAN ACADEMY AWARD for
(Chemical Sciences section)

Costin D. Neniţescu AWARD of the ROMANIAN ACADEMY on Chemical Sciences section for the scientifically work of the year 2012, has been awarded for the scientifically contribution entitled: **The influence of water content of cyclodextrin-based complexes on the structural descriptors of biologically active compounds.** This award was given for two research articles on the border of chemical/bioconjugation / supramolecular interaction and the involvement to the stability / bioactivity / bioavailability of flavonoid and essential oil – cyclodextrin nanoparticles.

The authors

Daniel I. HĂDĂRUGĂ is assistant professor at the Department of Applied Chemistry, Organic and Natural Compounds Engineering, Pol;itehnica University of Timişoara.
He received the Ph.D. degree in chemistry in 2003. The main research topic includes the obtaining and analysis of new dual bioactive compounds (such as antioxidant derivatives and bioconjugates) and micro- / nanoencapsulation in cyclodextrins and liposomes. He is published many research articles and book chapters (Wiley, USA and Franche-Comté, France) in this area and is reviewer for top journals in chemical and food fields.

Nicoleta G. HĂDĂRUGĂ is full professor at the Banat's University of Agricultural Sciences and Veterinary Medicine "King Mihai I of Romania", Timişoara, Department of Food Science from the Faculty of Food Processing Technology.
She obtained the Ph.D. degree in Chemical Engineering in 2005 at the Polytechnic University of Timişoara and the Habilitated Doctor in 2013. Professor Nicoleta Hădărugă's research interests include protection / stability and controlled release of biologically active compounds from cyclodextrins. She is international journal reviewer and Editor-in-Chief of the J. Agroalim. Food Chem. and Organizing Chair of The 8th International Conference on Water in Food.

Geza N. BANDUR is associate professor at the Department of Applied Chemistry, Organic and Natural Compounds Engineering, Politehnica University of Timişoara.
He received the Ph.D. degree in 1999. Professor Geza Bandur's expertize is especially the synthesis and analysis of carbohydrate based polymers as well as advanced thermal analysis methods. He has published numerous research articles on thermogravimetry and differential scanning calorimetry analysis of oligo- and polymer based materials

Heinz-Dieter ISENGARD is Emeritus Professor at the University of Hohenheim, Stuttgart.
Professor Isengard received the Ph.D. degree in chemistry in 1972 and had numerous scientifically and administrative possitions. He is the president of Association EuroFoodWater and organized many international conferences of food chemistry.

Water content of flavonoid/cyclodextrin nanoparticles: relationship with the structural descriptors of biologically active compounds

Authors: Daniel I. Hădărugă, Nicoleta G. Hădărugă, Geza N. Bandur, Heinz-Dieter Isengard

Abstract
The paper presents a study regarding the obtaining, characterization, and water evaluation of flavonoid (flavone, chrysin, naringenin, hesperetin, apigenin, fisetin, luteolin) and related compounds (cinnamic and caffeic acids, silybin etc.)/cyclodextrin complexes.

The thermogravimetric and calorimetric analyses indicate the formation of complexes, the presence of bioflavonoids and related compounds being revealed by the larger peaks from the calorimetric analysis (up to 250ºC); the dissociation of water and other volatiles (ethanol) is revealed by thermogravimetry.

The Karl Fischer titration (KFT) water content of β cyclodextrin complexes obtained by crystallization method was in the range of 8.8% (chrysin) to 12.6% (caffeic acid), and higher for ultrasonication method (9.4-13.3%).

For α-cyclodextrin complexes the water content was lower (8.2-9.8%). KFT water content correlates with the hydrophobic descriptors (i.e. octanol-water partition coefficient). This observation demonstrates the molecular encapsulation of compounds such as bioflavonoids in cyclodextrin cavity by replacing of crystallization water molecules with the more hydrophobic guest compounds.

Keywords
flavonoids; cyclodextrins; nanoparticles; Karl Fischer water titration; thermogravimetry; differential scanning calorimetry; structural descriptors.

Goal
In the present study the influence of structural characteristics of biologically active compounds from flavonoid, cinnamic acid, and flavonolignan classes on the encapsulation process in cyclodextrins by means of water content and the correlation of this water content with flavonoid structures and with the type of complexation method were investigated.

Conclusions

- The study regarding the obtaining, characterization, and water content evaluation of flavonoid and related compounds/ α- and β-cyclodextrin complexes revealed that the formation of the complex depends of the hydrophobicity of the guest compound (expressed by different descriptors), but only in the case of obtaining of complexes by crystallization method.

- Thus, the water content of cyclodextrin complexes, determined even by classical Karl Fischer titration or evaluated by thermogravimetry, depend on the hydrophobic (or related) descriptors of guest compound, especially for β-cyclodextrin complexes, the best correlation being obtained for logP (logarithm of octanol-water partition coefficient) and Nnp (total number of non-polar atoms); good correlations were obtained also for the water solubility descriptor (LogS), which are correlated (inverse correlation) with the hydrophobicity descriptors.

- These correlations were obtained only for the case of obtaining of cyclodextrin complexes by crystallization method and can be explained by the possibility to touch the association/dissociation equilibrium between guest (flavonoid and related compounds) and host (cyclodextrin) by very slow crystallization, when some of the water molecules from cyclodextrin are replaced by the guest molecule; if the guest molecule are more hydrophobic the van der Waals interaction with the inner cavity of cyclodextrin is better and the water content of the final complex is reduced. Furthermore, the obtaining of cyclodextrin complexes by ultrasonication method is inappropriate due to the facility of dissociation of guest-cyclodextrin complex in this process, as is revealed by the higher water content of these complexes.

- The water content determined by classical Karl Fischer method seems to be the better method for water evaluation in cyclodextrin micro/nanoparticles; thermogravimetry conduct to similar results, but little bit lower than the above mentioned method, due to the analysis technique: the TG analysis starts after obtaining the inert atmosphere (nitrogen) in the balance space and in this period a small quantity of water is already lost

- Moreover, the KFT allow evaluating only the water content and TG analysis indicate the mass loss by increasing temperature and do not differentiate between water and other volatile compounds,

Water content of natural cyclodextrins and their essential oil complexes: A comparative study between Karl Fischer titration and thermal methods

Authors: Nicoleta G. Hădărugă, Daniel I. Hădărugă, Heinz-Dieter Isengard

Abstract

The paper presents a comparative study regarding the water determination in natural cyclodextrins and in their essential oil complexes (Apiaceae, Liliaceae, and Cupressaceae families) by using Karl Fischer titration (KFT) and thermal methods.

For the natural cyclodextrins the influence of the solvent hydrophobicity and the preheating temperature on the water extraction process were evaluated. The water contents, estimated by KFT in both methanol and methanol-octanol solvent systems, were 10.6% and 14.4% for α and β-cyclodextrin, respectively.

The water content, estimated by KFT in a more hydrophilic solvent system, methanol-formamide, was 0.4-0.6% higher.

Thermogravimetric evaluation of water conducts to lower values. For the essential oil/cyclodextrin complexes, the KFT water content were in the range of 6.4-8.1%, higher values being obtained in the case of Juniperus essential oil/β cyclodextrin complexes (7.5-8.1%). With some exceptions, thermal analyses of complexes are in good agreement with the KFT results.

Keywords

Karl Fischer water titration; microparticles and nanoparticles; cyclodextrins; thermogravimetry; differential scanning calorimetry; scanning electron microscopy.

Goal

In this study the influence of the hydrophobicity of solvent mixture and the preheating temperature on the water extraction process for α- and β-cyclodextrin as well as for their complexes with various essential oils were evaluated by using classical Karl Fischer titration method and the results were compared with those from the thermogravimetric analysis.

Conclusion

- Classical Karl Fischer water titration is a good tool for evaluation of water concentration in cyclodextrins and their micro/nanoparticles used in food industry and KFT results are in good agreement with the thermogravimetric results; the KFT chemical method is more accurate than TG due to the fact that it evaluate only water concentration and furthermore the "surface" and "strong-bonded" water molecules can be determined.

- Karl Fischer water titration values for natural cyclodextrins depend on the hydrophobicity of solvent mixture: lower values were obtained in the case of more hydrophobic solvent addition to the methanol used as the base solvent. The differences between KFT water content values for natural cyclodextrins and their essential oils complexes is still small from the solvent hydrophobicity point of view and further investigations must be performed in order to elucidate all aspects of cyclodextrin Karl Fischer titration.

IEEE NIKOLA TESLA AWARD – Prof. Ion Gheorghe BOLDEA, PhD

- The IEEE Nikola Tesla Award was established in 1975 through an agreement between the IEEE Power Engineering Society and the IEEE Board of Directors.
- The Award is named in honor of Nikola Tesla, an electrical engineer, a distinguished Yugoslav-American inventor, and a pioneer in many fields, who is most renowned for the development of the coil that bears his name and the a-c induction motor.
- The IEEE Nikola Tesla Award is granted for outstanding contributions to the generation and utilization of electric power.

BIOGRAPHY

Prof. Ion Gheorghe BOLDEA, PhD in Electrical Engineering in 1973 has worked exclusively for University Politehnica Timisoara Romania, but spent more than 5 years in total as visiting scholar in USA and UK, while delivering intensive coursed, keynote addresses IA-IEEE DLs (since 2008) in USA, S. America, EU and Asia, with technical consulting over decades for companies like GM, Bosch, Vestas, Hilti, Hyosung, EMBRACO, Sclumberger etc.

His technical expertise is related to electric energy conversion and control by power electronics for better industrial productivity, energy savings and air pollution reduction. Besides the academic involvement he was a founding co-owner for 20 years of an industrial digital electric automation (IDEA) private enterprise that has now more than 60 engineers.

His technical expertise is related to electric energy conversion and control by power electronics for better industrial productivity, energy savings and air pollution reduction.

Besides the academic involvement he was a founding co-owner for 20 years of an industrial digital electric automation (IDEA) private enterprise that has now more than 60 engineers.

He worked and published on linear and rotary electric machinery design and control (18 books and more than 150 IEEExplore papers, 30 patents etc.).

He received 4 IEEE paper awards, and is a member of Romanian Academy of Technical Sciences and of Romanian Academy.

Prof. Boldea initiated cooperation with many universities such as those of Kentucky, Oregon and Texas at Dallas in USA, Cassino, Bologna, Torino, Trieste in Italy, Hanyang in Korea, Aalborg University in Denmark where he holds a Doctor Honoris Causa.

Specific contributions

- The introduction of the optimum goodness factor for the design of linear induction motors of high speed(1976);
- First integrated-propulsion-levitation passive guideway MAGLEV –Magnibus(4 ton prototype on an 150m test track) with linear homopolar synchronous motors and over all power factor and energy conversion above 80% (1986);

- Generalization in 1988 of the to be DTC (in 1995), proposed initially (1985) only for IMs, under the name of TVC, for both voltage and current source inverter, for all ac motor drives;
- The design and testing the largest power factor(0.91, at 1500W and 3.6krpm) reluctance synchronous motor (2 poles, ALA rotor) in 1992;
- 3rpm full torque sensorless control for an IM DTC drive without signal injection, using sliding mode observers and regulators(2000);
- The introduction of the first matrix converter in the terminal box of an induction motor(2000);
- The introduction of BEGA(an IPMSM with additional dc   excitation in an axis at 90 degrees with respect to magnets axis) to produce very large CPSR at unity power factor and pure resistive generator voltage drop by zero Id and zero Psiq active control (2006);
- Introducing the concept of "active flux" as a unifying concept to simplify sensorless(advanced) control of all ac motor drives(2008);
- Optimal design deterministic and evolutionary methodologies for IMs and SMs with embedded FEM (2010);
- Contribution to the   revival and development of   No-PM Brushless DC multiphase reluctance machines with dual flat top;
- current control for high performance over wide CPSR with simplified control and applications for electric transport and wind/hydro generators (2012);

EXECUTIVE UNIT FOR FINANCING HIGHER EDUCATION, RESEARCH, DEVELOPMENT AND INNOVATION – UEFISCDI AWARDS

Through these awards UEFISCDI aims to increase quality, impact and international visibility of Romanian research by recognizing and rewarding significant results published in prestigious journals from international senior scientific stream.

Within this competition can participate the researchers affiliated to institutions in Romania, authors of scientific articles published in journals indexed by Thomson Reuters Science Citation Index Expanded ("Science"), Social Sciences Citation Index ("Social Sciences") or Arts & Humanities Citation Index ("Arts & Humanities").

More information at http://uefiscdi.gov.ro/Public/cat/471/Premierea%20rezultatelor%20cercetarii.html

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Projects supported by public funds

Research Projects

Field	Total number of projects	Source of financing	Number of projects
Automation and Computers	10	National Funds* International Programs**	9 1
Electrical and Power Engineering	1	National Funds*	1
Electronics and Telecommunications Engineering	6	National Funds* International Programs** POSDRU***	2 3 1
Chemical Engineering	9	National Funds*	9
Civil Engineering	10	National Funds* International Programs**	6 4
Materials Engineering	5	National Funds* International Programs**	4 1
Mechanical Engineering	14	National Funds* International Programs** POSDRU*** Cross-border Cooperation RO-SR	10 2 1 1
Engineering and Management	1	National Funds*	1
Mathematics	2	National Funds* International Programs**	1 1

* National Funds - funds awarded by the Romanian govern through UEFISCDI

** International Programs - EU 7th Framework Program, Research Fund for Coal and Steel or the Information and Communication Technologies Policy Support Program - The European Space Agency (ESA)

*** Structural Funds - European Regional Development Fund, European Social Fund and the Romanian National Authority for Scientific Research

Project in highlight

FULL-SCALE EXPERIMENTAL VALIDATION OF DUAL ECCENTRICALLY BRACED FRAME WITH REMOVABLE LINKS (DUAREM)

Goal of the project

The aim of the project was to reduce the repair costs and downtime of a structure hit by an earthquake. There are three main objectives: (a) validate experimentally the re-centring capability of dual structures with removable dissipative members; (b) assess overall seismic performance of dual eccentrically braced frames; (c) obtain information on the interaction between the steel frame and the reinforced concrete slab in the link region and (d) validate the link removal technology.

Short description of the project

Improved seismic performance of multi-storey structures is to be attained through removable dissipative members ("fuse components") and re-centring capability. The concepts of removable dissipative members and re-centring capability are to be implemented in a dual structure, obtained by combining steel eccentrically braced frames with removable bolted links with moment resisting frames.
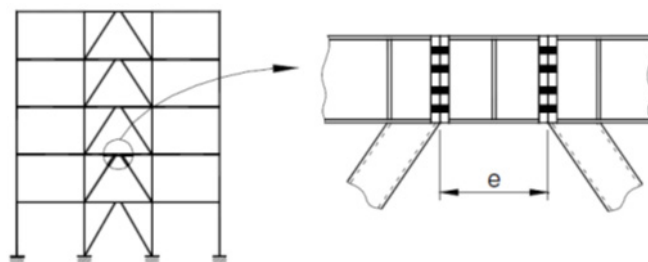

The bolted links are intended to provide the energy dissipation capacity and to be easily replaceable, while the more flexible moment resisting frames would provide the necessary re-centring capability to the structure. The columns are to be realised from high strength steel, in order to keep these members in the elastic range even under strong seismic input. The validation of the proposed solution is to be realised through a pseudo-dynamic test of a full-scale model of a dual eccentrically braced structure at the European Laboratory for Structural Assessment (ELSA) of the Joint Research Centre (JRC) in Ispra, Italy. The research will demonstrate the feasibility of the proposed concept clearing the route toward implementation into design.
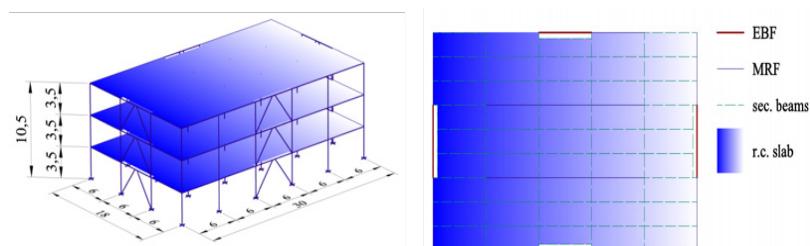
The main lateral load resisting system of the prototype structure is composed of eccentrically braced frames. Additionally, there are 4 moment resisting frames on transversal directions and 10 moment resisting frames on longitudinal (test) direction, to assure the restoring forces after an earthquake. Considering that in the transversal direction the lateral force resisting system is located on the perimeter frames only, and in order to reduce the cost of the experimental specimen, it was composed of the two perimeter frames only.

Steel structural components were designed in S355 grade steel, with two exceptions. Grade S460 steel was used for columns, in order to obtain a larger capacity without increasing the stiffness. This approach helps promoting the capacity design rules. Links were designed from S235 steel grade (which was replaced during fabrication with equivalent DOMEX 240 YP B) mainly due to coping with available actuator capacities.

The floor layout is conceived in a manner that allows investigation of two different solutions of interaction between the removable link and the reinforced concrete slab. One of the two eccentrically braced frames is realised so that the beam containing the removable link is totally disconnected from the reinforced concrete slab (the south frame) and in the other EBF the beam containing removable links is connected to the slab in a conventional way (the north frame).
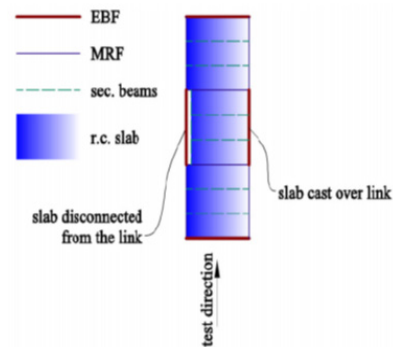
The structure showed an excellent seismic performance. The large scale experimental programme validated the procedure used to remove and replace damaged shear links in dual eccentrically braced frame. Small permanent deformations were recorded until the ultimate limit state earthquake level, which means that the structure is to a certain degree self-centring. Nevertheless, permanent drifts were eliminated further through removal of bolted links. Very good re-centring for frame with links disconnected from the slab was observed and only moderate cracks in the slab on the other frame were noticed (until the ultimate limit state).

If permanent plastic deformations after an earthquake are small, removing of shear links can be done simply by unbolting. If larger permanent drifts occur, as could be the case under near-field records or long-period motions, flame cutting of links and temporary braces for smooth release of forces could be employed. The system combining "fuse" components with re-centring capacity may also be extended to buckling restrained braced (BRB) and steel plate shear walls (SPSW) systems.

Project implemented by

CEMSIG - The Research Centre for Mechanics of Materials and Structural Safety - Research and Technical Development unit of Politehnica University Timisoara, at the Faculty of Civil Engineering, Department of Steel Structures and Structural Mechanics.

Research Team

- UPT - Politehnica University of Timișoara, Romania (project coordinator)
- University of Liege, Belgium
- University of Naples "Federico II"– Faculty of Architecture, Italy
- University of Ljubljana, Slovenia
- University of Coimbra, Portugal

Main activities

According to the flowchart of research, the main activities can be summarized as follows:
- The prototype structure was designed according to EN1990, EN1991, EN1992, EN1993, EN1994 and EN1998;
- Numerical simulations on the test structure and links were done in order to investigate the possibility to replace bolted links following significant inelastic deformations and the practical feasibility of the replacement procedure;
- Practical solutions regarding order in which bolted links need to be replaced were developed;
- A solution that uses temporary braces with viscous dampers mounted on the structure during link removal was analysed and chosen in order that the link removal process to be a safe one;

- Some experimental tests on one-storey one-span frames were used in order to calibrate the numeric model of the DUAREM test structure, before applying the link removal procedure;
- The testing sequence on the mock-up in the reaction wall facility of ELSA consists in modal evaluation, snap-back and pseudo-dynamic tests.
- The two frames of the specimen were instrumented in order to obtain information on the structural behaviour during the seismic tests, performed by using the pseudo-dynamic test method. The instrumentation consists of local displacement transducers (to monitor the links deformations and the slip in the splice connection of every EBF brace and the EBF beams from the 1st storey, in the south frame), global displacement transducers (to monitor the global longitudinal and transversal displacements of the structure), inclinometers (to monitor the rotations of the beam to column and column base joint zones) and strain gages (to monitor the yielding at the middle of the EBF braces and at the end of the MRFs beams at the 1st storey).
- Pre-test nonlinear dynamic simulations were performed on the 2D model of the experimental mock-up, using seven ground motion records, selected by matching the elastic response spectrum used in design. One record was chosen to be used in the pseudo-dynamic tests in order to evaluate the structural performance of the test structure, applied with several input levels:

Limit state	Return period, years	Probability of exceedance	a_g/a_{gr}	a_g/g
Full Operation (FO)	-	-	0.062	0.020
Damage Limitation (DL / SLS)	95	10 % / 10 years	0.59	0.191
Significant Damage (SD / ULS)	475	10 % / 50 years	1.00	0.324
Near Collapse (NC)	2475	2 % / 50 years	1.72	0.557

The following pseudo-dynamic tests were proposed and performed:
- DL/SLS (Damage Limitation/Serviceability Limit State) tests set:
  - Full operation (FO1) earthquake (ag=0.02g);
  - Damage Limitation (DL/ SLS) earthquake (ag=0.191g).
- SD/ULS (Significant Damage/Ultimate Limit State) tests set:
  - Full operation (FO2) earthquake (ag=0.02g);
  - Significant Damage (SD/ULS) earthquake (ag=0.324g);
  - Pushover (PO1) test (monotonic, with a displacement of 55 mm).
- NC (Near Collapse) tests set:
  - Full operation (FO3) earthquake (ag=0.02g);
 - Near collapse (NC) earthquake (ag=0.557g);

Results

The first tests, the snap back tests, were carried out by imposing and releasing (at a very short time interval) a force at the first floor of the north frame to simulate the last seismic link removal, were according to numerical simulation is were the highest forces are locked into the device. This was achieved by pulling the structure towards the reaction wall with a piston linked by a notched bar that gave the sudden release of force when breaking after reaching its maximum. The force achieved during the snap back was lower than that given by the numerical simulation, and limited to prevent damage on the structure.

The proposed pseudo-dynamic tests, as well as two link replacement operations, were performed and information about the seismic performance of the test specimen, the link replacement feasibility and concrete slab influence were obtained.
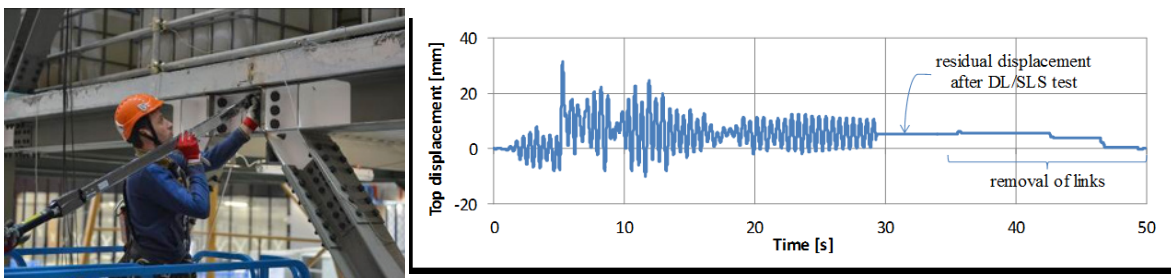
DL/SLS tests set results:

- FO1 test was performed in order to assess the elastic response of the structure with the initial (first) set of links, the selected seismic record being scaled to have the PGA of 0.02g. During this first test, the structure manifested an elastic response, in the non-dissipative elements, as well as in the dissipative ones (including the links). This means that there were no residual top displacements or inter-storey drifts of the structure, the maximum top displacement being also small.

• DL/SLS test was performed afterwards, in order to simulate a moderate earthquake, causing moderate structural damage, the selected seismic record being scaled to have the PGA of 0.191g. During this test, no yielding was observed in the elements outside links. Small maximum plastic deformations occurred in links and no slips have occurred in the EBF braces and beams splice connections. Beam to column and column bases joint zones manifested small rotations. Minor cracks were observed in the concrete slab. The structure exhibited low residual top displacement. Also low residual inter-storey drifts were observed.
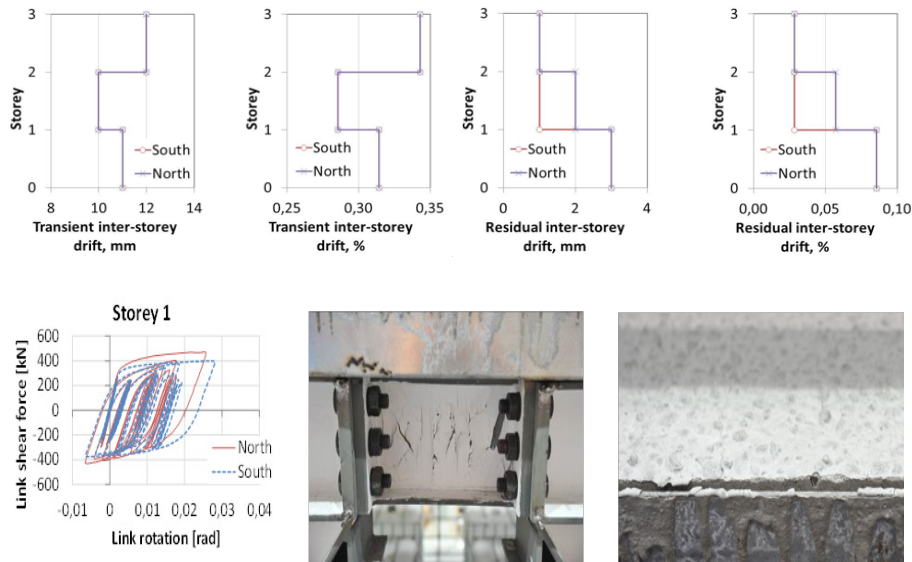

First link replacement (LR1):

• Because after the DL/SLS test the structure exhibited low residual top displacement and low residual drifts were observed, the decision was to remove the first set of damaged links, by removing the bolts, on a level by level basis, starting from the lower level to the upper one. The low value of the residual top displacement from the end of the DL/SLS test decreased after the elimination of the damaged links. A better re-centring was observed in the south frame, where the concrete slab is disconnected from the link. After unscrewing the bolts, a hydraulic jack had to be used for pushing apart the braces, in order to pull out the links. A new set of unused links was then mounted into the structure.


SD/ULS tests set results:

• FO2 test was performed in order to assess the elastic response of the structure with the new (second) set of links, the selected seismic record being applied with a scaling factor of 0.02. During this second FO test, the structure exhibited a similar behaviour as the FO1 test. This means that the structure manifested an elastic response, in the non-dissipative elements, as well as in the dissipative ones (including the links) and there were no residual top displacements or inter-storey drifts of the structure, the maximum top displacement being also small.

• SD/ULS test was performed in order to simulate a stronger earthquake, causing larger structural damage, the selected seismic record being scaled to have the PGA of 0.324g. During this test, no yielding was observed in the elements outside links. Moderate maximum plastic deformations occurred in links and no slips have occurred in the EBF braces and beams splice connections. Beam to column and column bases joint zones manifested slightly larger rotations. Moderate cracks were observed in the concrete slab. The structure exhibited still quite low residual top displacement.

• Also low residual inter-storey drifts were observed.
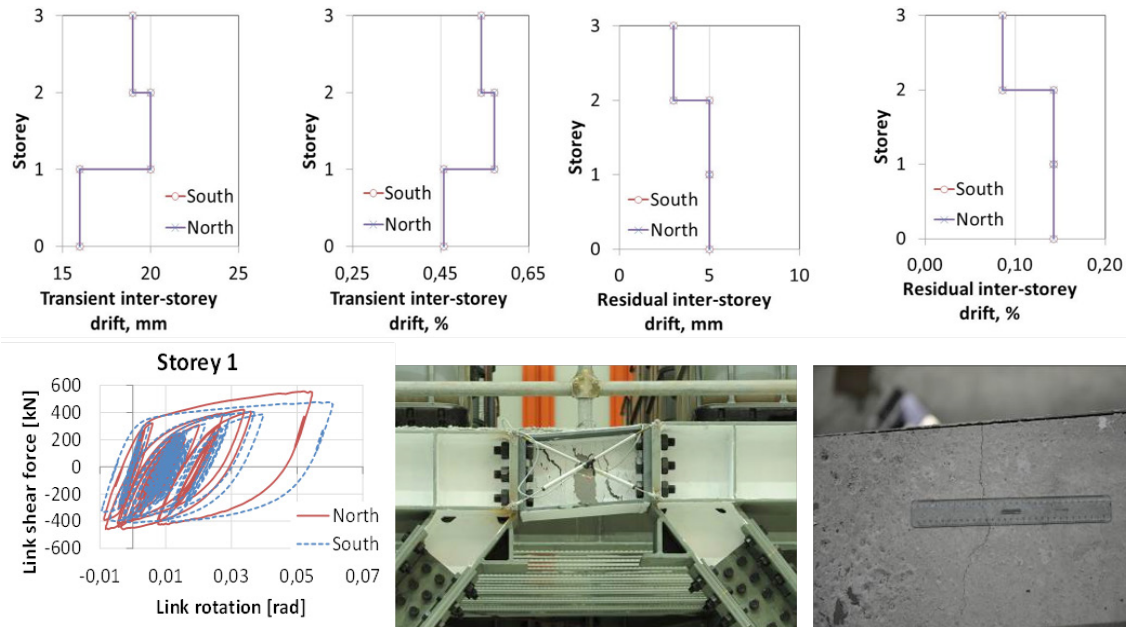
• PO1 test (a monotonic pushover test until an additional displacement of 55 mm) starting from the end of the SD/SLS test position was necessary. This was done to obtain larger residual displacements that were necessary in order to validate the feasibility of the link removal process and re-centring of the structure. During this test, no yielding was observed in the elements outside links. Higher maximum plastic deformations occurred in links and no slips have occurred in the EBF braces and beams splice connections. Beam to column and column bases joint zones manifested larger rotations. More visible cracks were observed in the concrete slab. After this test, the structure exhibited significant larger residual top displacement. Larger residual inter-storey drifts amounting were observed.
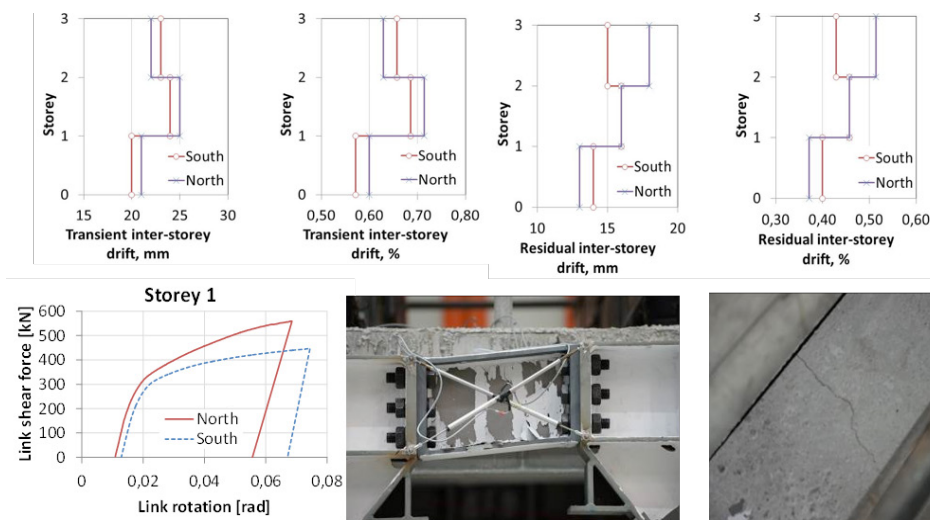
Second link replacement (LR2):

• Because after the PO1 test the structure exhibited significant larger residual top displacement and larger residual drifts were observed, the decision was to remove the second set of damaged links, by flame cutting both the web and flanges of the links, from the top storey downwards. The value of the residual top displacement from the end of the PO1 test was decreased after the elimination of the damaged links. Again a better re-centring was observed in the south frame, where the concrete slab is disconnected from the link. Although the hydraulic jack was not necessary to remove the links, it was needed for placing the new set of links back into the structure. A new set of unused links was then mounted into the structure.
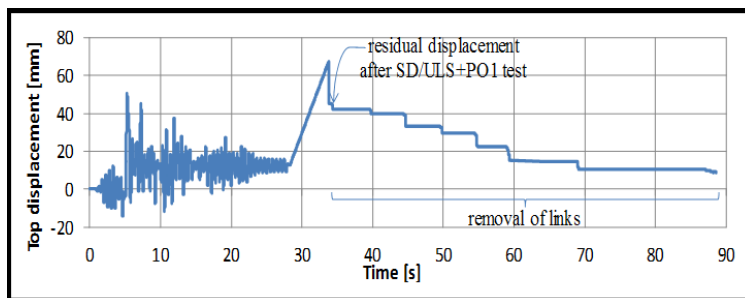
NC tests set results:

- TFO3 test was performed in order to assess the elastic response of the structure with the new (third) set of links, the selected seismic record being scaled to have the PGA of 0.02g. During this third FO test, the structure exhibited a similar behaviour as the first two FO tests. The structure manifested an elastic response, in the non-dissipative elements, as well as in the dissipative ones outside links and very small residual deformations in links and there were no residual top displacements or inter-storey drifts of the structure, the maximum top displacement being also small.

- NC test was proposed in order to simulate a much stronger earthquake and to obtain extensive damage throughout the structure, the re-centring capability being lost due to yielding in other members apart from the links, the selected seismic record being applied with a scaling factor of 0.557. This test was prematurely stopped because the available actuator capacity (1000 kN per frame at every floor) was not enough to carry it out with the imposed null torsion at every floor.

- Another cyclic pushover test (PO2) with maximum displacement amplitudes of 150 mm was further proposed, after the actuators' release of force from the NC test and afterwards a final cyclic pushover test (PO3) with maximum displacement amplitude of 400 mm.

- The last three tests brought extensive plastic behaviour throughout the entire structure. First of all, very large maximum plastic deformations occurred in links, failure occurring in the welds of the links to the end plates and also between web and flanges for the first two levels. Significant damage was also observed in the column bases zones and at the end of the MRFs beams (strains 3 times larger than the yield one), just outside the haunch. Beam to column and column bases joint zones manifested very large rotations. The concrete slab was heavily deteriorated in the north frame.

- Due to the presence of the slab over the links, the north frame is more rigid and has a larger capacity than the south frame. This makes more difficult the re-centring of the north frame with respect to the one of the south frame, but the residual drifts were still lower than the erection tolerances.
- The dual eccentrically braced structure showed an excellent performance at the SLS and ULS earthquakes. Small permanent deformations were recorded for both seismic intensity levels, which are within the erection tolerance limits defined in EN 1090. This behaviour occurs mostly due to the large post-elastic stiffness of the system, provided by the moment-resisting frames. Small permanent deformations effectively mean that the structure is self-centring to a certain degree.

Implementation period

01.06.2010 - 01.08.2014

Applicability and transferability of the results:

After the pseudo-dynamic experimental validation of the main concepts, the experimental results interpretation and numerical model validation and calibration, the system can be applied to new, higher, multi-storey steel dual structures in seismic areas. A design methodology for dual eccentrically braced steel frames with removable links thus can be developed, as well as a guide for link replacement technology. The system may also be extended to buckling restrained braced (BRB) and steel plate shear walls (SPSW) systems.

Fields of interest

- Re-centring structures; Performance-based design; Bolted link connections; Pseudo-dynamic structural experimental tests.

Financed through/by

- European Community's Seventh Framework Programme [FP7/2007-2013] for access to the European Laboratory for Structural Assessment of the European Commission — JRC under grant agreement n° 227887
- European Community's Research Fund for Coal and Steel under grant agreement n° RFSR-CT-2009-00024 "High strength steel in seismic resistant building frames"

Research centre

CEMSIG - The Research Centre for Mechanics of Materials and Structural Safety,
Politehnica University of Timisoara.

Dissemination of results:

• Dubina, D., Stratan, A., Dinu, F. (2011). "Re-centring capacity of dual-steel frames", Steel Construction: Design and Research, Vol. 4, No. 2, pp. 73-84.

• Ioan, A. (2011). "Seismic response of dual steel eccentrically braced frames with removable links". Scientific Journal - Mathematical Modelling in Civil Engineering, vol.7, no.4, ISSN 2066 – 6926, pp. 101- 110 – BDI Journal.

• Stratan, A., Ioan, A., Dubina, D. (2012). "Re-centering capability of dual eccentrically braced frames with removable bolted links". Proceedings of the 7th International Conference on Behavior of Steel Structures in Seismic Areas (STESSA), 9-11 January 2012, Santiago, Chile, ISBN 978-0-415-62105-2, pp. 723-728 – ISI Web of Knowledge conference.

• Ioan, A., Stratan, A., Dubina, D., Taucer, F. (2012) – "Dual Steel Eccentrically Braced Frames with Bolted Links – Simulation of Safe Removal Process". Proceedings of the First International Conference for PhD students in Civil Engineering (CE-PhD), 4-7 November 2012, Cluj-Napoca, Romania, ISBN 978-973-757-710-8, pp. 220-227.

• Ioan, A., Stratan, A., Dubina, D. (2013). "Numerical Simulation of bolted links removal in eccentrically braced frames". Pollack Periodica, vol. 8, no.1, ISSN 1788-1994, pp. 15-26 – BDI Journal.

• Dubina, D., Stratan, A., Florea, D., Ioan, A. (2013). "Sisteme structurale cu componente disipative de siguranta seismica" (in Romanian). AICPS Review, no. 1-2 ISSN 2067-4546, pp. 41-50.

• Stratan, A., Ioan, A., Dubina, D., D'Aniello, M., La Manna Ambrosino, G., Landolfo, R., Taucer, F., Poljansek, M. (2013). "Pre-test numerical simulation and experimental program on a dual eccentrically braced frame with replaceable links". "XXIV Giornate italiane della Costruzione in Acciaio", Torino, 30 September – 2 October 2013, ISBN 978-88-905870-0-9, pp. 867-876.

• Ioan, A. (2013). "Pre-testarea numerica a unui cadru cu bare disipative demontabile supus la incercari pseudo-dinamice" (in Romanian). AICPS Review, no. 3, ISSN 2067-4546, pp. 63-71. (ZAT2013)

• Ioan, A., Stratan, A., Dubina, D. "Evaluation of restoring capacity of dual steel EBFs with removable links". Pollack Periodica (accepted for publication)

• Stratan, A., Ioan, A., Dubina, A., Taucer, F., Poljansek, M. (2013). "Pre-test numerical simulations and experimental program on dual eccentrically braced frame with removable links". International Workshop "High Strength Steel in Seismic Resistant Structures - HSS-SERF" 28-29 June 2013, Naples, Italy, ISBN 978-973-638-552-0, pp. 137-148.

• Stratan, A., Ioan, A., Dubina, D., Taucer, F., Poljansek, M., Molina, J., Pegon, P., D'Aniello, M., Landolfo, L. 2014. „Experimental program for large-scale tests on a re-centring dual eccentrically braced frame". EUROSTEEL 2014 (7th European Conference on Steel and Composite Structures), 10-12 September 2014, Napoli, Italy.

• Ioan, A., Stratan, A., Dubina, D. 2014. „Link replacement order in high-rise re-centring dual eccentrically braced frames". EUROSTEEL 2014 (7th European Conference on Steel and Composite Structures), 10-12 September 2014, Napoli, Italy.

• Stratan, A., Ioan, A., Dubina, D., Poljansek, M., Molina, J., Pegon, P., Taucer, F. (2014). „Dual eccentrically braced frames with removable links: Experimental validation of technical solution through large-scale pseudo-dynamic testing". 5CNIS&1CNISS (5th National Conference of Earthquake Engineering and 1st National Conference on Earthquake Engineering and Seismology), 19-20 June 2014, Bucharest, Romania.

• Stratan, A., Ioan, A., Dubina, D., Poljansek, M., Molina, J., Taucer, F., Pegon, P., Sabau, G. (2014). "Experimental validation of re-centring capacity of eccentrically braced frames with removable links" – sent to Engineering Structures Journal - ISI Web of Knowledge journal.

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CONTROL ALGORITHMS AND OPTIMAL TUNING OF FUZZY MODELS FOR AUTOMOTIVE, MECHATRONICS APPLICATIONS AND MOBILE ROBOTS

Goal of the project

Development of control structures and algorithms and optimal tuning of fuzzy models for a wide range of industrial processes, mechatronics, mobile robots and automotive applications.

Short description of the project

The project aims:
- Advanced control structures for automotive and mechatronics applications.
- Improvement and development of new Takagi-Sugeno (T-S) fuzzy models and control solutions for a wide range of industrial processes.
- Optimal tuning of fuzzy models for automotive and mechatronics applications.
- Improvement and development of control algorithms for mobile robots.

Project implemented by

"Gheorghe Asachi" Technical University of Iasi (TUIASI) - Coordinator;
Politehnica University of Timisoara, Department of Automation and Applied Informatics - Project Partner P1;
S.C. ROMUS Trading & Development SRL - Project Partner P2.

### Implementation period

2012-2016

Main activities

- Design of low-cost T-S state feedback fuzzy controllers for the position control of a class of nonlinear servo systems.
- Sensitivity analysis with respect to the process parametric variations in the low-cost controller designs for vehicle power train systems with spark-ignition engine and continuously variable transmission.
- Modelling, simulation, analysis and design of linear, fuzzy and variable structure control solutions for direct current electric drive systems with continuously variable reference input, variable moment of inertia and variable load disturbance input, applicable to rolling mills and to strip winding systems.
- Development and experimental validation of simple T-S fuzzy models for several processes in automotive and mechatronics: anti-lock braking systems, nonlinear DC drive servo systems, magnetic levitation systems, electromagnetic actuated clutch systems, inverted pendulums.
- Fuzzy logic control algorithms that stabilize chaotic dynamical systems.

- Frequency domain design of fractional order proportional-integral controllers for lambda control in the framework of automotive engine control systems.
- Development of two-degree-of-freedom linear and fuzzy controllers, of hybrid T-S fuzzy controllers, of hybrid PI neuro-fuzzy controllers and of adaptive sliding mode fuzzy controllers for speed and position control of brushless DC drives with variable parameters – continuously variable reference input (speed), variable moment of inertia and variable load disturbance.
- Optimal tuning of parameters of T-S fuzzy models using nature-inspired algorithms (simulated annealing, particle swarm optimization and gravitational search algorithms) and evolving fuzzy modelling.
- Continuous development of the nRobotic platform in the framework of path planning and collision avoidance for mobile robots in missions.
- Development and testing of path planning algorithms for mobile robots using nature-inspired optimization algorithms.
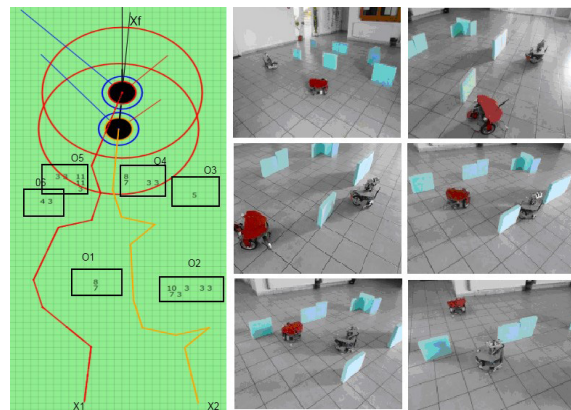
Results

- 20 papers published in ISI journals with impact factors.
- 3 papers published in journals indexed by international databases.
- 7 book chapters published in Springer-Verlag volumes.
- 20 papers published in conference proceedings indexed by international databases (IEEE Xplore, INSPEC, DBLP, Scopus).
- more than 50 independent citations in 2014.
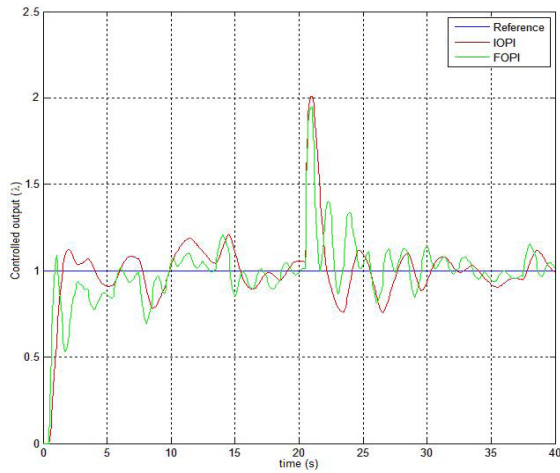
## Applicability and transferability of the results

Nature-inspired optimization algorithms in modelling and control design, low-cost solutions for control problems in mechatronics, electrical drives, automotive and robotics, tools for the modelling, optimization and design of fuzzy control systems, real-time programming and operating systems for control and robotics.

Financed through/by

Executive Agency for Higher Education, Research, Development and Innovation Funding – UEFISCDI, Bucharest, Romania.

Research Centre

CCISA - Research Centre for Automatic Systems Engineering
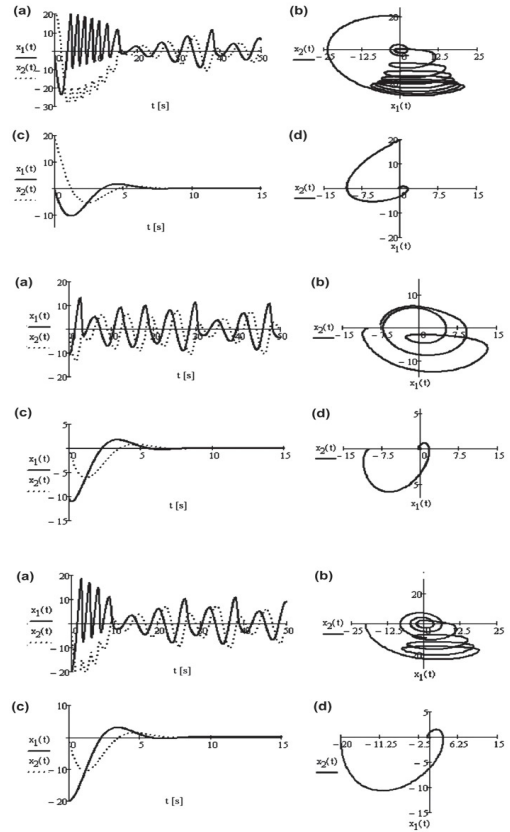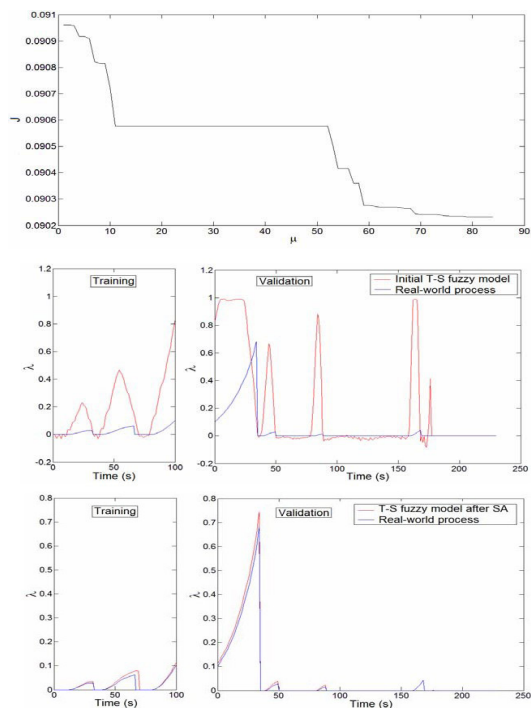
Research team

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NEW PERFORMANCE IMPROVEMENT TECHNIQUES OF CONTROL SYSTEMS USING EXPERIMENT-BASED TUNING

Goal of the project

Enhance the existing techniques and develop new techniques dedicated to the improvement of control system performance using experimental data.

Short description of the project

The project aims:
- Enhancement and development of data-based (data-driven) techniques and algorithms for improving control system performances using experimental data.
- Enhancement and development of nature-inspired algorithms n optimization of control system performance.
- Development of optical character recognition (OCR) applications.
- Development of new fuzzy control solutions for a wide range of industrial processes.
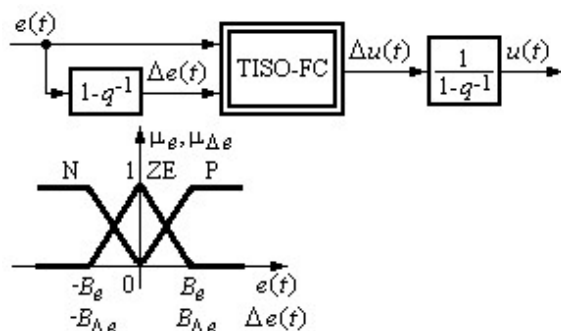
Project implemented by

Department of Automation and Applied Informatics.
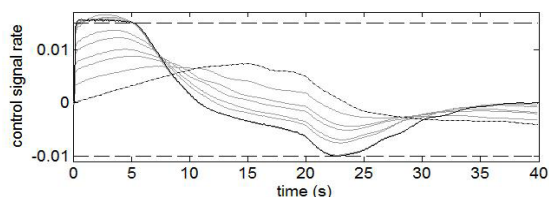
Implementation period
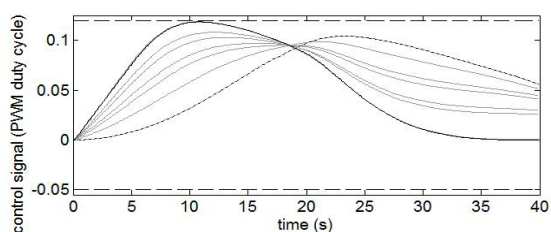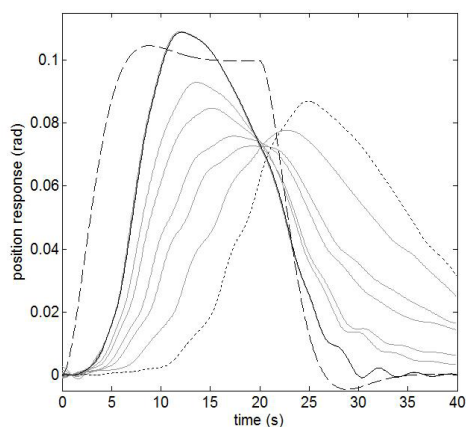
2011-2015

Main activities

- Application of Iterative Feedback Tuning (IFT) and Simultaneous Perturbation Stochastic Approximation (SPSA) to state-feedback optimal control with Kalman filter state observers.
- Application of stable Iterative Correlation-based Tuning to servo systems.
- An experiment-based approach to Reference Trajectory Tracking optimal control problem.
- Validation of iterative techniques on laboratory equipment such as: liquid level control, motion control systems with motor actuation (speed and position control, inverted pendulum).

- Enhancement of control systems performance by fuzzy control and IFT.
- Enhancement of existing nature-inspired algorithms such as Gravitational Search Algorithm (GSA) and Charged System Search (CSS).
- PI and fuzzy controller tuning to ensure a reduced sensitivity with respect to the parametric variations of processes.
- Enhancement of the training algorithm of Convolutional Neural Networks using a mixed approach of Back-Propagation and Gravitational Search Algorithm.
- Development of telesurgical applications and control of telerobots in space medicine,
- Control of nonlinear discrete-time MIMO systems.
- Application of IFT for controller tuning to nonlinear processes in constrained environments using neural networks.
- Application of model-free Iterative Learning Control to the control of repetitive processes in constrained environments.
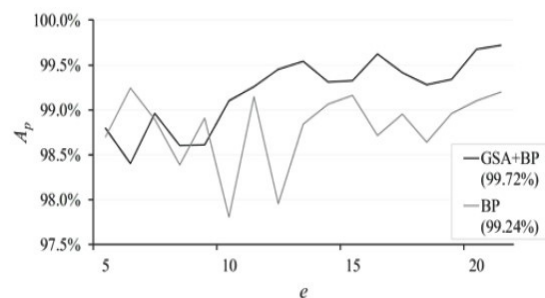
Results (overall 2011-2014)

- 26 papers (ISI) published in journals with impact factors, cumulated impact factor according to 2013 Journal Citation Reports (JCR) released by Thomson Reuters in 2014 = 51.240, cumulated relative influence score = 32.889.
- 1 journal paper indexed by international database (Zentrallblatt Math).
- 7 book chapters published in Springer-Verlag volumes.
- 17 papers published in conference proceedings indexed by Thomson Reuters Web of Science.
- 18 papers published in conference proceedings indexed by international databases (IEEE Xplore, INSPEC, DBLP, Scopus).

reference position (dashed) vs. controlled position (solid)

control signal with upper and lower contraints

control signal rate with upper and lower constraints
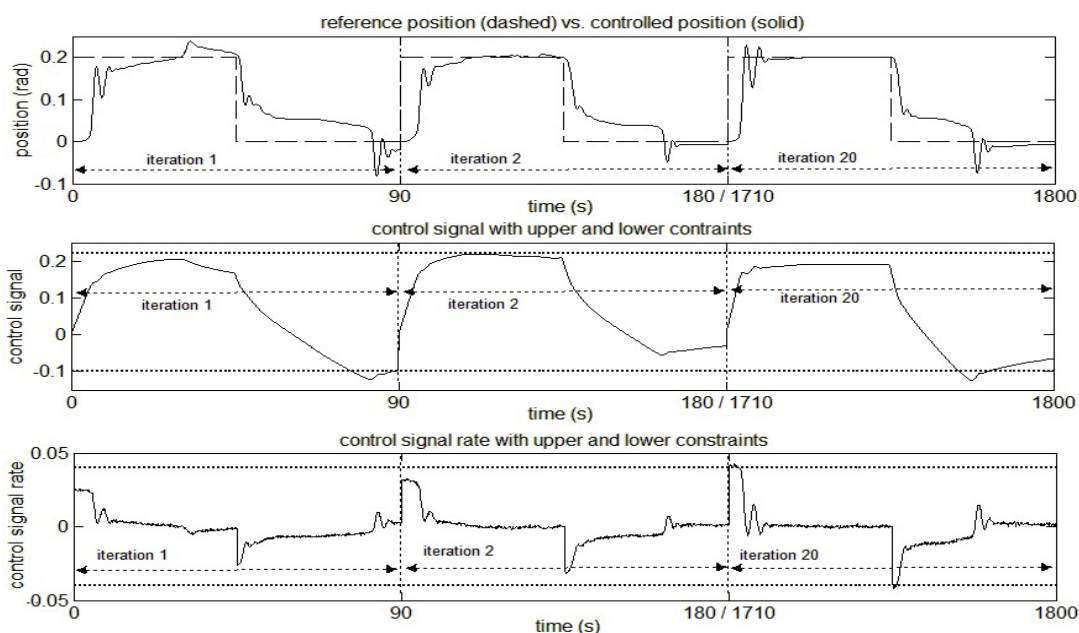
Applicability and transferability of the results

Control systems with a reduced parametric sensitivity, tools for the computer-aided design of controllers, computer-aided techniques in iterative data-based control, nature-inspired optimization algorithms in control design and image processing, tools for the systematic development of fuzzy control systems.

Financed through/by

Research team

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Research centre

Research Centre for Automatic Systems Engineering (CCISA)

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HYBRID SYSTEMS FOR CONVERTING RENEWABLE ENERGY OF SMALL VOLTAGE INTEGRATED INTO A MICROGRID

Goal of the project

The project is focused on the research, development and testing of an intelligent and flexible (configurable) small scale power system based on integration of three renewable energy sources: wind, hydro, and solar (photovoltaic) power, adapted to the available resources in Romania, in various regions of the country, working independently or connected to the grid.

Short description of the project

The project will cover the entire power conversion structure, including the design of adequate prime movers and new types of generators and power electronic converters, storage devices, power flow management system and load control. Some configurable structures (wind, micro-hydro and PV, all or a part of them, including their integration in a microgrid) will be proposed as experimental models, ready to be transferred to industry. There are proposed novelty elements regarding: low power wind turbine with integrated overspeed protection system, new generators configurations, and new topologies for power electronic converters and microgrid structures, optimal local control strategies and intelligent power system management.

Project implemented by

Politehnica University of Timisoara – Project coordinator
Technical University of Cluj-Napoca – Project partner
SC EETIM SA – Project partner

Implementation period

2012-2016

Main activities

- Microgrid components modeling, simulation and design.
- Microgrid components manufacturing, individual testing and integration in the experimental setup.
- Design, implementation and validation of the control strategies for microgrid components.
- Design, implementation and validation of the microgrid control strategy.
- Results dissemination and know-how exchange

Results

A new over-speed protection system for wind turbines.
A new electrical reactive brushless dc generator with performances comparable with high energy PM generator, at low cost.
A new RF-IPMSG with high efficiency, maintenance-free operation, and high-controllability.
A new AF-PMSG optimized for modular design. A new multiphase inverter with adequate control for the proposed generators.
New multi-input dc-dc converters with high efficiency.
High power tandem inverters for load management.
Hardware and software package for power management, power flow control, individual converter control, and MPPT and other control strategies.
Experimental microgrid system with integrated photovoltaic, wind and hydro generation.
Technical papers will be published in top international journals and conference proceedings

Applicability and transferability of the results

All the research results are the property of the project coordinator and its partners.

Financed through/by

Joint Applied Research Projects - Partnership in S&T priority domains financed by the Executive Agency for Higher Education, Research, Development and Innovation Funding (UEFISCDI).
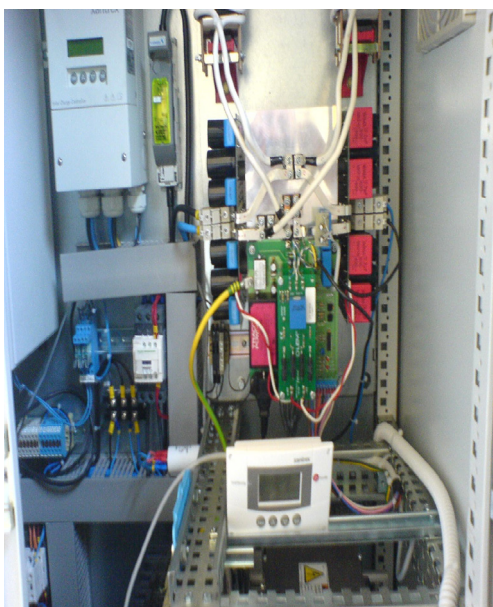
Research centre

Research Centre for Automatic Systems Engineering.

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ARTRAC – ADVANCED RADAR TRACKING AND CLASSIFICATION FOR ENHANCED ROAD SAFETY

Goal of the project

ARTRAC aims to develop an active safety system to protect vulnerable road users (VRUs) from vehicles in motion that is economically viable in the volume vehicle market. The safety system will consist of both actuators for controlling vehicle driving dynamics and the perception component for the vehicle's surroundings. It will be tested on two types of vehicles that pose the biggest hazard to VRUs in urban settings, namely cars and light delivery goods vehicles.

Short description of the project

• The environmental sensing used in ARTRAC project will be based on a single automotive 24 GHz narrowband radar sensor. This offers the potential to overcome the price barrier that has prevented VRU protection systems from entering widespread use. To meet the challenging technical requirements for very short measurement time, reliable target detection, ego motion and road condition estimation, a new transmit/receive antenna and multi-channel receiver will be developed.

Project implemented by

Consortium of seven institutions:
• 2 car manufacturers (VOLKSWAGEN, FIAT through CRF);
• 2 research organizations (VTT - Finland, CTAG - Spain);
• 2 universities (TUHH - Technical University Hamburg-Harburg, UPT - Politehnica University of Timi;oara);
• one SME specialized in car sensors (SMS Germany).

Implementation period

November 2011 – October2014

ARTRAC
Advanced Radar Tracking

The project label
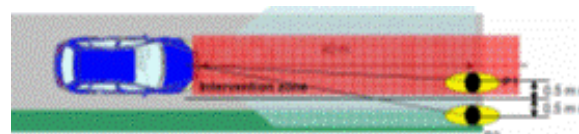
ARTRAC car radar technical specifications

Main activities

The whole system consisting of radar sensor, sensor fusion, risk assessment and vehicle control has a high potential to be launched because the majority of components is already standard equipment in series cars.

Measures for VRU protection might be divided into passive and active systems. Because of basic physical properties, passive measures can provide limited protection potential only. Therefore (active) actuators are necessary to achieve the desired protection for VRUs.

Vehicle deceleration seems to be a potential approach for active VRU protection with high benefit and high potential for high volume series cars, as they are already in use in high-end limousines.

The environmental sensing will be conducted with a novel high performance but low-cost 24 GHz narrowband radar system. From an operational viewpoint, this RF frequency fits exactly into the existing ISM band from 24,000 GHz to 24,250 GHz. Due to this techno-political feature this radar has a long term perspective on European and world-wide markets.

Results

ARTRAC addresses the following six major scientific and technical objectives:
• Develop a generic detection system able to detect pedestrians, cyclists, and other vulnerable road users (VRU) as well as vehicles.
• Implement the capability to monitor road surface conditions and detect low-friction road sections caused by water, ice or snow on asphalt, to warn or adapt the vehicle's electronic control systems such as electronic stability control (ESC) and collision avoidance systems (CAS) for changed friction conditions.
• Promote the deployment of VRU safety technologies among relevant bodies and stakeholders, including end-users.

Studies and papers developed by UPT research team for ARTRAC project in 2014

- Ioan NAFORNITA, Andrei CAMPEANU, Alexandru ISAR, Corina NAFORNITA, Adrian MACAVEIU – "Rapid Chirps", "Road Condition Measurements", "Tracking" – April 2014
- Adrian Macaveiu, Andrei Campeanu, Ioan Nafornita, Kalman-Based Tracker for Multiple Radar Targets,10th International Conference on Communications, COMMUNICATIONS 2014, May 29-31, 2014, Bucharest,IEEE Xplore,2014, pp.69-72 , DOI 10.1109/ICComm.2014.6866690
- Adrian Macaveiu, Corina Nafornita, Alexandru Isar, Andrei Campeanu, Ioan Nafornita, A Method for Building the Range–Doppler Map for Multiple Automotive Radar Targets, International Symposium on Electronics and Telecommunications (ISETC), Timisoara, November 2014, 14-15 Nov 2014, 2014,pp.151-156
- Corina NAFORNITA, Adrian MACAVEIU, Alexandru ISAR, Ioan NAFORNITA, Andrei CAMPEANU, Envelope Detector with Denoising to Improve the Detection Probability, pp 59-64. May 29-31, 2014, Bucharest, 10th International Conf. on Communications, IEEE Xplore

Applicability and transferability of the results

The key result of the ARTRAC project is a safety system that aims to protect vulnerable road users, designed to be economically viable in the volume vehicle market. The safety system consists of both actuators for controlling vehicle driving dynamics and the perception component for the vehicle's surroundings. The ARTRAC detection system will be small, lightweight and economical in order to enable an easy integration in the vehicle design. More details: http://vimeo.com/111830073

Fields of interest

radar, sensor, vulnerable road users, protection, road condition detection, collision avoidance, assisted braking.

Research centre

Research Centre for Intelligent Signal Processing (ISPRC)

Financed through/by

The project is
- 75% funded by the EU 7th Framework Program (FP7 No. 284740/2011 – 120.183 €)
- 25% by the national Program PNII (contract 223EU/24.07.2013 –178.996,74 lei)

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SY4SCI SYNERGY STUDY: OCEAN VIRTUAL LABORATORY

Goal of the project

The project will allow oceanography experts to discover the existence and then to handle jointly, in a convenient, flexible and intuitive way, the various co-located Earth Observed (EO) datasets and related model/in-situ datasets over dedicated regions of interest with a different multi facet point of view. The developed tools shall foster the emergence and prototype of new methods and products making use of the complementarity between sensors to study ocean related processes. The tool shall also provide the best possible visibility on the upcoming Sentinel1/2/3 data takes to help plan and coordinate with field campaign. The Ocean Virtual Laboratory (OVL) is filling the gap between Space agencies data portals that distributes specific EO data and analysis software dataset.

Short description of the project

The project aims to implement new software putting together two types of tools: a mathematical programming environment (as Matlab) and a geographical programming environment (as Google Earth). The raw data, as for example: Synthetic Aperture Radar (SAR) images, "temperature" images, "salinity" images, "altimetry" images; will be provided by satellites recently launched by the European Space Agency (ESA). The new software will have a multi-layer structure, each type of raw data representing a layer. The aim of new software is to exploit the information furnished by each layer and the difference of information obtained from different layers by hybridization (fusion), to characterize the phenomena at the ocean's surface (as the ocean currents for example). The tasks of the project are the following.

- Undertake an extensive scientific review to refine the project requirements and produce a consolidated Reference Baseline document.
- Implementation the SY-4Sci OVL novel synergy algorithms and the OVL platform, perform validation of new synergy products and access Sentinel1 and Sentinel3 products suitability for synergy studies.
- Write recommendation for further scientific research exploiting the synergy between ocean satellite sensors with a special focus on Sentinel1 and Sentinel3.
- Perform cross-cutting management and promotion of the SY-4Sci OVL project and open tools.

Project implemented by

- OceanDataLab, Brest, France - Coordinator
- Institut Francais de Recherche pour l'Exploitation de la MER (IFREMER), Brest, France - Partner
- Nansen Environmental and Remote Sensing Center (NERSC), Bergen, Norway - Partner
- Politehnica University of Timisoara (UPT), Romania - Partner
- Institute of Oceanology of the Polish Academy of Sciences (IO PAN), Sopot, Poland and Plymouth Marine Laboratory (PML), Plymouth, UK - Partner

Main activities

- Review of existing synergy methods and consolidation of requirements,
- Define new methods and algorithm to be developed,
- Selection and preparation of EO products database,
- Specification and implementation of the prototype platform and processing modules,
- Specification and implementation of the prototype synergy processing modules,
- Validation of the developed tools and products,
- Recommendations for further scientific research.

Implementation period

24 October 24 2014 – 24 October 2016.
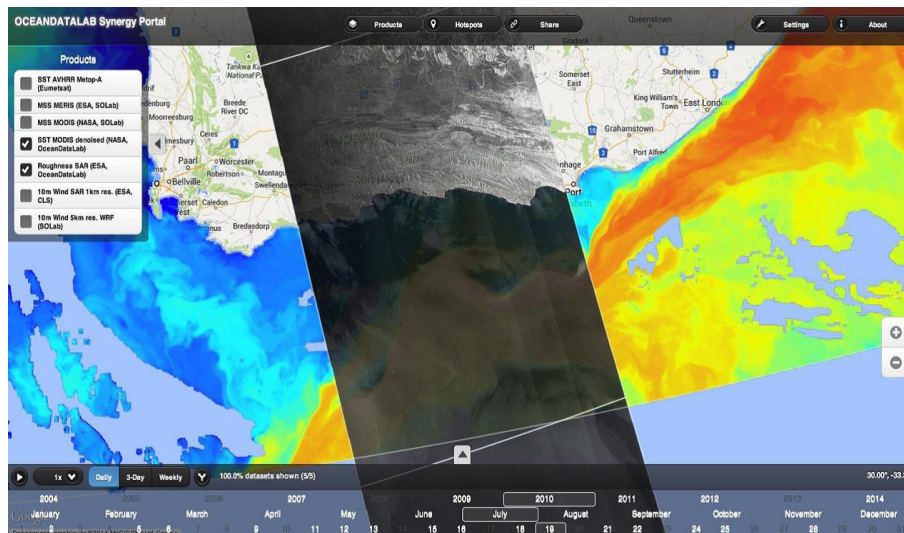
Results

- Deliverables
  - Requirements Baseline,
  - Algorithm Theoretical Basis document,
  - Product Specification document,
  - Product Validation Report,
  - Software User Manual.

- Dissemination
  - Publications,
  - Presentations

Applicability and transferability of the results

The subject is evaluated today at technology maturity level 1 (Scientific Research), and it is aimed to conclude the project at technology readiness level (TRL) 3 (Laboratory Experiments).

Financed through/by

- European Space Agency (ESA), ESRIN/Contract N° 4000112389/14/I-NB — consortium 250000 EURO,
- UPT: 24713 EURO.

Research centre

Research Centre for Intelligent Signal Processing (ISPRC)

Research team

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IMAGE FUSING TECHNIQUES (IMFUSING)

Goal of the project

The Line of Sight (LoS) of a satellite could be disrupted by obstacles, reducing the accuracy of the information provided to a Global Navigation Satellite System (GNSS) receiver. The first objective of the project is to eliminate or weight the signals coming from these satellites. To do simpler the identification of satellites having a direct LoS with the GNSS receiver this project proposes, as a supplementary sensor, to use a fish eye camera. The segmentation of the image provided by the fish eye camera permits to identify the satellites that are not on the LoS of the GNSS receiver.

Short description of the project

To provide sufficient information to the GNSS receiver, at the image processing level, the algorithms conceived will include the calibration of the camera sensor, image segmentation techniques, and distance and angle measurements deduced from calibrated image analysis. The algorithms at user sensor level will use camera information to discard measurements, will estimate boundaries of accuracy, will build a Quality of Service (QoS) indicator on the computed position and will authenticate the position. The algorithms at tracking loop level will use camera information to adjust the GNSS receiver correlator.
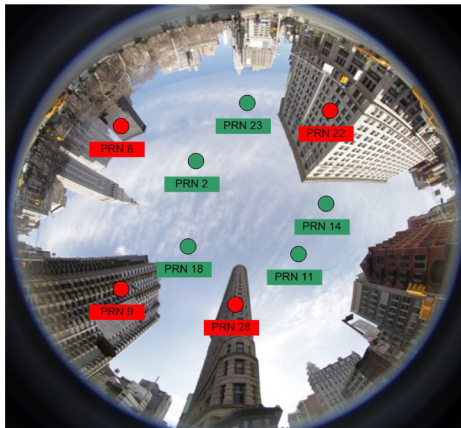
Project implemented by

Politehnica University of Timisoara - Coordinator
Thales-Alenia Toulouse France - Partnerf

Implementation period

1 October 2014 – 30 March 2017

Research centre

Research Center fo Intelligent Signal Processing

Main activities

Phase I 01/10/2014–31/03/2015: State of the art analysis,

Phase II April 1 2015 – March 31 2017
    01/04/2015–30/09/2015: Core technical development
    01/04/2015-31/01/2016: Test campaign
    01/12/2015-31/05/2016: Performance analysis
    01/06/2016-30/09/2016: Dissemination and exploitation.

Results

Deliverables:
    Report on the State of the art in Image-GNSS fusion,
    Preliminary Design Review Report,
    Test Review Board Report
    MATLAB codes for developed algorithms.
Dissemination:
    Scientific paper in a scientific journal,
    Technical Note on synthesis of the study.

Applicability and transferability of the results:

The subject is evaluated today at technology maturity level 1 (Scientific Research), and it is aimed to conclude the project at technology readiness level (TRL) 3 (Laboratory Experiments).

Financed through/by

European Space Agency (ESA), contract number 10031/02.08.2013
UPT: 128.234 EURO, Thales Alenia: 70.000 EURO

Research Team

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IONOSPHERIC PROPAGATION PREDICTIONS AND WIDEBAND COMMUNICATIONS USING HF SDR SENSORS FOR INFORMATIONAL SUPPORT IN EMERGENCY SITUATIONS IN ROMANIA

Goal of the project

The project aims to implement software and hardware solutions that integrate ionospheric sounding algorithms in a network of SDR (Software Defined Radio) sensors in order to develop and validate a HF (High Frequency) ionospheric prediction model for the territory of Romania.

Short description of the project

The project targets a systemic approach of the communication network through the
implementation, development and integration of recent technological solutions from the
perspective of providing information support for the management of interventions in disaster areas where communication infrastructure does not exist or is damaged. Project results can be applied not only in the rapid resolution of remote communications in emergency situations, but also can be extended to other applications in the HF communications range, such as encrypted data communication links for the government or the military.

Project implemented by:

- Land Forces Academy "Nicolae Bălcescu", Sibiu - Coordinator
- Interactive Systems & Business Consulting, Bucharest - Partner
- Politehnica University of Timişoara - Partner
- Technical University of Cluj-Napoca - Partner

Implementation period

21.11.2014 - 30.06.2016

Main activities

- Building a SDR sensor network for ionospheric sounding
- Elaboration of an application for HF propagation predictions in Romania.
- Development of broadband HF communications by the implementation of adaptive systems

Results

The main deliverables of the project are

- an ionospheric model which is specific for Eastern Europe;
- algorithms for the automatic identification and classification of waveforms in order to increase the transfer rate and to implement techniques for dynamically accessing the HF resources;
- SDR solutions for local monitoring and collaborative spectrum sensing in the HF range;
- a HF radio network on the territory of Romania which allows high transfer rates in collaborative environments, by automatically adapting to specific conditions of ionospheric propagation at high angles of elevation.

Financed through/by

PN-II-PT-PCCA-2013-4

Research team

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INTER-UNIVERSITY PARTNERSHIP FOR EXCELLENCE IN ENGINEERING - PARTING

Goal of the project

- Improvement and stimulation of participation to doctoral programs.
- Attracting potential researches to pursue a career in research for stimulating economic growth and development of knowledge-based society.
- Improvement of mobility during doctoral studies.
- Promoting interdisciplinarity in engineering
- Enhancing adaptability in a continuously changing scientific and economic environment

Short description of the project

- 25 scholarship grants awarded to 25 doctoral students for 18 months
- Domains: Information Technology; Electronics and Telecommunications; Systems Engineering; Power Systems and Energy; Environmental Sciences; Architecture; Materials Science; Mechanical and Industrial Engineering; Management.

Project implemented by

- Technical University of Cluj-Napoca - coordinator
- Politehnica University of Timisoara - partner
- Transilavania University of Brasov - partner

Implementation period

01.01.2014 - 31.06.2015

Main activities

- Scholarship grants for 25 doctoral students
- Financial assistance for long term mobility (more than one month) in EU universities
- Financial assistance for publications and participation to scientific conferences

Results

- Increase of number of PHD theses sustained
- Increase of number of published papers
- Improvement of quality of doctoral programs through interdisciplinarity
- Trans-national and inter-regional development

Financed through/by

Operational Sectorial program for Development of Human Resources - POSDRU 2007-2013
Priority Axis: 1. Education and Professional Formation for Supporting Economic Growth and Development of Knowledge-Based Society
Intervention Domain: 1.5 Doctoral and Post-Doctoral Programs for Supporting Research

Research team

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EXPERIMENTAL MODEL FOR AN AUTOMATIC CAPACITIVE COMPENSATOR DESIGNED FOR IMPROVING THE POWER FACTOR AND FOR LOAD BALANCING IN LOW-VOLTAGE ELECTRICITY DISTRIBUTION NETWORKS - CAEREDJT

Goal of the project

The project is intended to finance industrial research activities, needed to put in practice under the form of an experimental model of research findings of a group of academics from UPT, concerning the network load balancing electric phase through cross unbalanced capacitive compensation. In electrical networks, capacitive load variation implies variation of the capacity compensation, thus the need for building an unbalanced capacitive automatic compensator, to record load variation.

Short description of the project

The automatically unbalanced capacitive compensator proposed by this project is an innovative product, so achieving a functional experimental model involves overcoming a number of scientific and technical challenges, the most important being: control and single-phase switching of the capacitor batteries steps, the construction algorithm and implementation of a programming language for PLC process control, process optimization for automatic compensation.

Project implemented by

- Politehnica University of Timisoara— Lead partner
- S.C. ICPE S.A. Bucharest — Project partner

Implementation period

01.07.2014 - 30.06.2016

Main activities

1. Conducting studies and analysis on the alternative constructive solutions and developing the technical documentation for the construction of the experimental model.
2. Manufacturing of the experimental model and the analysis, control and monitoring systems.
3. Testing the model and proving its functionality and its utility
4. Dissemination of results and protect the intellectual property rights.

Financed through/by

UEFISCDI

Applicability and transferability of the results

The results of the project are useful for unbalanced electrical loads supplied at low voltage level, and also for the Distribution system operator (DSO).

Results

- The main outcome of the project will be a functional experimental model and its documentation of implementation for a capacitive compensator designed to improve power factor and load balancing in networks of low voltage power distribution.
- It will underpin the design and construction in a later stage, of a prototype of a capacitive automatically balance high power compensator (tens of kVA) for increasing network performance of low-voltage power distribution and utilization facilities connected to it, by reducing reactive power flow and load balancing.
- The results of the research will be disseminated in scientific papers in professional journals or communication conferences.
- New technical solutions brought by this automatic capacitive compensator, as regard to the structure, order, sizing, automatic control algorithm, will be the subject of intellectual property protection activities.

Research team

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As. Alexandru BĂLOI, PhD
Lecturer Ilie Mihai TĂUCEAN, PhD
Lecturer Mircea-Bogdan RĂDAC, PhD
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NEW FABRICATION CONCEPT OF SILVER NANOWIREPOLYANILINE TRANSPARENT, CONDUCTIVE AND FLEXIBLE ELECTRODES FOR SOLAR CELLS

Goal of the project

The aim of the project is to develop transparent, conductive and flexible electrodes for solar cells based on silver nanowire/polyaniline hybrid materials and to offer a new technical solution to decrease the sheet resistance of the silver nanowires embedded in the polymer matrix. Low melting point metallic nanoparticles (In and Sn) will be deposited on the surface of silver nanowires, allowing to weld the nanowires and to obtain a network with high electrical conduction paths.

Short description of the project

A great challenge in the actual research of solar-to-electricity conversion is the construction of flexible solar cells. Although indium tin oxide (ITO) deposited on plastic is traditionally used for organic solar cells and light emitting diodes, solutions are searched to replace the IT O layer and to manufacture cheap transparent conducting electrodes. Silver nanowires (AgNWs) are a promising candidate to replace ITO due to their high electric conductivity and corrosion resistance, but there is still the issue of increased resistance on wire contacts. The proposed solution involves the modification of the AgNWs by deposition on their surface of metallic nanoparticles with low melting temperatures like tin and indium. The modified nanowires will be suspended in a proper medium to form an electroconductive ink that will be deposited on flexible polymeric sheets. The nanowires will be welded by thermal treatment, with and without the application of static pressure

Project implemented by

Politehnica University Timisoara
Department of Applied Chemistry and Inorganic Compounds and Environmental Engineering

Implementation period

02.09.2013-30.09.2016
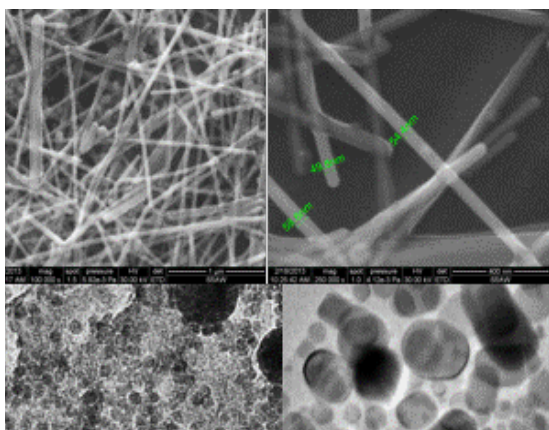
Main activities

Research activities:
- Synthesis and characterization of silver nanowires with controlled aspect ratio (2013).
- Synthesis and characterization of indium and tin nanoparticles (2014).
- Development and characterization of transparent conductive electrodes on flexible substrates using silver nanowires and assessment of their electrical and optical properties (2014)
- Synthesis and characterization of silver nanowires modified with tin and indium nanoparticles and preparation of electroconductive inks based on modified Ag nanowires (2015)
- Manufacturing of modified Ag nanowires-based flexible, transparent and conducting electrodes, with high diffuse transmittance and low sheet resistivity by coating the electro-inks on flexible substrates (2015)
- Deposition of a conducting polymer on previously manufactured electrodes and their use in the construction of dye-sensitized solar cells (2016).

Results

- Samples of silver nanowires
- Samples of indium and tin nanoparticles
- Samples of transparent and conductive electrodes

ISI publications:
- R. Banica, D. Ursu, C. Sarvas, S. F. Rus, S. Novaconi, A. Kellenberger, A.V. Racu, T. Nyari, Electrical properties optimization of silver

International conferences
- R. Banica, R. Baies, R. Bucur, C. Locovei, A. Kellenberger, T. Nyari, Study of liquid phase synthesis of silver nanowires for solar cell applications, 3rd European Energy Conference – E2C 2013, October 27-30, 2013 – Budapest, Hungary.
- R. Banica, R. Baies, D. Ursu. M. Poienar, T. Nyari, Silver nanowires synthesis in the PVP-silver-chloride system, ECO IMPULS 2013, November 7-8, Timisoara, Romania.

- R. Banica, C. Sarvas, S.F. Rus, S. Novaconi, A. Kellenberger, T. Nyari, Optimization of the electrical and mechanical properties of transparent electrodes based on silver nanowires supporrted on polyethylene terephtalate, International Symposium on Flexible Organic Electronics ISFOE 14, 7-10 July, 2014 – Thessaloniki, Greece.
- R. Banica, C. Sarvas, S.F. Rus, D. Ursu, S. Novaconi, A. Kellenberger, T. Nyari, Manufacture of ultrathin transparent electrodes based on silver nanowires with application to three-dimensional solar cells, International Symposium on Flexible Organic Electronics ISFOE 14, 7-10 July, 2014 – Thessaloniki, Greece.
- L. Cseh , C. Locovei, O. Marinica, A. Kellenberger, T. Nyari, R. Banica, Synthesis and characterization of indium nanoparticles as precursor for solar cells, New trends and strategies in the chemistry of advanced materials with relevance in biological systems, technique and environmental protection. New trends and strategies in the chemistry of advanced materials, 5-6 June, 2014 – Timisoara, Romania

Applicability and transferability of the results

The manufacture of electroconductive inks based on silver nanowires covered with metal nanoparticles with low melting points is expected to have wide technological applications and an important economic impact. This type of conductive inks may be used not only for flexible solar cells but also for other optoelectronic devices, such as flexible LEDs, organic thin film transistors, organic lasers and photo detectors, electronic paper, disposable sensors, low-cost smart cards and RF identification tags, or flexible arrays of plastic microphones.

Financed through/by

UEFISCDI - Executive Agency for Higher Education, Research, Development and Innovation Funding,
Programme IDEAS, Exploratory Research Projects.

Research centre

Research Centre for Environmental Science and Engineering
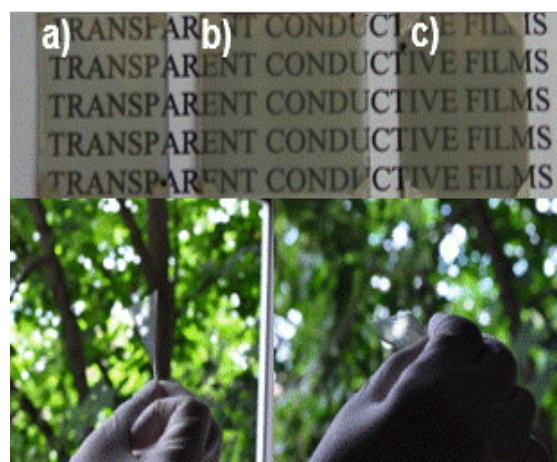
Research team

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Terezia NYARI - senior researcher
Liliana CSEH - senior researcher
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BIOCATALYST-CLICK CHEMISTRY DOWNSTREAMING TANDEM BASED INNOVATIVE KIT FOR OPTICALLY PURE FINE CHEMICALS SYNTHESIS

Goal of the project:

The project goal is to develop an innovative kit for efficient and cost-effective sequential continuous flow large-scale (multigram) preparation of optically pure chiral building blocks useful for synthesis of pharmaceutical compounds and agricultural chemicals, based on tailor-made immobilized lipases mediated kinetic resolution of various racemic substrates and a subsequent click chemistry like efficient down streaming of the reaction mixture.

Short description of the project

In this project a chemo-enzymatic process which integrates several innovative steps in both biocatalytic and down streaming parts will be set up. The utilization of tailor-made biocatalysts in industrial processes is an innovative approach, technically comparable to the synthetic solutions but with higher economic benefits. The use of immobilized biocatalysts-click chemistry tandem will permit to design easily scaled-up continuous flow procedures for industrial manufacturing of the target compounds, underlining the economic relevance of the proposal.

Project implemented by

- Politehnica University of Timişoara - Project leader
- University "Babes-Bolyai" Cluj Napoca - Partner 1
- Natural INGREDIENTS R&D S.R.L - Partner 2

Implementation period

01.07.2014-30.06.2016

Main activities

1. Preparation of various precursors: (hetero)aryl-ethanols, hydroxy- and amino acids and synthesis of various propargylic esters as O- and N-acylating agents used in enzymatic kinetic resolution (EKR).
2. Development of optimal EKR and click-chemistry type down streaming procedures.
3. Immobilization of lipases.
4. Development of the continuous flow procedure

Applicability and transferability of the results

The obtained kit, as well as the high-value products, will be marketable, but the process will be appropriate for further scaling-up, depending on the customer demands.

Financed through/by

UEFISCDI
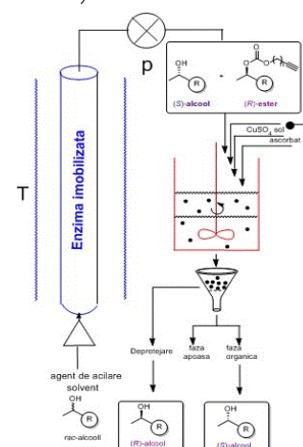
Results

1. Multi-gram amounts of various racemic compounds and various propargylic esters as acyl donors for the EKR;
2. Enantiomeric separation protocol for previously synthesized racemates, chromatographic protocols for testing the enantioselectivity of the enzymatic reactions;
3. Scientific article submitted to an ISI quoted journal;
4. Scientific presentation, published in the abstract book of an international conference;
5. Experimental protocol of down streaming procedures;
6. Immobilization protocols and analysis procedures for tailor-made immobilized lipases;
7. Integrated EKR-click-chemistry type down streaming procedure;

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TEMPERATURE ASSESSMENT OF A VERTICAL STEEL MEMBER SUBJECTED TO LOCALISED FIRE PROJECT (LocaFi)

Goal of the project

The main goal of the project is to improve the existing knowledge on the effects of the localized fires in a building compartment. With the actual methodology included in the Eurocodes for the fire design of buildings, it is only possible to assess the temperature of a steel element in the vertical axis of the localised fire. It is impossible to asses the temperature or the flux received by a vertical member at a given distance of the fire source.

Short description of the project

The project is devoted to the development of an analytical model for the calculation of the temperatures in the vertical structural steel elements of a building, subjected to localised fires.

The new method, developed by means of experimental and numerical research, will provide the fluxes received in any point of a building compartment subjected to a localised fire.
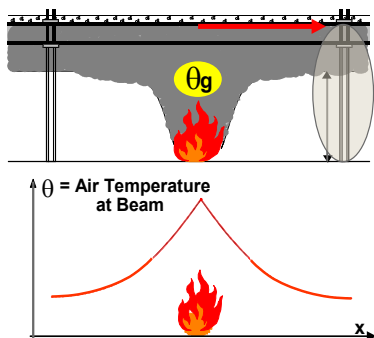
Project implemented by

- ArcelorMittal Luxembourg (coordinator)
- Centre Technique et Industriel de la Construction Métallique, France
- Politehnica University of Timisoara, Romania
- Universite de Liege, Belgium
- University of Ulster, Ireland

Implementation period

01.07.2012- 30.06.2015

Fields of interest

Design of buildings in fire situation.

Financed through/by

Research Fund for Coal and Steel – RFCS

Research centre

Research Center for Mechanics of Materials and Structural Safety – CEMSIG

Main activities

- Collection of the different national annexes and national parameters for the application of the Natural Fire Models in different European countries and implementation of theses parameters in a Software;
- Definition and realisation of laboratory tests assessing the effect of the real flame emissivity for element engulfed into the fire;
- Definition and realisation of laboratory tests assessing the fluxes received by an element subjected to localised fire but not engulfed in the fire;
- Development and validation using CFD models of simplified analytical model for the evaluation of the fluxes received by an element in any point of a compartment;
Implementation of the developed analytical model in a user-friendly tool;
- Redaction of a design guide for the application of the new methodology including design examples.

Results

Design procedures based on the analytical models developed within the project will be proposed.

Applicability and transferability of the results

The analytical models developed within the project will be introduced in a user friendly software and in an advanced calculation model for fire design, in order to offer a large utilization of the procedure for the construction market.

Research team

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EUROPEAN PRE-QUALIFIED STEEL JOINTS (EQUALJOINTS)

Goal of the project:

The goal of the project is to introduce in the European practice a qualification procedure for the design of moment resisting connection in seismic resistant steel frames, in compliance with EC8 requirements.

Particular objectives of the project are to qualify a set of standard all-steel beam-to-column joints, develop pre-qualification charts and design tools that can be easily used by designers. The project is also intended as a pre-normative research aimed at proposing relevant design criteria to be included in the next version of EC8. Besides it would contribute to the advancement of knowledge in the field of seismic behavior of steel moment resisting joints usually adopted in moment resisting frames (MR), in un-braced bays of dual moment-resisting/concentrically braced frames (MR+CB) and in moment-resisting/eccentrically-braced frames (MR+EB).

Short description of the project:

The project is the first attempt in Europe to produce qualification tools for seismic-resistant joints. Novel design methodologies and details for beam-to-column connections that are reliable, feasible and economical, solving also the open issue of design by testing required by EC8 for partial strength/stiffness connections will be provided. The cyclic behavior of beam-to-column joints has a crucial role on the overall seismic response of both MR and dual frames. Recent studies highlighted the influence of joint rotation capacity on the seismic response of mid-rise MR frames designed according to EC8.

The innovative content of the project is represented by:
- Experimental investigations on 96 beam-to-column joint specimens covering: three typical European typologies and one US dog-bone joint typology made of heavy cross sections;
- Evaluation of the influence of different parameters (e.g. axial force, loading protocol and member sizes) on the joint performance;
- Development of codified pre-qualification charts of typical beam-to-column joints used in EU practice.
- In Europe these tools do not exist in design codes. Hence, this project was intended as pre-normative research aiming to propose design guidelines for the future version of EC8.

Project implemented by

- University of Naples "Federico II", Department of Structures for Engineering and Architecture.
- Poitehnica University of Timisoara, Department of Steel Structures and Structural Mechanics

Implementation period:

01.07.2013 – 31.06.2016
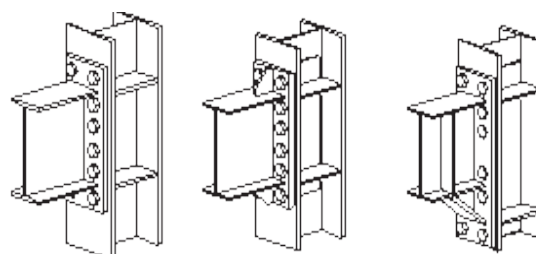
Main activities:

With respect to the aim and objectives of the project, a set of multi-storey building frames were analysed at CEMSIG centre for the selection of member cross sections for joint assemblies. The design procedure for joints was established according to the provisions of EC3, EC8 and AISC 358. Extensive pre-test finite element (FE) numerical simulations were carried out aimed to offer an accurate prediction of the joint behaviour and to find answers to problems for which decisions were taken in the design process. In addition, the experimental test set-up was designed, and validated through FE numerical simulations. As a result, shop drawings for specimens and test set-up were performed.

Future activities will be devoted to the experimental investigation of material samples, and 24 large-scale joint assemblies. In addition, the numerical models of the joints will be calibrated based on monotonic and cyclic test results, which will allow extending the experimental program with a parametrical study. Finally, the design procedure will be validated based on experimental and numerical results.
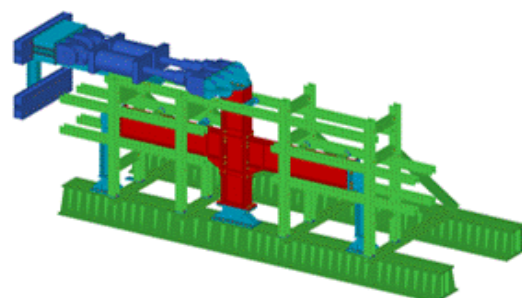
Results:

Particular results are represented by the selection of members (beams & columns) from the analyzed frames, and the development of a design procedure for bolted beam-to-column haunched connections. The pre-test numerical simulations lead to some adjustments of the joint design procedure and joint configurations. As a result, the joint configurations were established and the experimental test set-up was designed. Finally, the shop drawings for joint specimen and test set-up were completed.
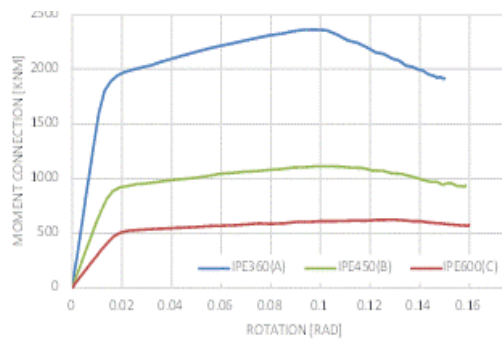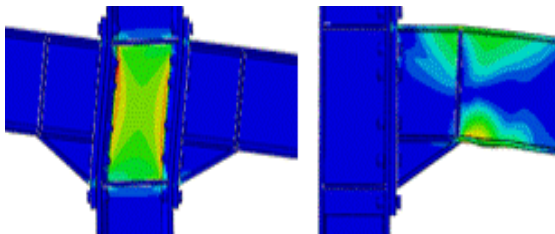
Applicability and transferability of the results:

- The project provides easy-to-use design tools for engineers and promotes saving cost solutions. In addition, the outcomes of the project will be largely beneficial for the EU industry. Because the US joints examined within EQUALJOINTS will be made of heavy sections, which are produced only in Europe, this will be an important opportunity to get on the US Market, consolidating the gain of EU economy and having beneficial impact to exportation of EU products.
- The impact and transferability of the project is by no means restricted to the selected joint configurations and this project will open the door for other joints to be included in future updates of the guidelines.

Financed through/by

Fields of interest:

Seismic resistant structures for multi-storey building frames.

Research Center

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG, Politehnica University of Timisoara.

Research team

- University of Naples "Federico II" (UNINA) - Coordinator
- Imperial College (IC)
- University of Coimbra (UC)
- University of Liege (ULg)
- Politehnica University of Timisoara (UPT)
- European Convention for Constructional Steelwork (ECCS)
- ArcelorMittal Belval & Differdange S.A. (AM)
- CORDIOLI & C

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SEISMIC PROTECTION OF ENGINEERING STRUCTURES THROUGH DISSIPATIVE BRACES OF NANO-MICRO MAGNETO-RHEOLOGICAL FLUID DAMPERS – SEMNAL-MRD

Goal of the project:

The goal of the project is to develop a seismic protection system, which uses magneto-rheological fluid (MRF) dampers, acting as semi-active structural control system. Particular objectives are:

- To develop nano-micro MRF compatible with application in seismic MR dampers;
- To design and built a 10tf capacity MR damper;
- To provide type tests, based on EN 15129-2009: Anti-seismic devices, aimed to validate, calibrate and model the damper;
- To design, execute and test a brace-damper assembly in order to validate the integration of damper and brace, including connections;
- To propose structural application schemes for implementation in practice of semi-active control brace-MRD systems.

Short description of the project:

There are three strategies for the seismic protection of structures: (i) reduce seismic demands, (ii) enhance structural damping, and (iii) use active or semi-active structural control. The current project involves the third approach focusing on semi-active systems. Semi-active devices have properties that can be adjusted in real time but cannot inject energy into the controlled system. Many of them can operate on battery power alone, proving advantageous during seismic events when the main power source to the structure may fail. The most promising devices suitable for implementation into a semi-active control appear to be magneto-rheological (MR) dampers, which succeed in overcoming many of the expenses and technical difficulties associated with other types of semi-active devices.

Response characteristics of MR devices can be changed by varying the magnetic field through different current inputs. In addition to its small power requirement, the MR damper can transfer large forces at low velocities. Currently there are MR dampers with capacities up to 200 kN and research results proved the possibility to obtain capacities up to 400-500 kN.

Project implemented by

- The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG, Politehnica University of Timişoara.
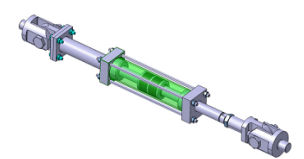
Implementation period:

01.07.2014 – 30.06.2016

Main activities:

The activities of the project are divided in three stages (I/2014, II/2015, III/2016), of which the first was completed. The particular activities covered the establishment of the seismic action for two locations (Timişoara, Bucureşti), and the estimation of the functional parameters corresponding to the MR damper.
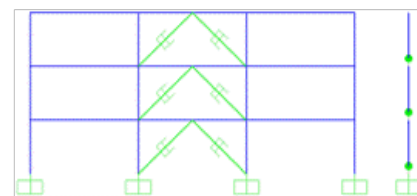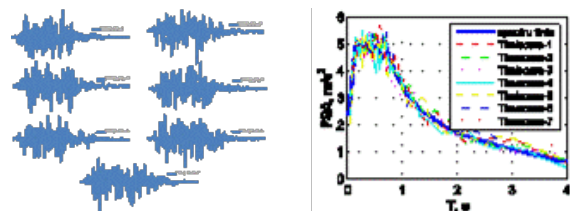
Response of the damper (3rd floor)
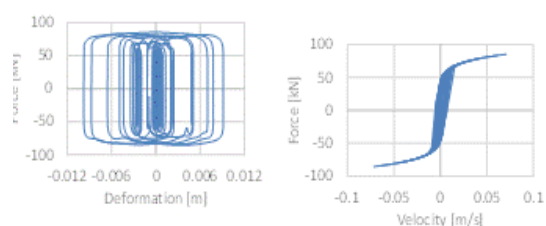
Response of the frames
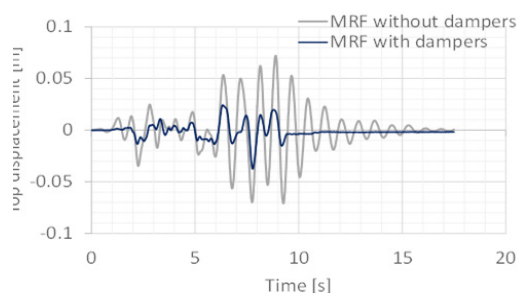
Further, a MR damper of 10 tons capacity will be designed, fabricated and tested under different loading conditions (triangular, sinusoidal, random excitations). In addition, numerical hysteretic models will be calibrated based on the tested MR damper enabling the modeling of structural response. Since the dampers in structural systems will be coupled with braces, both single damper and brace-damper assembly tests will be performed. With a numerically simulated control unit, structural systems equipped with brace-damper assemblies will be numerically tested in order to observe and characterize their behavior.

Results:

The results of the first stage comprise two sets of artificial accelerograms (stiff and soft soil) and the estimated functional parameters of the MR damper (i.e. force, deformation, velocity). It can be highlighted that the calibration procedure of the functional parameters was established, and the dependence of the parameters was identified in relation to the nature of the seismic motion. Besides, the main outcomes of the project will be:
- Nano-micro composite MR fluid recipes for seismic semi-active dampers;
- The technical solution for the MR damper;
- The prototype of the MR damper;
- Validation tests of brace-damper systems;
- Numerical evaluation of effectiveness of MR dampers in reducing seismic effects in structural applications.
- Design and numerical testing of the control algorithm on single degree of freedom systems.

Applicability and transferability of the results:

- Considering the seismicity of Romanian territory and the effectiveness of the dissipative devices targeted in the project (once under fabrication, the implementation in new and existing structures would be quite easy), the national market potential is very large. On the other hand, this market can comprise all the Balkan's area, including Turkey and Greece, with development potential towards neighbouring Asian Countries.

Financed through/by

The project is supported by a grant of the Romanian National Authority for Scientific Research, CNDI—UEFISCDI, project Nr. 77/2014 (PN-II-PT-PCCA-2013-4-1656).

Fields of interest:

Seismic resistant structures for multi-storey building frames

Research Center

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG, Politehnica University of Timisoara.

Research team

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- S.C. ROSEAL S.A.
- IMS-AR, Institute of Solid Mechanics of the Romanian Academy
- AR-FT, Timişoara Branch of the Romanian Academy
- S.C. TITAN S.A.

There are no secrets to success. It is the result of preparation, hard work, and learning from failure.
Colin Powell

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IMPLEMENTATION INTO ROMANIAN SEISMIC RESISTANT DESIGN PRACTICE OF BUCKLING RESTRAINED BRACES (IMSER)

Goal of the project:

Goal of the project: The goal of the project is to create the background for quick implementation of the steel frames with buckling-restrained braces (BRB) into Romanian practice design.

Short description of the project:

The latest version of the Romanian seismic design provisions (P100-1/2013) have introduced, for the first time in Europe, design provisions for buckling restrained braced frames (BRBF). Buckling restrained braces have a great potential in the field of seismic design of structures due to their large ductility and symmetrical cyclic response, as compared with conventional braces.

BRBF can be used both for new construction, as well as for strengthening of existing reinforced concrete, steel or masonry structures. BRB frames are able to provide two key properties of a seismic resistant structure: stiffness (for reducing interstorey drifts under moderate earthquakes) and ductility (for energy dissipation capacity under large earthquakes). BRBs were studied extensively worldwide over the past 30 years and have many practical applications especially in Japan and United States. Though researched in Europe as well, BRBs were applied in a very few applications here. The main reasons for lack of application into practice are believed to be the absence of design provisions in EN 1998-1, not enough acquaintance with the system by practicing structural engineers, need for experimental validation, and proprietary character of most BRB devices.
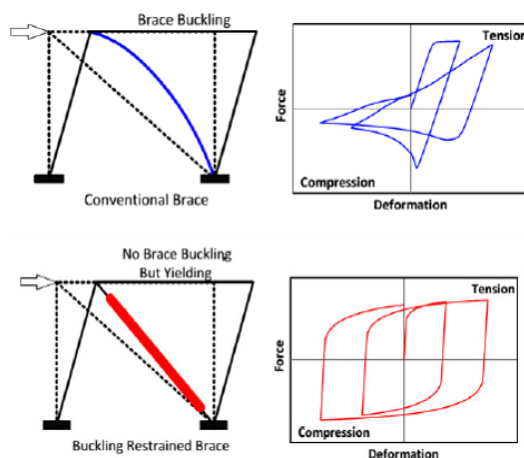
Project implemented by

- Project implemented by: CEMSIG - The Research Center for Mechanics of Materials and Structural Safety, Research and Technical Development unit of Politehnica University Timisoara, at the Faculty of Civil Engineering, Department of Steel Structures and Structural Mechanics.

Implementation period:

01.07.2014 – 30.06.2016

Main activities:

- Development of two different types of BRB prototypes: "conventional" (steel core / mortar / steel casing) and "dry" (without mortar), followed by a prequalification testing program on a set of BRBs of different capacity. This will provide an initial database on prequalified BRBs, rendering project-specific experimental programs unnecessary, at least for most common design situations;
- Transfer of the "know-how" on design and production of two types of BRBs to the industrial partner, who will be able to set up quantity production of these devices;
- Development of design guidelines for buckling restrained braces (at the device level). It will allow production of generic BRBs by local producers at more competitive prices than imported ones. "Dry" (or "steel-only") BRBs are believed to be especially suited for this purpose, as they can be easily adopted by steel fabricators;
- Development of design guidelines and design examples for steel BRB frames (at system level).
- Dissemination of the project outcomes to practising engineers, through presentations in annual conferences of the Association of Structural Engineers (AICPS) and through two workshops organised in Bucharest and Timisoara.

Results:

The following results were achieved up to the present date:

- Design of prototype BRBF and MRF structures for two building typologies (low-rise and mid-rise), which are located in two different seismic zones (Bucharest, TC = 1.6 s and Timisoara, TC = 0.7 s). Four BRBFs were designed according to Eurocode 3, Eurocode 4 and P100-1 /2013. Two of them were 3 storey-high (H = 10.50 m) and the plan layout was 3 spans of 7.5 m by 5 bays of 7.5 m. The other two were 6 storey-high (H = 21.00 m) and had the same plan layout. BRBs were disposed in chevron configuration. Moreover, a 3 storey-high MRF was designed (H = 10.50 m, plan layout with 3 spans of 7.5 m by 5 bays of 7.5 m, located in Bucharest). It will be used for comparative assessment of analysed structures from the economic and technical point of views.
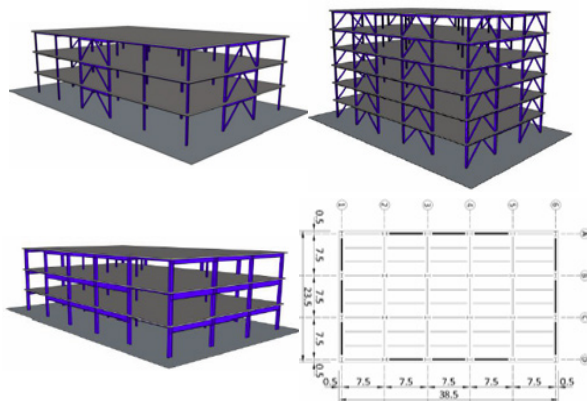
- Selection of typical capacities of BRBs. Two typical BRB capacities were selected (300 kN, respectively 700 kN), which together can cover a range of demands in BRBs ranging from 136 kN to 839 kN.
- Synthesis of existing information on performance and design of BRBs. A comprehensive literature review was performed identifying options for component materials, technology and design methods. These will serve as a starting point for developing a set of "dry" and "conventional" BRBs to be prequalified through an extensive numerical and experimental program.

Applicability and transferability of the results:

- A Design Guide for both "dry" and "conventional" BRBs for manufacturers, as well as a Design Guide (including examples) for steel BRB frames for practising engineers will be produced within the project. Moreover, a set of BRBs will be prequalified, eliminating the need of project-specific testing. The design guidelines and the prequalification will facilitate the use of BRBs in the Romanian design practice.

Financed through/by

Research Center

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG, Politehnica University of Timisoara.

Research team

- Politehnica University of Timisoara, (coordinator);
- SC Popp & Asociaţii SRL, Bucharest;
- SC HYDOMATIC SISTEM SRL, Timisoara.

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LARGE VALORISATION ON SUSTAINABILITY OF STEEL STRUCTURES – LVS3

Goal of the project

During the last decade, a lot of research projects have been funded to develop methodologies, systems and products aiming at improving the thermal efficiency as well as the global environmental footprint of steel buildings. The new standard EN15804 intended for environmental calculation of buildings takes now into account the fact that steel is a recyclable material (Module D). This project summarises all this acquired knowledge into a set of documents and two software, translate them into different European languages and finally, disseminate all over Europe by organising workshops.

Short description of the project

LVS3 is a valorisation project, which aims to promote the recently developed knowledge and design methodologies concerning the environmental impact assessment of steel and composite buildings.

Project implemented by

- ArcelorMittal Belval & Differdange S.A., Luxembourg
- Politehnica University of Timisoara, Romania

Implementation period:

01.07.2013 – 15.12.2014

Main activities

The project is divided 3 main parts:
- Creation of supporting documents (background, design guide, leaflet, software, presentations);
- Translation of documents into national languages;
- Organisation of a special training for the project's partners;
- Dissemination of the knowledge into the different European countries.
- Preparation of all data for further dissemination based on HTML – web version;

In order to achieve the objectives of the projects, theses different parts have been divided into six work packages, i.e.:
- WP1: Realisation of documentation and software about the environmental assessment of steel and composite buildings. All these documents and software interface have be written in English;
- WP2: Translation of the documentation and software interface;
- WP3: Training for partners involved in seminars;
- WP4: Organisation of Seminars in each of the participating countries;
- WP5: Post dissemination activities;
- WP6: Coordination.

Results

- The main results are the translation of the documents and software in Romanian language and dissemination of the knowledge by organization of a seminar in December 5th, 2014.
- The audience consists of designers, architects, developers, students and professors and last but not least the decision makers and authorities.
- During the seminar, printed documents as well as USB Keys that contain all data were distributed.
- A number of 83 participants attended the seminar.

Applicability and transferability of the results

At this moment the industry and the academics have good understanding of the assessment of the environmental footprint and the improvement of the thermal efficiency of steel and composite buildings.

The added value is in the fact that the research outcomes have been presented to engineering community throughout Europe.

By translating the design guides and software into local languages, the partners will access even broader audience.

Finally, introducing the methodology in the whole Europe at the same time follows the systemised approach represented by Eurocode and EN Standards to promote homogeneous design.

Financed through/by

- Research Fund for Coal and Steel
- Total budget of "LVS" project: 376.006 €
- Budget of the Politehnica University of Timisoara: 31910 €

Research Center

The Research Centre for Mechanics of Materials and Structural Safety – CEMSIG, Politehnica University of Timisoara.

Research team

- ArcelorMittal Belval & Differdange SA (Luxembourg)
- University de Ljubljana (Slovenia)
- Ceske Vysoke Uceni Technike V Praze (Czech Republic)
- University of Athens (Greece)
- University of Timisoara (Romania)
- University of Naples Federico II (Italy)
- University of Vilnius (Lithuania)
- University of Warsaw (Poland)
- Tecnalia (Spain)
- University of Miskolc (Hungary)
- University of Coimbra (Portugal)
- University of Tallinn (Estonia)
- CTICM (France)
- University of Liège (Belgium)
- Bouwen met Staal (Netherlands)
- Stalbyggnadsinstitutet Stiftelser (Sweden)
- AC&CS – CRM Group (Belgium)
- Club Asturiano de la Innovación Asociación (Spain)

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STRUCTURAL CONCEPTION AND COLLAPSE CONTROL PERFORMANCE BASED DESIGN OF MULTISTORY STRUCTURES UNDER ACCIDENTAL ACTIONS (CODEC)

Goal of the project

The main goal of the project is the development of a performance based robustness design methodology for mitigation of progressive collapse of multi-story frame buildings against extreme load events coming from both natural and man-made hazards.

Short description of the project

Steel building structural performance and safety can be endangered due to extreme loading caused by accidental actions. Direct and indirect methods can be used in design to improve the resistance and to reduce the consequences. The project aimed to evaluate the structural components and material properties that are responsible for an improved response. Thus, different structural systems and detailing were tested experimentally under all kind of actions, i.e. static, dynamic, blast or fire, and the main response parameters have been quantified. Afterwards, numerical models were validated, as a first step to perform extensive parametric studies. When all completed, these studies will allow the development of a collapse control design methodology for reducing the consequences associated with the extreme loading events (properties damages, structural failures, fatalities).

Project implemented by

- Coordinator (CO) – Politehnica University of Timisoara
- Partner 1 (P1) - Technical University of Cluj-Napoca
- Partner 2 (P2) - URBAN-INCERC (Cluj Branch)
- Partner 3 (P3) - INSEMEX Petrosani
- Partner 4 (P4) - SC ACI SA Cluj-Napoca

Implementation period

July 2012 - June 2016
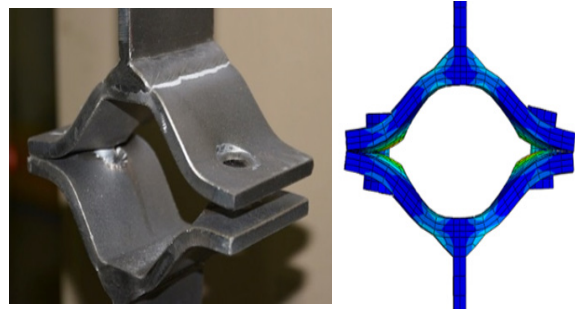
Main activities

- Preliminary investigations (Review of existing methods, identification of research needs; Preliminary analysis and selection of case study structures)
- Design of experimental and numerical simulation programs
- Experimental program on materials, weld details and connection macro-components
- Experimental program on joints (column loss scenarios and blast conditions)
- Experimental program on sub-assemblies
- Numerical simulation program
- Design guidelines and recommendations
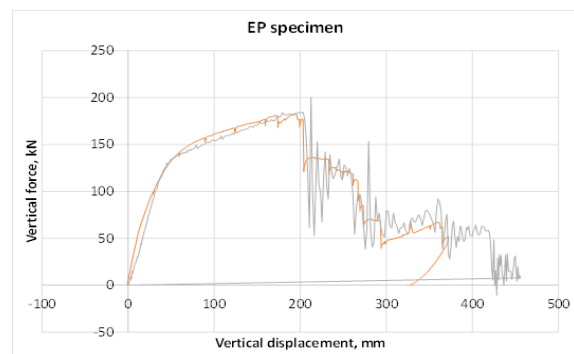
Joint specimen after the test (left) and experimental vs. numerical force-displacement curve (right)

Results

- T-stub and weld detail specimens have been tested in four different conditions: imposed displacement of 0.05mm/sec and of 10 mm/sec, combined with room temperature T=20C and elevated temperature T=542C conditions
- Monotonic experimental tests on joints under column loss scenarios have been performed for different connection typologies: welded (reduced beam section, cover plate) and bolted (extended end plate, extended end plate with haunch)
- Performance of two bay - two span steel frames has been studied experimentally. External links were introduced to simulate ties to the rest of the structure. Assemblies with and without reinforced concrete floor were tested.
- The direct blast effect on columns and joints was tested for intermediate and marginal columns. In the experiments different stand-off distances were employed.
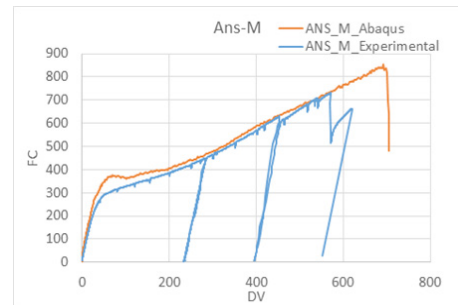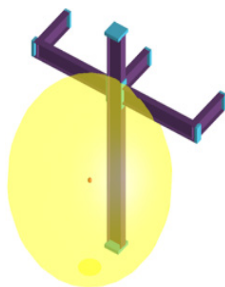
• Experimental tests on T-stub elements (top), blast T assemblies (middle) and 3D assemblies (bottom)

Applicability and transferability of the results

• Construction and design practice, code and primer manuals drafting

Financed through/by

Research Centre

• The Research Center for Mechanics of Materials and Structural Safety – CEMSIG (www.ct.upt.ro/ centre/cemsig/index.htm)

Research Team

Prof. Florea DINU, PhD (Project coordinator)
Prof. Dan DUBINĂ, PhD
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Assoc. Prof. Adrian CIUTINA, PhD
Assist.prof. Ioan Both, PhD
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NEARLY ZERO ENERGY BUILDING AND PASSIVE HOUSE – SUSTAINABLE SOLUTIONS FOR RESIDENTIAL BUILDINGS

Goal of the project

The idea of this project arose from the need to develop solutions that reduce the energy consumption in the Romanian residential building sector. The main goal of the NEZEBUILD research project is related to the design and detailing of technical solutions in order to achieve the nearly zero energy building standard, resulting in the validation of such designs through extensive monitoring. Design, detailing and execution include the construction elements, finishes and installations system.

Short description of the project

In Dumbravita (near Timisoara), a house was designed and built as a duplex. Half of the duplex was designed as a passive house (PH) and the other half as a nearly zero energy building (NZEB). During the design and use of energy efficient buildings, the need arose to implement a monitoring system with a good quality/price balance, necessary in order to validate the theoretical design. The PH and NZEB are equipped with monitoring systems. Through the monitoring process of the two houses, the energy consumption is measured and thermal comfort parameters are kept under observation. The monitoring systems register data which is uploaded to a web server. The components of the monitoring systems (central units and several ambient/energy sensors) resulted from the need to make data available online and the physical measurements that had to be taken. All project activities aim at developing a recommendation design guide regarding PH an NZEB based on experimental research.

Project implemented by

- Project Partnership comprising Politehnica University of Timisoara - CCI Department and Arhitim.

Implementation period

2012 – 2016

Main activities

- Design and detailing of NZEB system including procurement of materials, equipment and elaboration of energy performance certificate for NZEB.
- Elaboration of research reports and scientific papers.
- Energy performance assessment of the passive house using the recorded data from the monitoring system.
- Execution of finishes for the NZEB, mounting of HVAC system and procurement of all the other necessary equipment.
- Design of the monitoring system and initiation of the monitoring activities for the NZEB.
- Elaborating a comparative PH vs. NZEB study on energy efficiency; optimization of global cost for NZEB;
- life-cycle assessment of NZEB.
- Dissemination of recommendations and general rules for implementing energy efficient residential houses in temperate climate.

a) Normal image

b) Thermal image

Fig. 1 General view of house

a) Passive house

b) Nearly zero energy building
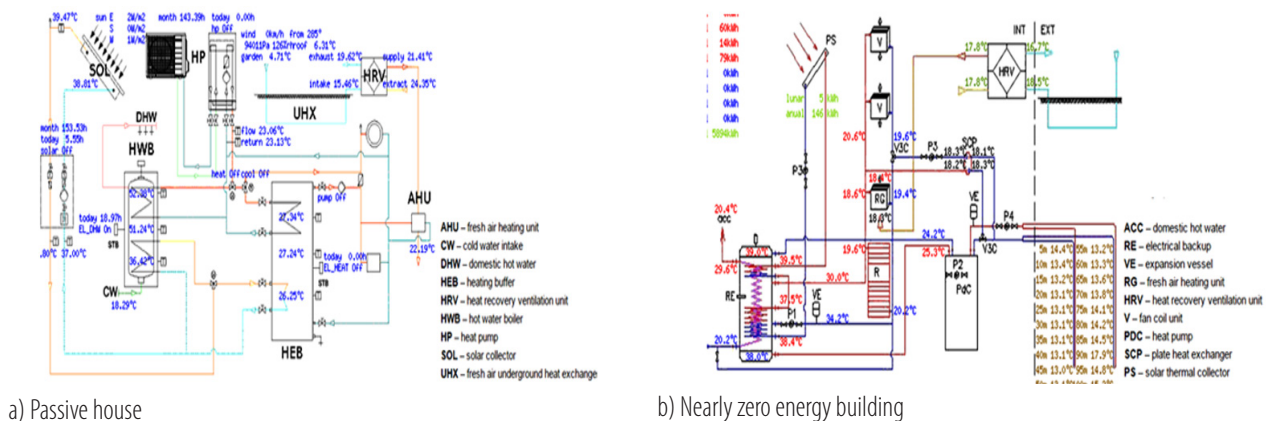
Fig. 2 Schematic representation of the buildings services

Results

Currently, the most relevant results consist in:
1. validation, verification and centralization of data obtained through the monitoring systems;
2. analysis of the monitoring data and energy certification based on actual measured energy consumption of PH;
3. completion of the finishing and equipping works on the NZEB;
4. installation of the monitoring system and initiation of the monitoring for NZEB;
5. evaluation of the energy consumption for the NZEB, registered since the initiation of the monitoring process (January 2014);
6. monitoring and evaluation of the energy produced by the solar photovoltaic panels installed for the NZEB;
7. elaboration of a comparative study between the PH and the NZEB in order to identify the advantages and disadvantages that characterize each type of house.

Applicability and transferability of the results

The topic of the project is closely related with the increasing concern of nowadays society on reducing the energy consumption in buildings. The targeted groups of the project are scientist, specialists in the energy efficiency field and stakeholders. The project deliverables will assure the transfer of knowledge, generating further „know-how" for scientific community and for practicing specialists (civil and environmental engineers, electrical and energy engineers, architects, technicians).

Research Centre

• Research Centre for Retrofitting of Constructions – RECO
• CCI Department

Research Team

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Prof. Valeriu STOIAN, PhD
Assist. Lecturer Tamas NAGY-GYORGY, PhD
As. Sorin-Codrut FLORUT, PhD
As. Eng. Cosmin DAESCU, PhD
Eng. Simon PESCARI, PhD student
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CH4LLENGE – ADDRESSING THE FOUR KEY CHALLENGES OF SUSTAINABLE URBAN MOBILITY PLANNING

Goal of the project

Achieving sustainable, energy-efficient and environmentally friendly transport systems is one of the European key aims. Sustainable Urban Mobility Plans (SUMPs) are an instrument that contributes to reaching the climate and energy targets set by EU leaders and is promoted by the European Commission in relevant documents such as the Transport White Paper and Action Plan on Urban Mobility. Cities frequently face major barriers while creating their own Sustainable Urban Mobility Plans.

Short description of the project

In CH4LLENGE (2013-2016), nine European cities, and eight supporting organisations have teamed up for overcoming the four most pressing challenges in sustainable urban mobility planning:

- Stakeholder participation and citizen involvement
- Institutional cooperation between sectors and disciplines
- Identification of the most effective policy measures
- Monitoring and evaluation of progress in SUMP development

For each challenge, the project cities analyze their local mobility situation, develop new strategies how to tackle their urban mobility problems and test solutions to overcome barriers in participation, cooperation, measure selection as well as monitoring and evaluation in more than forty pilot schemes.

Based on the lessons learned from the pilot schemes in the nine participating project cities, on the experience from the Follower Cities and on the results from the training activities, four CH4LLENGE Kits will be developed as the main outputs of the project. Each kit will address one challenge and will consist of a comprehensive manual, a brochure and the relevant e-learning modules. The kits will be available in English, Czech, Croatian, Dutch, French, German, Hungarian, Polish and Romanian.

Both, cities with a lot of experience with integrated planning approaches and cities initiating the SUMP process will benefit from the results of CH4LLENGE.

Implementation period

2013-2016

Main activities

- CH4LLENGE will produce four practical CH4LLENGE kits covering the identified SUMP challenges: participation of stakeholders, institutional cooperation, Identification of most effective measures and monitoring and evaluation. The kits will consist of a comprehensive manual, a quick-facts brochure and the relevant e-learning modules aimed at local practitioners and will guide you through participation processes,institutional cooperation, measure selection as well as monitoring and evaluation procedures;
- Four interactive SUMP Challenge Training Workshops are held for local planners and decision-makers. In addition, National SUMP Seminars and Summer Schools are organized in the Czech Republic, Croatia, Hungary, Poland and Romania.
- Learn with us online by registering for our free Online Learning Courses and benefit from the results of the workshops and seminars as well as the experiences from the CH4LLENGE cities.

GUIDELINES

DEVELOPING AND IMPLEMENTING A
SUSTAINABLE URBAN MOBILITY PLAN
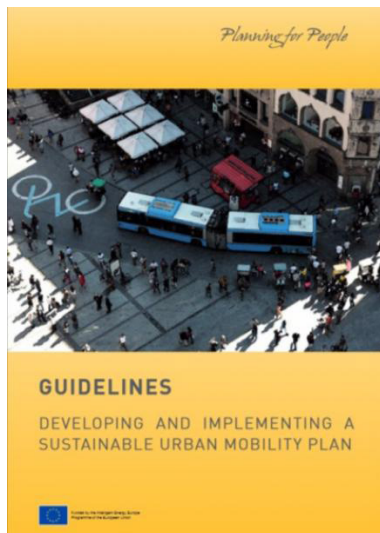
Financed through/by

IEE – Intelligent Energy Europe Programme of the European Union.

Project implemented by

The CH4LLENGE cities:
- Amiens (France)
- BKK Centre for Budapest Transport (Hungary)
- Brno (Czech Republic)
- Dresden (Germany)
- Ghent (Belgium)
- Krakow (Poland)
- Timisoara (Romania)
- West Yorkshire Passenger Transport Executive, WYPTE (METRO) – Leeds (UK)
- Zagreb (Croatia)

SUMP Knowledge Partners:
1. Rupprecht Consult, Forschung & Beratung GmbH (Lead Partner) – Cologne (Germany)
2. The Association for Urban Transition, ATU – Bucharest (Romania)
3. Forschungsgesellschaft Mobilität - Austrian Mobility Research FGM – AMOR – Graz (Austria)
4. Institute for Transport Studies (ITS)
5. University of Leeds (UK)
6. Polis – European Cities and Regions Networking for Innovative Solutions – Brussels (Belgium)
7. Politehnica University of Timisoara (Romania)
8. Union of the Baltic Cities Commission on Environment UBC – Turku (Finland)
9. Urban Planning Institute of the Republic of Slovenia, UIRS – Ljubljana (Slovenia)

Research team

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HIGH MAGNETIZATION MAGNETIC NANOFLUIDS AND NAO-MICRO-COMPOSITE MAGNETIZABLE FLUIDS: APPLICATIONS IN HEAVY DUTY ROTATING SEALS AND MAGNETORHEOLOGICAL DEVICES

Goal of the project

The project is oriented to the extension of the performances of rotating seals and adaptive motion control devices to meet the requirements of several well-defined new applications, by high and very high magnetization sealing fluids and new types of magnetorheological fluids to be synthesized.

Short description of the project

The project concept and objectives are illustrated schematically in figure the below:
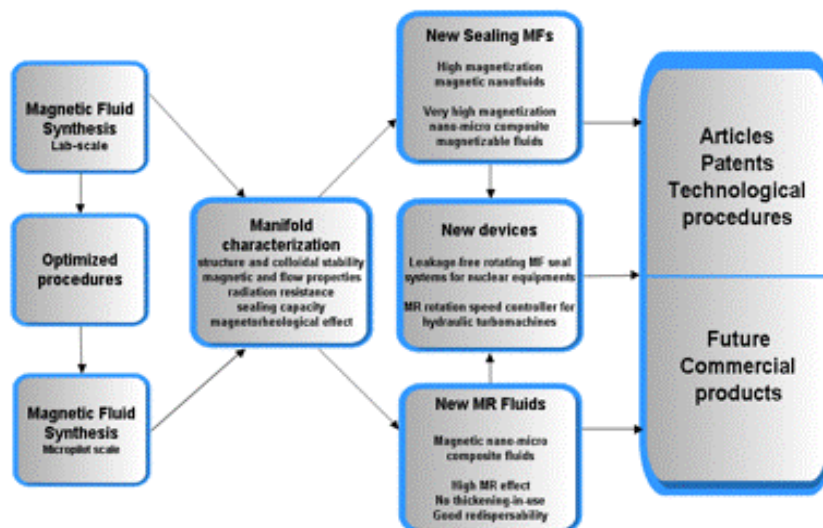
Project implemented by

• Romanian Academy – Timisoara Branch (Project coordinator),
• Politehnica University of Timisoara (Partner 1),
• S.C. ROSEAL S.A. Odorheiu Secuiesc (Partner 2)
• National Institute for R&D in Electrical Engineering ICPE-CA Bucharest (Partner 3).

Implementation period

23.07.2012 - 23.07. 2016.

Main activities

The main activities of the MagNanoMicroSeal project are:
• Synthesis and manifold characterization of magnetizable fluids for high pressure and heavy duty rotating seals and magnetorheological devices and, respectively,

• Design, fabrication and testing of leakage – free magnetofluidic rotating seal and magnetorheological (MR) control devices for well-defined applications/exploitation conditions.

Results

The main results of this project refer to the elaboration of the following **technological procedures:**
• synthesis of high magnetization sealing fluids;
• synthesis of nano-micro structured magnetorheological fluids;

and **qualification procedures:**
• magnetic nanofluids for sealing applications in nuclear equipments;
• magnetic nanofluids for rotating seals for nuclear equipments.

The contributions of Politehnica University of Timisoara to this project refer mainly to complex magnetic, rheological and magneto-rheological analyses of the magnetic sealing fluids and nano-micro structured magnetorheological fluids.

Mechanical – magnetofluidic tandem rotating seal for compressors and liquified gas pumps (functional model)
(Partner 2 – S.C. ROSEAL S.A.)

Applicability and transferability of the results

The technological progress is strongly evidenced by future commercial products planned for the industrial partner S.C. ROSEAL S.A.: 16 new types of magnetically controllable fluids, 1 prototype and 3 functional models of magnetofluidic devices for nuclear and hydraulic power engineering.

Financed through/by

Ministry of National Education through the Executive Agency for Higher Education, Research, Development and Innovation Funding, Partnerships in priority S& T domains Programm PN II, Collaborative Applied Research Projects PCCA 2011 - UEFISCDI

Research centre

• Research Center for Engineering of Systems with Complex Fluids, Politehnica University of Timisoara
• Magnetometry Laboratory, Rheology Laboratory, Numerical Simulation and Parallel Computing Laboratory
• URL: http://mh.mec.upt.ro/ccisfc/
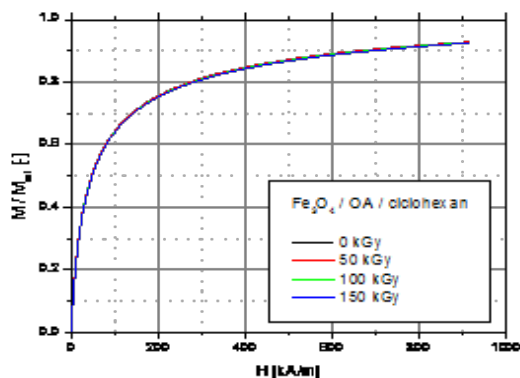
Magnetization curves for non-/ irradiated MF/cyclohexane (OA) (Partner 1 – Politehnica University of Timisoara)

Research team

The project research team consists of 42 researchers, engineers and technicians
Dr. Ladislau VEKAS - the project manager
Assoc.Prof. Floriana D. STOIAN, PhD
Phys. Oana MARINICA
Lect. Sorin HOLOTESCU, PhD
Assoc. Prof. Nicolae CRAINIC, PhD
Lect. Andreea DOBRA, PhD
Lect. Adelina HAN, PhD
Res. Assist. Florica BALANEAN
Res. Assist. George GIULA.

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ENVIRONMENTAL ENERGY HARVESTING HYBRID SYSTEM BY PHOTOVOLTAIC AND PIEZOELECTRIC CONVERSION, DC/DC TRANSFORMATION WITH MEMS INTEGRATION AND ADAPTIVE STORAGE

Goal of the project

The design and testing of the prototype of a hybrid system for energy harvesting from the ambient through photovoltaic conversion, DC/DC transformation with MEMS integration and adaptive storage, will be carried out. A key novel component is the planar power micro-transformer for high frequency, with hybrid magnetic nanofluid/ferrite core and windings fabricated in MEMS technology, a part of the DC/DC converter. A second key component is the photovoltaic cell, which relies on novel solutions.

Short description of the project

A prototype with wireless sensors powered by the harvesting system will be designed and tested.

Project implemented by

- National Institute for R&D in Electrical Engineering ICPE-CA Bucharest (Coordinator)
- Politehnica University of Timisoara (Partner 1)
- Romanian Academy – Timisoara Branch (Partner 2)
- Politehnica University of Bucharest (Partner 3)
- SYSCOM PROCESS CONTROL LTD (Partner 4).

Implementation period

01.07.2014 – 30.06.2016

Main activities

- elaboration of the experimental model of the energy harvesting hybrid system by photovoltaic conversion and DC/DC transformation with MEMS integration;
- design and testing of the experimental model of the energy harvesting hybrid system by photovoltaic conversion and DC/DC transformation with MEMS integration;
- design and testing of the prototype of the energy harvesting hybrid system by photovoltaic conversion and DC/DC transformation with MEMS integration.

Results

- The main result of the project will be the integration of an innovative photovoltaic conversion system and an original DC/DC converter, which utilizes a planar, spiral, MEMS, hybrid (magnetic nanofluid/ferrite) cored micro-transformer in an efficient device for energy harvesting.
- Regarding the use of a magnetic nanofluid core micro-transformer for the DC/DC converter, from the manufacturing point of view, it is expected that once the appropriate magnetic nanofluid characteristics are established, it will offer an easier way of obtaining the transformer core compared to a solid one.

- From the operating point of view, it is expected that by replacing the solid core with a liquid core will result in a better heat dissipation and reduction of the thermal stresses in the micro-transformer, leading to a longer life-cycle, maintaining or even improving the electric characteristics.

Applicability and transferability of the results

The product can bring added value for further development as an end-product to the industrial partner. Possible applications are characterized by their placement in hard to reach places, isolated and without local and/or conventional sources. Among these are applications for industrial automation, monitoring of various parameters in industry, agriculture, surveillance and monitoring of perimeters.

Financed through/by

UEFISCDI, Partnerships in priority S& T domains Programm PN II, Joint Applied Research Projects PCCA 2013.

Research centre

Research Center for Engineering of Systems with Complex Fluids, Politehnica University of Timisoara

Research team

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IMPROVEMENT OF THE TITANIUM WEAR RESISTANCE BY ELECTRON BEAM REMELTING OF THE PRE-DEPOSITED THERMAL

Goal of the project

Improvement of the exploitation performance of the titanium, especially wear behavior, without influencing its good corrosion resistance.

Short description of the project

Titanium is one of the most promising metals in field of high specific strength engineering. Although it offers attractive mechanical, chemical and physical properties, its surface properties are deficient, possessing poor fretting fatigue resistance and poor wear resistance properties. Thermal spray coatings is one of the most common ways to improve the surface characteristics of the materials being used in awide range of industries to improve the abrasive, erosive, and sliding wear of machine components.

The proposed theme focuses on the improving of the titanium wear resistance by electron beam (EB) remelting of the pre-deposited oxidic powder Al2O3-TiO2 using the high velocity oxygen fuel (HVOF) and atmospheric plasma spraying (APS) methods. The EB treatment may lead to the elimination of porosity, enhancement of the coating strength and chemical homogeneity, and the development of metallurgical bonding at the coating-substrate interface producing strengthened coatings adhesion.

Main activities

1. State of the art and perspectives evaluation in surface coatings technique used as a method in order to improve the wear behavior of the titanium;
2. Development of HVOF and APS sprayed Al2O3-TiO2 coatings on the surface of titanium and their remelting using the electron beam (EB) method;
3. Analysis and characterization of the obtained HVOF sprayed Al2O3-TiO2 coatings before and after the electron beam remelting treatment;
4. Study of the wear and corrosion behavior of the coatings before and after the electron beam remelting;

Results

- Deposition of the Al2O3-TiO2 coatings using the HVOF and APS spraying methods on the surface of a titanium substrate
- Electron beam remelting of the pre-deposited Al2O3-TiO2 coatings
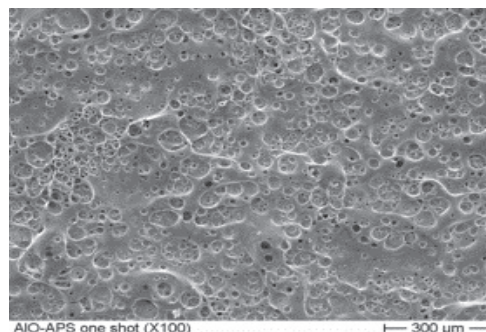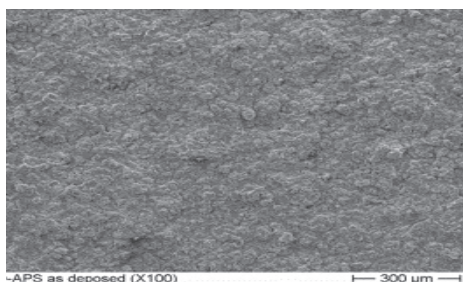
AlO-APS one shot (X100) ⊢— 300 μm ⊣

APS as deposited (X100) ⊢— 300 μm ⊣

Project implemented by

Politehnica University of Timisoara

Implementation period

02.09.2013-30.09.2016

Applicability and transferability of the results

The results which will be obtained in frame of the project will be transferred to companies in the field of automotive industry and not only. Also they will be presented to national and international conferences and published in scientific journals.

Research Centre

Research Centre for Processing and Characterization of Advanced Materials

Financed through/by

UEFISCDI - Executive Unit For Financing Education Higher Research Development And Innovation

Research team

Ion-Dragos UTU - Project manager
Viorel-Aurel SERBAN – senior researcher
Cosmin CODREAN – senior researcher
Carmen OPRIS – senior researcher
Iosif HULKA – postdoc researcher

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SUSTAINABLE DEVELOPMENT OF A RESEARCH CENTER IN BANAT REGION AND DANUBE FLOW AREA THROUGH SCIENTIFIC RESEARCH AND ENVIRONMENTAL SIMULATION TOOLS TO ASSES AND EVALUATE POTENTIAL THREATS. ACRONYM: ENVIROBANAT

Goal of the project

Strengthening the cross border cooperation in Banat region, development of two state-of-the-art research laboratories in the field of environmental protection and contribution to the development and increase visibility of regional scientific research actors and opportunities.

Short description of the project

We started the project having in mind the improvement of the quality of life for communities in Banat region and increasing the overall competitiveness of research capabilities and visibility in cross border area. It this century development without environmental concern isn't possible as we should think about sustainable actions only. In this respect, the Envirobanat project comes to support NGO's, industries and societies with valid, relevant and accessible data regarding current state of air and surface water quality in Banat region, with high resolution scientific equipment's and relevant research capabilities, both in manpower and research infrastructure and with well-trained experts.

Project implemented by

- Politehnica University of Timisoara
- University of Novi Sad, Technical Faculty "Mihajlo Pupin" Zrenjanin

Implementation period

12.06.2013 – 11.06.14
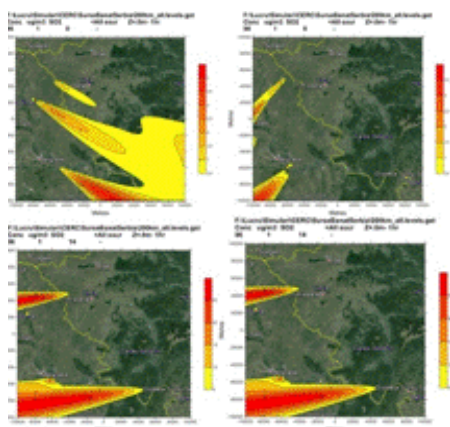
Main activities

- In-situ monitoring of surface water quality on Danube and its main tributaries (pH, nitrite/nitrate, COD/DO, Fe, Phosphor, suspended matter;
- Collection of air quality data from over 10 continuous air quality monitoring stations in Romanian and Serbian Banat regions;
- In-situ monitoring of airborne particles, concentration and aerodynamic sizing in the range of $0.3 \div 20$ μm;
- Organizing two major scientific conferences, one in Timisoara and one in Zrenjanin;
- Organizing training sessions for knowledge transfer (air quality dispersion tools, PM10 sizing and monitoring techniques) for Serbian students and experts
- Realization of several studies for air pollutants dispersion in Banat area from relevant industrial sources in the region.
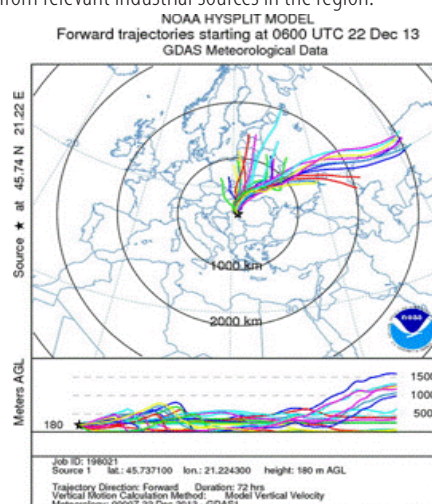
Results

- Creation and development of an extensive air – NO/NO2, CO, SO2, benzene, toluene, xylene, particle concentration (PM10, PM4, PM2.5 & PM1), mass distribution and size distribution ($0.3 \div 20$ μm) – and surface water quality parameters (pH, NO2-, NO2-, P, suspended matter, BOD, COD, DO) for Banat region and Danube tributaries, downloadable from www.envirobanat.ro;
- Acquisition of high-end/high resolution equipment's for air and water quality research;
- Extensive training of 15 Serbian students in the use of Cambridge Environmental Research ADMS5 and ADMS Road atmospheric dispersion modelling systems;
- Extensive training of 12 Serbian students in the use of PHOENICS – computation fluid dynamics software for environmental studies;
- Extensive training of 19 Romanian students in the use of GRIMM instruments – Application of laser diffraction particle sizing;
- Organization of two regional conferences, in Zrenjanin and Timisoara;
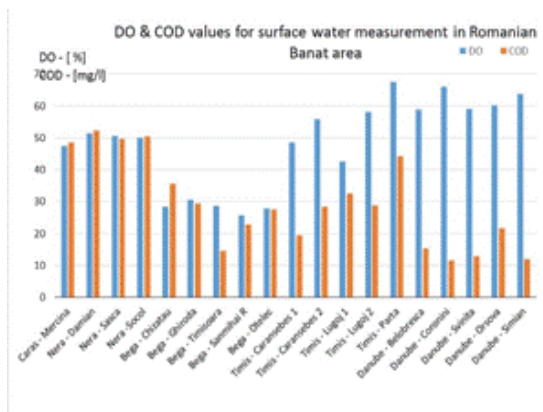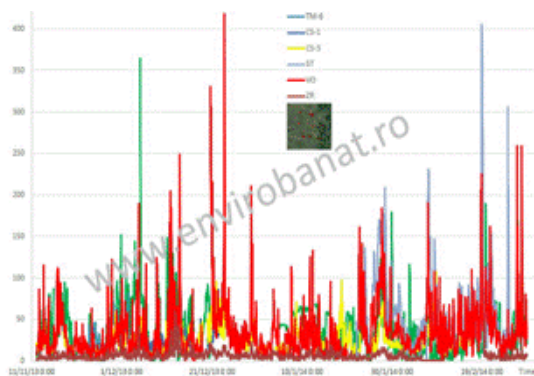
Applicability and transferability of the results

All obtained results are available for download via project webpage www.envirobanat.ro, in form of individual files, pdf or database. The project outputs provides significant tools to support local and regional universities, NGO's and authorities in their effort to contribute to regional economic growth by means of durable medium and long term development strategies.
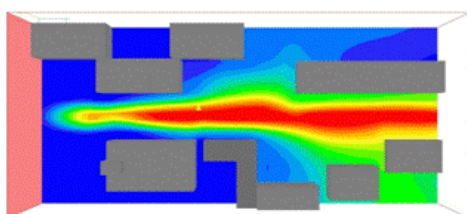
Financed through/by

Research team

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Gavril BRĂTEANU
TFMP: Milan PAVLOVIC, Aleksandar DJURIC, Bogdana VUJIC, Milan NIKOLIC, Marko SIMIC, Branko DAVIDOVIC, Aleksandar PAVLOVIC, Dejan DJORDJEVIC.

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NUTRITIONAL LABELING STUDY IN BLACK SEA REGION COUNTRIES - NUTRILAB

Goal of the project

- Bring together, review and analyze current research on consumer understanding of claims, and also labeling where this would inform our knowledge of consumer understanding of claims.
- Gather information on how consumer understanding of claims varies across different population groups, to gain insight into the understanding of the 'average consumer'.
- Draw conclusions from existing research to see whether there are areas where further information would be useful, and to inform the direction that any additional research conducted in future could take. A strong component in this framework will be the capacity building. It will explicitly aim to identify and integrate the different and overlapping conceptual understandings of scientists from the different disciplines carrying out joined research in this project.

Short description of the project

This multidisciplinary and comparative Joint Exchange programme will identify and examine how nutritional labeling in European countries and out of Europe can influence on health and welfare of population. Health professionals agree that the relationship between diet and health is important. Our eating habits can help or hurt our overall health and well-being. Good eating habits include being a smart shopper and selecting foods that reflect the Dietary Guidelines. The food label was designed to help people choose foods for a healthful diet. By using the food label, we can compare the nutrient content of similar foods, see how foods fit into our overall diets, and understand the relationship between certain nutrients and diseases.

Project implemented by

- Institute of Microbiology and Biotechnology, Academy of Sciences of Moldova (IMB), Moldova
- Politehnica UIniversity of timisoara (UPT), Romania
- University of Food Technologies (UFT), Bulgaria
- Fundatia pentru Cultura si Invatamant "Ioan Slavici", Romania
- Lucian Balaga University of Sibiu (ULBS),Romania
- University of Rousse Angel Kanchev (UR), Bulgaria
- Transilvania University of Brasov (UNITBV), Romania
- Technical university of moldova (TUM) Moldova
- Donetsk National University Economics and Trade named after M. Tugan-Baranovsky (DONNUET), Ukraine
- Kharkiv State University for Food Technologies and Trade (KSUFT), Ukraine
- National University of Food Technologies, (NUFT), Ukraine
- St. Petersburg State Institute of Technology (Technical University) (SIT), Russian Federation

Implementation period

01.01.2013 – 31.12.2015

Main activities

1. Integrate experiences from consortium countries into NUTRILAB project development;
2. Provide guidelines for sampling and administration;
3. Translate the NUTRILAB results and questioners from English to the language instruction in the respective countries;
4. Coordinate the NUTRILAB data collection for all consortium countries and partners and other participating countries;
5. Relevant theories, findings and methodology, and provide an overview of previous similar surveys to aid instrument development;
6. Collect data in each NUTRILAB consortium country.
7. data collection will be defined in different steps:
- definition of keywords for search engines;
- Web-browsing;
- Compile a report/book towards the end of the project.

Results

- NUTRILAB seasonal schools which provide within a reasonably compact timeframe as a thorough and exhaustive treatment as possible of various topics in food labeling, but from a particular angle in each case
- Second North and East European Congress on Food (NEEFood-2013) which was held on May 26-29 2013 on the premises of the National University of Food Technologies

Applicability and transferability of the results

- Review of EU and national action plans, papers surveys;
- Review of EU and national R&D projects and programmes;
- Code and clean the national data files (all partners);
- Merge the national data files into the international data file, and clean it;
- Conduct general overall comparative data analysis and sum up findings from the project at large;

Financed through/by

Project number: 318946 - FP7-PEOPLE - 2012 - IRSES

Research team

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Dumitru MNERIE
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Petru ANDEA
Hannelore FILIPESCU
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Web: http://www.rosita.ro/nutrilab/news.html

NOVEL TECHNIQUE TO ENHANCE THE SECURING LEVEL OF SECURITY PAPER USING THE SUPERPARAMAGNETIC FINGERPRINT OF MAGNETIC NANOPARTICLE DISPERSIONS ¬- NANOMAG-SECURITYPAPER

Goal of the project

Security paper is among the most important ingredients used in the fight against the forgery of private or public documents. The continuous diversification and sophistication of the paper securing techniques is one of the most important ways to erect fences against forgery attempts. The NanoMagSecurityPaper project aims to expand the diversity of high tech means for paper securing. The general objective of the project is to elaborate a new paper securing technique based on the superparamagnetic fingerprint of magnetic nanoparticles made of oxide compounds.

Short description of the project

The objective of the project is to elaborate a new paper securing technique based on the superparamagnetic fingerprint of the magnetic nanoparticles.

Project implemented by

- Romanian Academy – Timisoara Branch (CO)
- SC CEPROHART SA (P1)
- SC ROSEAL SA Odorheiu Secuiesc (P2)
- SC Datronic – NCIP SRL (P3)
- National Institute of R&D for Izotopic and Molecular Technologies Cluj-Napoca (P4)
- Politehnica University of Timisoara (P5).

Implementation period

01.07. 2014 – 30.06.2016

Main activities

1. to elaborate superparamagnetic paper assortments with
- 1.1 low security level, using polydisperse magnetic nanoparticles,
- 1.2 high security level, using bidisperse magnetic nanoparticles, an
- 1.3 white color, using core-shell (core/magnetic, shell/polymer) particles.
2. to elaborate and test the authentication method using the magnetogranulometry technique applied to
- 2.1 static magnetometry
- 2.2 dynamic magnetometry.

Results

1. Synthesis and magneto-optic characterization of monolayer stabilized magnetic nanoparticles with oleic acid
2. Synthesis and magnetic, TEM and FTIR characterization of magnetic nanocompozites embedded in three type of oxide matrices:
- SiO2 based magnetic nanocomposites;
- TiO2 based magnetic nanocomposites;
- ZnO based magnetic nanocomposites.

Applicability and transferability of the results

The new method of securing paper using the superparamagnetic nanoparticles can be transferred to SC Ceprohart SA Braila. The transfer will contribute to:
- diversification of the product made in the national paper industry with simple brown paper secure and secure complex white paper,
- orientation of national industry to obtain a special paper grade with high complexity,
- increase the security level of specialty papers, difficult to fake on the internal market
- reduce the imports of security paper
- increase output and thus sales of security paper from Ceprohart.

Financed through/by

UEFISCDI

Research centre

Research Centre for Engineering of Systems with Complex Fluids – Laboratory of Rheology and Magnetometry, from Politehnica University of Timisoara.

Research team

Dr. Vlad SOCOLIUC, the director of the NanoMagSecurityPaper project
Phys. Oana MARINICA
Dr. Phys. Aurel ERCUTA
Dr. Phys. Catalin MARIN
Res. Assist. Florica BĂLĂNEAN
Res. Assist. George GIULA.

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HISPEED NANO MAG SEAL

Goal of the project

The project technical objective is to achieve at experimental model scale new leakage-free MNF sealing systems for high peripheral speeds (up to 30 – 70 m•s-1) in the sealing area, designed to equip gas turbocompressors.

Short description of the project

The project proposes the development of magnetic nanofluid (MNF) seals which has significant advantages compared to conventional mechanical seals: hermetic sealing, exceptionally long lasting operation without intervention (~ 5 years), minimal wear (only viscous friction), virtually zero contamination, optimal torque transmission, wide operating range (10-8 mbar - 10 bar), relatively simple and cost efficient execution.

Project implemented by

• SC ROSEAL SA Odorheiu Secuiesc (CO)
• Romanian Academy – Timisoara Branch (P1)
• National Institute of R&D for Izotopic and Molecular Technologies Cluj-Napoca (P2)
• Politehnica University of Timisoara (P3)
• Romanina Research and Development Institue for Gas Turbines – COMOTI Bucharest (P4).

Implementation period

01. 07. 2014 – 30. 06. 2016

Main activities:

1. Laboratory and micropilot scale synthesis of magnetic nanofluids with carboxylic stabilizers and magnetizations between 400-1000 G. Samples characterization.
2. Conception, design and implementation of new experimental models of sealing systems with magnetic nanofluid, for high peripheral speeds
3. Testing and performance evaluation of new experimental models sealing systems with magnetic nanofluid, designed for high peripheral speeds

Results

Establishment of the laboratory scale methods for synthesis and characterization of magnetic nanofluids with carboxylic stabilizers and magnetization values between 400-1000 G.

Applicability and transferability of the results

The expected results will facilitate desgin and low cost industrial scale production of an original sealing system with stable MNF at high temperatures (160 – 180 °C), for high peripheral speeds (up to 30 – 70 m•s-1) in the sealing gap. They have some important advantages compared to conventional mechanical seals: hermetic sealing, high reliability, relatively simple construction, low execution cost. These performances indicate the market towards ROSEAL Co. is heading, namely the gas turbocompressors in fertilizer and petroleum refining industry.

Financed through/by

the Ministry of Education, Research, Youth and Sports (MECTS) - Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI) through the PN II Program Partnerships in Priority Areas, Collaborative applied research projects.

Research Centre

Research Centre for Engineering of Systems with Complex Fluids – Laboratory of Rheology and Magnetometry, from Politehnica University of Timisoara.

Research team

Tunde BORBATH, PhD - the director of the HiSpeedNanoMagSeal project (Romanian Academy - Timisoara Branch)
The Politehnica University of Timisoara (P3) research team in this project consist of 3 researchers and 2 research assistants, as follows:
Phys. Oana MARINICA
Assoc. Prof. Floriana D. STOIAN, PhD
Assoc. Prof. Nicolae CRAINIC, PhD
Res. Assist. Florica BALANEAN
Res. Assist. George GIULA

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Web: http://www.roseal.eu/HiSpeedNanoMagSeal/etape.html

MICRO-MECHANICAL MODELLING OF CELLULAR MATERIALS WITH REFINEMENTS ON FRACTURE AND DAMAGE

Goal of the project

Cellular materials are widely used as cores in sandwich composites, for packing and cushioning. The main characteristics of foams are light weight, high porosity, high crushability and good energy absorption capacity. Present project propose to develop micro-mechanical models in order to predict the mechanical properties of cellular materials with a focus on modeling the fracture and the influence of damage on the mechanical response.

Short description of the project

Project combines analytical methods, with numerical micro-mechanical finite element analysis and experimental investigations: materials testing and investigating the damage mechanisms by Digital Image Correlation and Thermoelastic Stress Analysis. The novelty of the project will be highlighted by the size and notch effect for cellular materials, and by investigating the effect of microstructural damage on the mechanical response of cellular materials.

Project implemented by

- Politehnica University of Timisoara
- Lublin University of Technology, Lublin, Poland
- Slovak Academy of Science, Bratislava, Slovakia
- Polymer Competence Center Leoben, Austria
- ILK, TU Dresden, Germany

Implementation period

05.10.2011 – 04.10. 2015

Main activities

- Better understanding of mechanical behavior of cellular materials.
- Develop micro-mechanical models to estimate mechanical properties of cellular materials.
- Implementation of constitutive material models in Finite Element Analysis.
- Investigating the size effect and notch effect on cellular materials Evaluating the behavior of cellular materials under dynamic (impact and fatigue) loading.
- Identification of damage mechanisms in cellular materials.
- Investigating the effect of microstructural damage on the mechanical properties of cellular materials.

Financed through/by

Grant PN-II-ID-PCE-2011-3-0456, Contract Nr. 172/2011, by Romanian Ministry of National Education, through UEFISCDI

Investigating the damage of PUR foams with different densities and holes
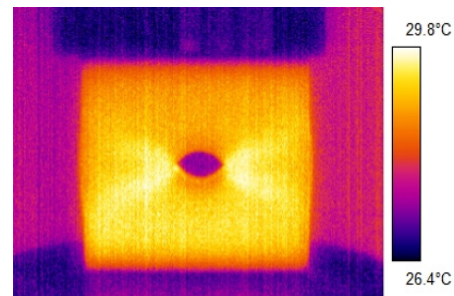
by thermography
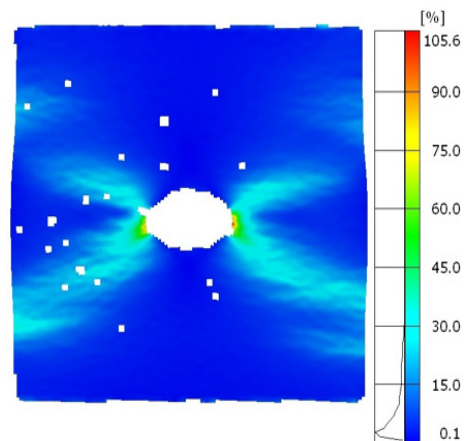
by Digital Image Correlation
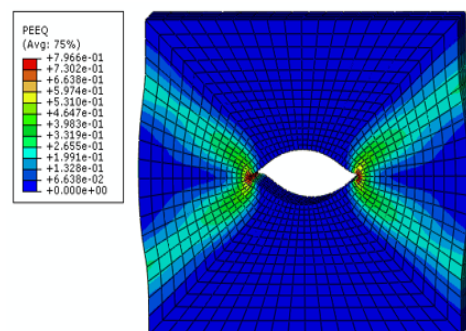
by Finite Element Method (equivalent plastic strain)

Main results for 2014 year:

Journal Papers:
1. L. Marsavina, D.M. Constantinescu, E. Linul, D.A. Apostol, T. Voiconi, T. Sadowski, Refinements on fracture toughness of PUR foams, Engineering Fracture Mechanics, 129, 54-66, 2014, DOI: 10.1016/j.engfracmech.2013 (ISI);
2. T. Voiconi, R. Negru, E. Linul, L. Marsavina, H. Filipescu, The notch effect on fracture on polyurethane materials, Frattura ed Integrita Strutturale, 30, 101-108, 2014 (SCOPUS);

Conference Papers:
1. L. Marsavina, E. Linul, T. Voiconi, R. Negru, Experimental investigations and numerical simulations of notch effect in cellular plastic materials, The 3rd International Conference on Competitive Materials and Technology Processes, Miskolc, Hungary, 2014;
2. E. Linul, T. Voiconi, L. Marsavina, Determination of Mixed Mode Fracture Toughness of PUR foams, New Trends in Fatigue and Fracture NT2F14, „Fatigue and fracture at all scales", Belgrade, Serbia, 2014, published in Structural Integrity and Life, Vol 14(2) 87-92, 2014;
3. T. Voiconi, L. Marsavina, E. Linul, J. Kováčik, Determination of elastic and damping properties for clossed-cell aluminium foams using Impulse Excitation Technique, Proceedings of XIIIth Youth Symposyum of Experimental Solid Mechanics, 141-145, 2014;
4. E. Linul, D.A. Serban, T. Voiconi, L. Marsavina, T. Sadowski, Energy-absorption and efficiency diagrams of rigid PUR foams, Key Engineering Materials, 601, 246-249, 2014 (ISI Proceedings, Scopus);
5. D.A. Apostol, D.M. Constantinescu, L. Marsavina, E. Linul, Analysis of Deformation Bands in Polyurethane Foams, Key Engineering Materials, 601, 250-253, 2014 (ISI Proceedings, Scopus) ;
6. T. Voiconi, E. Linul, L. Marsavina, J. Kovacik, M. Knec, Experimental determination of mechanical properties of aluminium foams using Digital Image Correlation, Key Engineering Materials, 601, 254-257, 2014 (indexat ISI Proceedings, Scopus);
7. T. Voiconi, E. Linul, L. Marsavina, T. Sadowski, M. Knec, Determination of flexural properties of rigid PUR foams using digital image correlation, Solid State Phenomena, 216, 116-121, 2014 (Scopus) ;
8. L. Marsavina, D.M. Constantinescu, E. Linul, T. Voiconi, D.A. Apostol, T. Sadowski, Evaluation of mixed mode fracture for PUR foams, Procedia Materials Science, 3, 1342-1352, 2014 (ScienceDirect)

Book Chapter

L. Marsavina, D. Constantinescu, Failure and Damage in Cellular Materials in Failure and Damage Analysis of Advanced Materials, Eds. H. Altenbach, T. Sadowski, Springer, Udine, 2014.

Applicability and transferability of the results

• Results will be used by foams manufacturers Necumer and Spumotim to improve their technologies. Also, companies using foam components like TRW Automotive and Adidas will benefit by our developed micro-mechanical models to characterize their components and in the product design.

Fields of interest:

• Composite and cellular materials
• Mechanical testing
• Finite Element Analysis
• Fracture and Damage Mechanics

Research team

Prof. Liviu MARȘAVINA, PhD – Project Manager
Prof. Dan M. CONSTANTINESCU, PhD – Senior Researcher
Emanoil LINUL, PhD – Postdoc Researcher
Cristian NES, PhD- Postdoc Researcher
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Eng. Florin STUPARU– PhD student

"There are no secrets to success. It is the result of preparation, hard work, and learning from failure."
Colin Powell

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MICROSTRUCTURE – MECHANICAL PROPERTIES RELATIONSHIP FOR METALLIC FOAMS BILATERAL AGREEMENT ROMANIA – SLOVAKIA

Goal of the project

Intensification of the already existing, up to date on volunteer basis, international scientific and technological cooperation between Universitatea Politehnica Timisoara (UPT) ROMANIA and Institute of Materials and Machine Mechanics (IMMM) from Slovak Academy of Sciences (SAS) Bratislava, SLOVACIA. This will be achieved by elaboration of common journal papers, and reciprocal sustain of scientific events organised on the partner country, preparation of joint international projects on European basis.

Short description of the project

The technology for foaming of aluminum alloys has been considerably improved in last decade worldwide.

Aluminum foam can undergo static loading, and accidentally dynamic or impact loading during the crash accident. Unfortunately, there is still missing detailed connection between static and dynamic mechanical behaviour of foams.

The project investigates the mechanical properties of metallic foams under dynamic and static loading with respect to foam microstructure.

The project belongs to the priority domain "7 New Materials, Micro and Nanotechnologies – 7.1 Advanced Materials". Cellular metals are a class of advanced materials and investigation on graded cellular metals (cellular structures with different densities in different part of the piece) will also be investigated in present project.

Project implemented by

- Politehnica University of Timisoara
- Institute of Materials and Machine Mechanics (IMMM) from Slovak Academy of Sciences (SAS) Bratislava, SLOVAKIA

Implementation period

01.03.2013 – 10.12. 2014
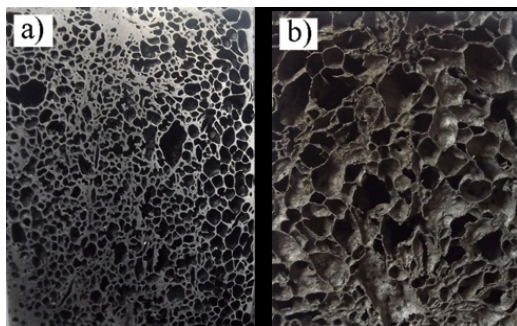
a. AlMg1Si0.6   b. AlSi12Mg0.6
Cellular structures of two aluminium foams

Main activities

- Production of aluminium foams by the Slovak partners.
- Mechanical testing of aluminium foams. The relation between manufacturing parameters, density and mechanical properties was identified.
- Mechanical testing of aluminum foams under dynamic loading. Impact compression tests performed on aluminum foam specimens.
- Investigation of fatigue behavior of aluminium foam.

Main results for 2014 year:

Journal Papers:

1. E. Linul, T. Voiconi, L. Marşavina, J. Kováčik, A comparison between static and dynamic compression behavior of metal foams, (submitted)

Conference Papers:

1. T. Voiconi, E. Linul, L. Marşavina, J. Kováčik, M. Kneć , Experimental determination of mechanical properties of aluminium foams using Digital Image Correlation , Key Engineering Materials, vol. 601, pp. 254-257, 2014, DOI: (ISI Proceedings);
2. J. Kováčik, L. Marsavina, A. Adamčíková, F. Simančík, R. Florek, M. Nosko, P. Tobolka, P. Minár, N. Mináriková, J. Jerz, E. Linul, Uniaxial Compression Tests of Metallic Foams: A Recipe , Key Engineering Materials, vol. 601, pp. 237-241, 2014 (ISI Proceedings);
3. T. Voiconi, L. Marşavina, E. Linul, J. Kováčik, Determination of elastic and damping properties for clossed-cell aluminium foams using Impulse Excitation Technique, Proceedings of XIIIth Youth Symposium on Experimental Solid Mechanics, vol. 1, pp. 141-144, 2014, ISBN: 978-80-01-05556-4.

Chemical composition:
M8 - AlMg1Si0.6
S7 - AlSi12Mg0.6
G - Al 99.5% + 0.4% TiH$_2$

METALLIC FOAM

Identification of metallic foam

Microscopic analysis

Chemical composition (M8, S7 și G)

Density determination

Elastic properties determination (IET)

Flexural modulus

Longitudinal mode

Influence of density

Influence of composition

Torsion modulus

Results
E, G, ν, Q^{-1}

Mechanical properties under static loading

Static compression

Influence of density

Influence of temperature

Influence of composion

Influence of *skin*

Static bending

Results
σ$_{CS}$, σ$_p$, ε$_D$, EA, Eff, E$_F$, σ$_F$ (K$_I$)

Mechanical properties under dynamic loading

Dynamic compression

Influence of density

Influence of composition

Fatigue

Results
σ$_{CS}$, σ$_p$, ε$_D$, EA, Eff

The Experimental plan for characterization of metallic foams

Applicability and transferability of the results

Results could be used by metallic foams manufacturers. Also, companies using foam components from automotive industry will benefit by our results in order to design better foam components as energy absorbers.

Financed through/by

Research team

at Institute of Materials and Machine Mechanics (IMMM) from Slovak Academy of Sciences (SAS) Bratislava, SLOVAKIA

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Emanoil LINUL, PhD
Dragos A. APOSTOL, PhD
Dan A. ȘERBAN, PhD
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NEW HAPTIC ARM EXOSKELETONS FOR ROBOTICS AND AUTOMATION IN SPACE (EXORAS)

Goal of the project

The project seeks to develop in Romania the capacity to design and manufacture special assemblies meant to work in the field of Robotic Exploration. The overall goal is to stimulate Romania's participation to international space missions and programs, in collaboration with ESA (European Space Agency), as its 19th member. The practical task is to develop a new haptic arm exoskeleton designed to enable in-space force-feedback telemanipulation with redundant robotic arms.

Short description of the project

EXORAS will provide a new haptic arm exoskeleton for robotic exploration. The exoskeleton is desired to explore future ways of commanding a manipulator arm in space. It will be created a prototype with special features of design, namely several shortcomings of previous telemanipulation systems will be removed. The new system pursues requirements regarding weight, ease of wearing and comfort of the human operator. The project assumes the full design, assembling and testing of the prototype. All aspects are taken into account: kinematics, dynamics, sensorics, wireless control, haptic feed-back, actuation, materials and so on.

Project implemented by

- Technical University of Cluj-Napoca – Coordinator
- University "Transilvania" Brasov – Partner 1
- Politehnica University of Timisoara – Partner 2 (146)

Implementation period

2012 – 2015

Main activities

- Research on the development of exoskeleton haptic systems for robotic exploration (existing solutions and development of new solutions; establishment of basic components with functional and technical specifications)
- Concept, design and assembly (mechanical design, kinematic analysis, development of control software, simulation)
- Testing and optimizing of prototypes (assembling, testing and optimizing of prototypes)
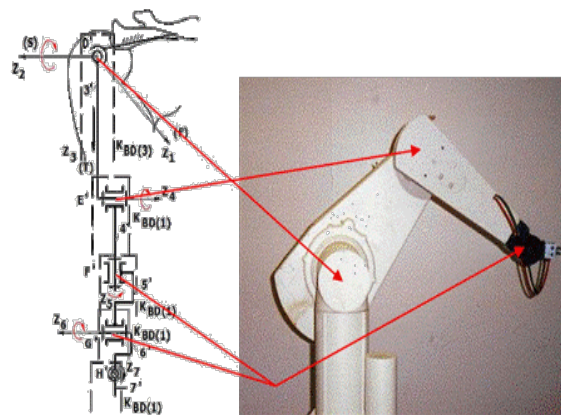
Fig. 1 Corresponding joints of exoskeleton and robot
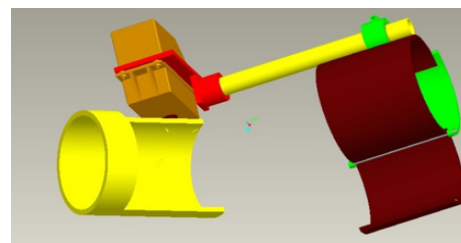
Fig. 2 CAD model of the exoskeleton with servo rotary drive

Results

At this stage, the research work lead to the design and partial implementation of new six solutions of exoskeleton arm. A generic scheme of the general concept from kinematic point of view is given in figure 1.

The design and practical solutions developed until now focused on the elbow and wrist joints. The six variants of exoskeleton under study use:

- servo rotary drive mounted directly on the shaft of the joint (fig. 2)
- linear actuation and transformation of motion (fig. 3)
- free motion and electromagnetic brake (movement transmission via a wire mechanism)
- free motion and electromagnetic brake
- haptic feedback generated by myostimulation
- haptic feedback generated by vibration modules.

The solutions above were judged on a set of criteria and the most convenient alternative proved to be the one using electromagnetic brakes. The CAD model and images of the assembly practically achieved are shown in figure 4.
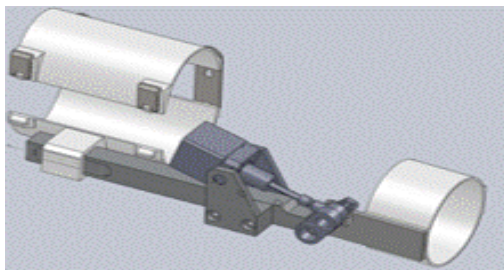
Fig. 3 CAD model of the exoskeleton with linear actuation
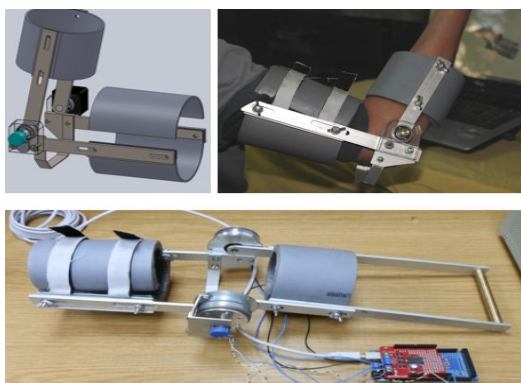
Fig. 4 CAD model and practical assembly of the exoskeleton with free motion and electromagnetic brake

Applicability and transferability of the results

EXORAS fulfills entirely the goal of STAR program (of Romanian Space Agency) that aims increasing of the research competitiveness for participation of academic entities to activities of ESA, included in the law no. 262/2011 regarding the membership status to ESA.

This project is going to produce clear benefits to the consortium partners and beyond, regarding the competitiveness of the market for hi-tech mechatronics and robotics. In addition, the gain in knowledge is going to be transferred into higher-education support.

Research centre

Mechatronics&Robotics Research Center

Financed through/by

Funded by the Romanian Space Agency (ROSA) through Contract nr. 13/19.11.2012 within the program STAR 2012 – Projects of RDI, Research direction: S1 Research

Research team

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Iosif CĂRĂBAŞ
Eugen ZĂBAVĂ
Aurel DIACONU
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Valer DOLGA
Marius MATEAŞ
Sanda GRIGORESCU
Cristian POP

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DOCTORAL AND POSTDOCTORAL SCHOLARSHIPS FOR RESEARCH EXCELLENCE

Goal of the project

The main goal of the project is the strengthening of a competitive framework for the financial support of Ph. D. students and postdoctoral researchers in order to enhance their education. The project provides also a large transnational cooperation between universities, research centres and companies.

Short description of the project

- Facilitation and improvement of the researchers' experience in priority research areas;
- Enhancement the access to research infrastructure in cooperation with universities and renowned research centres in UE;
- Improvement the value of research at both doctoral and postdoctoral level by increasing the number of researchers and the number of priority research topics;
- Providing of funds in support of research activities for twenty Ph.D. students and five postdoctoral researchers of our university;
- Increasing the visibility of research outcome by publishing the results in prestigious journals and conference proceedings.

Project implemented by

- Transilvania University of Brasov
- Politehnica University of Timisoara
- Technical University of Cluj-Napoca
- Universidade Nova de Lisboa (Portugal)
- Université de Technologie de Belfort-Montbéliard (Franta)

Investeşte în oameni!
FONDUL SOCIAL EUROPEAN
Titlul proiectului: Burse doctorale si postdoctorale pentru cercetare de excelenta
Numărul de identificare al contractului: POSDRU/159/1.5/S/134378

EVALUAREA SĂNĂTĂŢII ŞI SECURITĂŢII OCUPAŢIONALE PENTRU CREAREA DE LOCURI DE MUNCĂ DURABILE

ETL prof. Anca Drăghici şi prof Arjana Davidescu
ETS prof. George Savii

2014

Implementation period

15.04.2014 – 14. 10. 2015

Main activities

1. Development of a framework for selecting the target group of researchers to be financed, based on a powerful competition;
2. Financial support for the selected researchers:
- Monthly stipend of 1800 lei for doctoral students and 3700 lei for postdoctoral researcher,
- Research fellowship within UE universities of 4200 lei/ month for doctoral researchers,
- Travel grants for a research stage abroad of 1000 lei,
- Cover of costs for travel and accommodation in view of participating to scientific events until 1000 lei and 600 lei respectively,
- Subscriptions/ purchases of scientific publications (2200 lei),
- Consumables until 2200 lei,
- Acquisition of a laptop (3000 lei).
3. Tutoring and scientific guidance for researchers;
4. Dissemination of results within seminars and training sessions:

Results

- 25 researchers from UPT were selected (20 Ph.D. students and 5 postdoctoral researchers);
- Financial support for 25 researchers;
- 3 articles published by researchers members of the UPT target group in several international journals;
- 15 published research papers under the signature of the UPT researchers in the proceedings of various international conferences;
- 9 research papers to be published in the proceedings of several international conferences, by UPT researchers.

Applicability and transferability of the results

An up to date management for doctoral and postdoctoral research is a compulsory requirement for any university that aims to be part of teh European Research Area.

Doctoral studies are studies of higher education of elite and allow the attainment of qualifications of 8th level, according to the European Qualifications Framework (EQF) and National Qualifications Framework (NQF). Their purpose is to bring a contribution to the development of knowledge through research / innovation / original scientific production and development of dedicated human resources with high level of expertise in scientific research, capable of rapid and efficient insertion on the highly qualified labour market.

Investeşte in oameni!
FONDUL SOCIAL EUROPEAN
Titlul proiectului: Burse doctorale si postdoctorale pentru cercetare de excelenta
Numărul de identificare al contractului: POSDRU/159/1.5/S/134378

DEZVOLTARE DURABILĂ: METODE ŞI MIJLOACE DE ANALIZĂ-EVALUARE-MONITORIZARE A DEZVOLTĂRII SUSTENABILE A SISTEMELOR TEHNICO-ECONOMICE

ETS prof. George Savii

2014

Fields of interest

- Information society technologies
- Energy
- Environment
- Health
- Agriculture
- Materials
- Innovative products and processes
- Socio-economic and humanistic research

Financed through/by

The European Social Fund, Sectoral Operational Programme Human Resources Development - POSDRU

Research team

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Prof. Anca DRĂGHICI, PhD
Prof. Lacrimioara STOICU-TIVADAR, PhD
Prof. Francisc PETER, PhD
Prof. George SAVII, PhD

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DYNAMICAL SYSTEMS AND THEIR APPLICATIONS

Goal of the project

The main objective of this project is to create fundamental knowledge in dynamical systems theory and to apply this knowledge in formulating and analyzing real world models.

Short description of the project

The specific objectives, tasks and methodology of the project are contained in 5 WPs.

- In WP1 we develop new methods for the center and isochronicity problems for analytic and non-analytic systems, study bifurcations of limit cycles and critical periods.
- In WP2 we deal with the problem of integrability for some differential systems with invariant algebraic curves, study global attractors of almost periodic dynamical systems, Levitan/Bohr almost periodic motions of differential/difference equations.
- The main objective of WP3 is to study dynamics of some classes of continuous and discontinuous vector fields.
- WP4 deals with Hamiltonian systems in Plasma Physics, twist and non-twist area preserving maps, numerical methods, and the study of symmetries of certain kinds of k-cosymplectic Hamiltonians.
- The last WP tackles mathematical models in Neuroscience and Medicine.

Project implemented by

1. Politehnica University of Timisoara
2. West University of Timisoara
3. University of Craiova
4. Center for Applied Mathematics and Theoretical Physics, Slovenia
5. University of Maribor, Slovenia
6. Universitat Autonoma de Barcelona
7. Moldova State University
8. The Institute of Mathematics and Computer Science of the Academy of Sciences of Moldova
9. Tiraspol State University

Implementation period

01.10.2012 - 30.09. 2016

Main activities

- Develop new methods and algorithms for studying center and isochronicity problems.
- Investigations of reaction-diffusion equations.
- Study of differential and integral operators of non-integer order.
- Study global attractors of almost periodic dynamical systems and their topological structure.
- Study dynamics of certain classes of continuous and discontinuous vector fields.
- Study Hamiltonian systems with 1 ½ degrees of freedom and their discrete correspondents, namely systems generated by area-preserving maps.
- Investigations of ODE-based and map-based neuronal models.

Financed through/by

FP7

Results

1. M. Han, Valery G. Romanovski, Limit Cycle Bifurcations from a Nilpotent Focus or Center of Planar Systems, Abstract and Applied Analysis, Vol. 2012, Article ID 720830.

2. Valery G. Romanovski, Y. Xia, X. Zhang, Varieties of local integrability of analytic differential systems and their applications, J. Differential Equations 257 (2014) 3079–3101.

3. B. Fercec, J. Giné, M. Mencinger, Regilene Oliveira, The center problem for a 1 :-4 resonant quadratic system, J. Math. Anal. Appl. 420 (2014) 1568–1591.

4. J. Giné, C. Christopher, M. Presern, Valery G. Romanovski, and N. L. Shcheglova, The Resonant Center Problem for a 2:-3 Resonant Cubic Lotka–Volterra System, V.P. Gerdt et al. (Eds.): CASC 2012, LNCS 7442, pp. 129–142, 2012. Springer-Verlag Berlin Heidelberg 2012.

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7. D. Dolicanin, J. Giné, R. Oliveira, V. G. Romanovski, The center problem for a 2:-3 resonant cubic Lotka–Volterra system. Applied Mathematics and Computation Vol. 220 (2013) 12–19.

8. G. Chang, T. Zhang, M. Han, On the number of limit cycles of a class of polynomial systems of Liénard type, J. Math. Anal. Appl. 408 (2013) 775–780.

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RANDOM MATRIX TEHNIQUES IN QUANTUM INFORMATION THEORY (RMTQIT)

Goal of the project

The field of Quantum Information Theory (QIT) attracted lately the interest of scientific community due to the its ambitious goals meant to create new technologic systems (quantum computers) and new more secured methods to transmit the information. Nowadays, QIT is a multi-faceted field, with large connections in the subfields of Mathematics, such as Functional Analysis, Operator Theory, Linear Algebra, Probability Theory. The project RMTQIT purposes to give answers to open questions from QIT, using techniques from random matrix theory.

Short description of the project

The project RMTQIT focuses on a systematic exploration of theoretical questions in QIT about random quantum states and random quantum channels. These problems have attracted the attention lately in a very naturally connection to fundamental issues of QIT theory, such as entanglement theory and classical (or quantum) capacities for channels.

Project implemented by

1. The Department of Mathematics, Politehnica University of Timişoara.
2. Laboratoire de Physique Théorique de Toulouse, Université Paul Sabatier Toulouse III, France.

Implementation period

01.03.2013 - 29.02.2016

Main activities

In the last year within the project RMTQIT it took place interesting activities meant to complete the scientific tasks purposed as well as to extend and attract new collaborators.

- First of all, it would like to mention that we welcomed at Timisoara for short visits some of our collaborators: Dr Ion Nechita, Dr. David Reeb, from Zentrum Mathematik, Technische Universität München, Dr. Kim Dang, from Department of Mathematics Yale University and Prof. Dr. Antonino Messina, from University Palermo, Italy.
- Dr. David Reeb presented the research seminar "Extending Quantum Channels", on 16 July 2014 at Department of Mathematics, UPT.
- The results of our research activity were presented to scientific community with several occasions:
- in May at University of Munchen, where dr M.A. Jivulescu presented the talk "On the reduction criterion for random quantum states", at the 25th edition of the Conference on Operator Theory, Timişoara, where dr. Nicolae Lupa presented the talk "Eigenvalue distribution of the reduced Wishart matrices and applications in quantum information theory".

Results

1. Maria Anastasia Jivulescu, Nicolae Lupa, Ion Nechita - On the reduction criterion for random quantum states - JOURNAL OF MATHEMATICAL PHYSICS, Volume: 55, Issue: 11, Article Number: 112203-1-27, NOV 2014, (arXiv:1402.4292)
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Financed through/by

- UEFISCDI, Romania
- L'Agence Nationale de la Recherché (ANR), France

Research Team

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KNOWLEDGE MANAGEMENT-BASED RESEARCH CONCERNING INDUSTRY-UNIVERSITY COLLABORATION IN AN OPEN INNOVATION CONTEXT- UNIINOI

Goal of the project

In the present competitive climate, research knowledge and innovation are seen as the main distinguishing factors of firm success and as the basis of competitive advantages. Following a long tradition of research in the field of innovation, Open Innovation is an approach in which the boundaries of innovation are shifting from a situation where firms conduct research and development activities mainly internally, to a widespread collaboration and external knowledge source, to help them in achieving and sustain innovation. Although universities are seen among the most important partners with whom firms can cooperate, quantitative empirical evidence with regards to the development, evolution and sustainability of Industry-University relations in Open Innovation is still very scarce.

Main activities

• The general objective of the project is to sustain the research and development activities, based on knowledge management and carried out in collaboration by the consortium partners, for the development of an environment that promote Industry-University collaboration in Open Innovation.

Project implemented by

• University of Oradea
• Politehnica University of Timisoara
• Technical University of Cluj-Napoca
• S.C. EMSIL TECHTRANS S.R.L.

Implementation period

2014-2016

Main activities

1. The development of the collaborative research environment
2. The development of an Open Innovation environment between Industry-University
3. The development of a model for performance measurementof Industry-University collaboration in Open Innovation

Financed through/by

Ministry of National Education
The Executive Unit for Financing Higher Education, Research, Development and Innovation
Programme Partnerships in Priority Domains - Contract 337/2014
The Executive Unit for Financing Higher Education, Research, Development and Innovation (UEFISCDI)
Total budget of the contract: 1.062.479 lei
Public budget: 923.729 lei
Own budget: 138.750 lei

Research Team

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Projects supporting research

Field	Total number of projects	Source of financing	Number of projects
Automation and Computers	2	Cross-border cooperation HU-RO* Cross-border Cooperation RO-SR*	1 1
Engineering and Management	1	International Program**	1
Industrial Engineering	1	POSDRU*	1

*S*tructural Funds - European Regional Development Fund, European Social Fund and the Romanian National Authority for Scientific Research,
** International Program - Leonardo da Vinci, Transfer of Innovation project (LDV-TOI)

UPT | Universitatea Politehnica Timişoara

LEADSUS
LEADERSHIP IN SUSTAINABILITY – SUSTAINABILITY MANAGER

Goal of the project

The general objective is to transfer and integrate a new skill at the level of European industry and institutions. Specific objectives of the LeadSUS project are:

1. Adaptation, harmonization and refinement of existing training materials and their integration into a professional training program dedicated to employees of companies, institutions and VET organizations;
2. Achievement of EU Certification of the new training program and job role as Sustainability Manager within the ECQA framework;
3. Creation of E-learning platform within the ECQA to facilitate the on-line training on sustainability management for different trainees from different EU locations;
4. Extension of Capability Adviser - Process Management Software Tool to support Sustainability Management assessment methodology;
5. Testing/piloting the training program in Romania and France;
6. Building the capacity in Sustainability Management topics in Romania, Slovenia and France by training of future trainers (15 persons) and future Sustainability Managers (110 persons).

Short description of the project

Activities and details about the LeadSUSproject are available on the project web page: www.leadsus.eu

The project activities and results will support organizational leaders and employees, to understand the strategic implications of sustainability by developing innovative and creative approaches.

LeadSUS training program will drive leadership understanding, strategic business approaches, enthusiasm, innovation and consideration of environment and social aspects as key issues toward sustainable development. The training program is developed by the project consortium members and it will be available on-line as multimedia training materials with exercises, case studies and references (in English and Romanian languages), but also, in a printed book that will be a guide for sustainable managers.

LeadSUS training program develops competences and skills on the following topics:

*   Sustainability management,
*   Economic sustainability,
*   Ecologic sustainability,
*   Social sustainability,
*   Product sustainability.

Leadsus training program is developed in accordance with the ECQA (European Certification and Qualification Association) guidelines (www.ecqa.org). All participating trainees will have the opportunity to certify their newly acquired skills and competences within ECQA framework, on two performance levels: foundation or advanced.

LeadSUS training and certification platform will be available on www.ecqa.org

The project target group consists of managers and employees, representatives of private organizations (industry related) and public organizations, with environmental, social or business development related responsibilities and employed master students.

Project implemented by

DSRO – SC DENKSTATT ROMANIA SRL, Timisoara, Romania www.denkstatt.ro

UPT – Politehnica University of Timisoara. Romania www.upt.ro

INPG - Institut Polytechnique de Grenoble, France www.grenoble-inpg.fr

BICERO - BICERO, Business Informatics Center Rozman Ltd., Slovenia www.bicero.com

EMIRAcle – European Manufacturing and Innovation Research Association, Brussels, Belgium (www.emiracle.eu)

ISCN – International Software Consulting Network I.S.C.N. GesmbH, Graz, Austria www.iscn.com

Implementation period

18.11.2013 – 18 .11.2015

Main activities

LeadSUS project activities are described by the following work packages (WP):

WP 1 - Project management
- 1.1. Project coordination and collaboration
- 1.2. Project Administration and reporting

WP2 - Project Quality management
- 2.1. Project quality and evaluation criteria
- 2.2. Configuration management and Project Document Control
- 2.3. Quality reviews

WP3 - Identification of market needs and skill set design
- 3.1. Identification of target group and their needs
- 3.2. Identification of innovative methods, tools standards and techniques to satisfy the target group needs
- 3.3. Identification of similar training programs
- 3.4. Certified Sustainability Manager Skills set design

WP4 - LeadSUS - Sustainable Manager training material package adaptation and refinement

4.1. Adaptation and refinement of existing training materials and adapting to the skill set and material translation into EN, SI, FR and RO languages

4.2. Multimedia materials

4.3. Development and extension of Process management tool with Sustainability section

4.4. Development of Leadership in Sustainability Guide

WP5 - ECQA E learning platform configuration
- 5.1. Prepare and configure the On line learning management system and self assessment portal
- 5.2. Prepare On line course based on the training material

WP6 - Examination and Certification within ECQA framework
- 6.1. ECQA Exam Question Database
- 6.2. Certified Sustainability Manager Job role Committee

WP7 - Dissemination and exploitations of results
- 7.1. Dissemination and exploitation plan, micro planning
- 7.2. Dissemination activities and records
- 7.3. Final event of the project
- 7.4. Leadership in Sustainability Guide publishing and distribution

WP8 - Transfer of knowledge to Slovenia, France and Romania
- 8.1. Pilot training in Grenoble
- 8.2. Pilot training in Timisoara
- 8.3. Train the trainers in Timisoara
- 8.4. Train the trainers in France
- 8.5. LeadSUS - Sustainability Manager training for company and institutions trainees in Timisoara/Romania
- 8.6. LeadSUS - Sustainability Manager training for company and institutions trainees in Bucharest/Romania
- 8.7. LeadSUS - Sustainability Manager training for company and institutions trainees in France
- 8.8. LeadSUS - Sustainability Manager training for company and institutions trainees in Slovenia

Results

The main result of the LeadSUS project will be a complete defined training and certification program called: Leadership in sustainability – Sustainability Manager. The training materials (in English, Romanian, French and Slovenian languages) will be available on-line on a designed web platform (ECQA e-learning platform) and the certification program will be supported by the European Certification and Qualification Association (www.ecqa.org).

Applicability and transferability of the results

The consortium's vision is to create a great impact in Romanian, Slovenian and French companies and in-stitutions. One Sustainability Manager can shift an entire company in the direction of sustainable development. Leading Sustainability is a key issue in companies and institutions. One professional Trainer in Sustainability Management will impact companies and institutions on a long term, providing capacity building for future Sustainability Managers.

LearSUS project will have impact in 3 countries (Romania, Slovenia, France) and 4 related regions (Western and Bucharest-Ilfov Regions in Romania, North-Eastern Slovenia, South – Eastern France).

LeadSUS training program will be transfer and assimilated with a master or post-graduate program developed by UPT. In additional, project pool knowledge will be transfer in some PhD and post-doctoral research programs.

There is planned a long term impact of the LeadSUS project in the EU wide, by creation of a new ECQA Certified Job Role (www.ecqa.org) in a new profession, available for EU citizens and more.

Financed through/by

European Commission, Educational, Audiovisual & Culture Executive Agency
LIFELONG LEARNING PROGRAMME, through the National Agency in Romania (www.anpcdefp.ro)
A Leonardo da Vinci, Transfer of Innovation project (LDV-TOI)

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ACTIVE INSERTION ON THE LABOR MARKET THROUGH INNOVATIVE TRAINING IN ENGINEERING – FORMING

Goal of the project

The project's goal is the employability improving for the unemployed and people looking for a job, by providing integrated services and innovative counseling, mediation and customized engineering training in order to improve skills and professional competencies and a greater correlation of them with the labor market needs in the North-East, West, Central, South-Muntenia and Bucharest-Ilfov Regions.

Short description of the project

• The project addresses to graduate people of secondary and higher technical education studies that fits into one of the following categories: unemployed, long-term unemployed, people searching for a job (never been employed) or inactive people.

Project implemented by

• Politehnica University of Bucharest
• Politehnica University of Timisoara
• "Lucian Blaga" University of Sibiu
• Technical University "Gheorghe Asachi" of Iaşi
• The Red Point SA
• S.C. Ascendo S.R.L.

Implementation period

01.04.2014 – 30.09.2015

Main activities

• A1. Project Management
• A2. Information, communication and advertising activities develop to support the attending of project objectives and indicators
• A3. Providing information and professional counseling services for individuals and groups of people (included in the target group)
• A4. Providing mediation services, including individual mediation plans development and job shops organization

• A5. Providing training programs (through techniques and modern methods using a ICT) and professional development
• A5.1. Developing, implementing and maintaining the ICT platform that will integrate applications required in the project
• A5.2. Designing and developing of the on-line and onsite courses (training support) as well as providing professional training services

Results

The expected results/indicators at the national level are:
1. 1000 people informed and beneficiaries of the professional orientation services
2. 400 people, beneficiaries of the mediation services
3. 960 persons selected for being participants in the professional training program (courses)
4. Minimum 100 information actions on project activities
5. Organization of 4 job shops
6. 288 long time unemployed people participants in integrated programs, out of which: 136 women, 74 young people, and 78 people having more than 45 years old
7. 61% of the integrated programs participants should be certified
8. 13% of the integrated programs participants should be employed in the next six months (from the end of the project)

Applicability and transferability of the results

Long-term positive effects of the project are:

- Human capital development in accordance with the requirements of a highly competitive labor market in the engineering filed;
- Fostering integration and reintegration into the labor market of the unemployed with secondary or higher technical education, from rural and urban areas by providing individualized training programs and in accordance with market requirements. These will contribute to the increasing of the employment rate.
- Stimulation of the (re)integration into the labor market of the people from the regional target groups by providing them real opportunities on finding and getting a job in the field of engineering; these will contribute to the employment rate increasing on the labor market, in accordance with vision of the general objective of the Programme.

Research centre

- Integrated Engineering Research Center (CCII)
- Materials and Manufacturing Engineering Department (IMF)

Financed through/by

EUROPEAN SOCIAL FUND
Sectoral Operational Programme Human Resources Development 2007 – 2013
Priority: 5. Promoting active employment measures
Key Area of Intervention: 5.1. Developing and implementing active employment measures
Cod Contract: POSDRU/125/5.1/S/134003

Research team

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Assoc. Prof. Cristian-Gheorghe TURC, PhD – Leader Assistant
Assoc. Prof. Eugen PĂMÎNTAŞ, PhD – Technical coordinator
Assoc. Prof. Mircea NICOARĂ, PhD – Training coordinator
Lecturer Felicia Veronica BANCIU, PhD – Expert responsible with the target group
Lecturer Adrian BUT, PhD – Expert responsible with the labor market relation
Silvia Ana JURCHESCU – Financial expert
Dana SUBA – Legal and acquisitions expert
Andrea Valeria MARIN – Accountant

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CROSS-BORDER ACCESS INFRASTRUCTURE TO HIGH-LEVEL EDUCATION THROUGH WEB-CASTS

Goal of the project

The overall goal of the project is to increase the overall competitiveness of the economy in the border area by creating a cross-border partnership between the Faculty of Automation and Computers from Timisoara and the Technical Faculty from Zrenjanin and by improving the quality of education for the students and pupils from the border area.

Short description of the project

The aim of this partnership is to implement an infrastructure for live and on-demand video streaming of learning material for the target groups and to this purpose establish a long and fruitful cooperation between teachers, pupils and students on both sides of the border. The infrastructure is presented below:
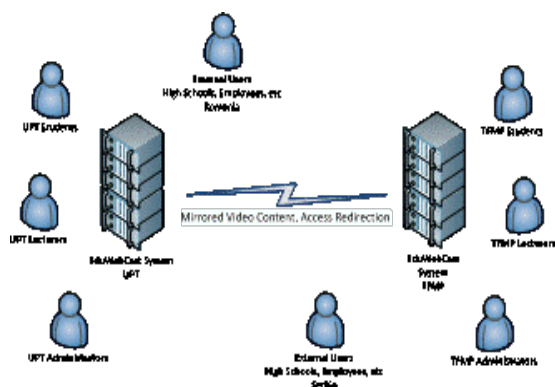
The joint realization and administration of the web cast project is the result of the partnership between the two faculties and will lead to more common projects based on the materials created through the project, contests between pupils and students, possible periodic educational exchanges. Besides the students, the academic personnel will have the chance to contact their homologues on the other side of the border and exchange opinions, information and teaching techniques which will help improve the entire educational process in both partners to the benefit of the target groups.
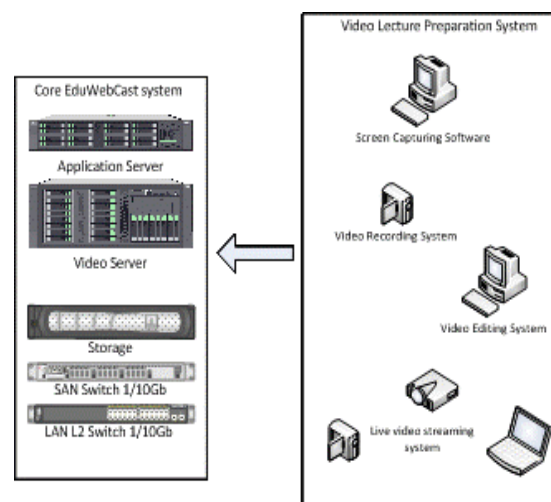
Project implemented by

- Politehnica University of Timişoara, UPT — Lead partner
- Technical Faculty "Mihajlo Pupin" Zrenjanin — Project partner

Implementation period

19.12.2013 - 18.06.2015

Main activities:

1. Communication and publicity activities;
2. Establishment of the hardware and software architecture;
3. Establishment of the content of the lectures;
4. Acquisition of the specific equipments and software.

Results

1. Several technical meetings took place both in Timişoara and Zrenjanin. As a consequence the architecture of the system was established both in the hardware and software parts.
2. The specifications were studied and both teams agreed on a list of equipments and on the features of the software.
3. The number of the lectures and their content were established.
4. The acquisition processes were launched.

Fields of interest:

Live and on-demand video

Applicability and transferability of the results:

- Achievement of a secure WiFi network covering a large area, offering also the EDUROAM service and IP streaming service
- Possibility to develop research oriented on IP streaming, network traffic and main features.

Research centre

Research Center in Computers and Information

Financed through/by

Romania-Republic of Serbia IPA Cross-Border Cooperation Programme

Research team

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Răzvan BOGDAN
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JOINT CROSS-BORDER INTERNET COMMUNICATION SYSTEM OF THE UNIVERSITY OF DEBRECEN AND POLITEHNICA UNIVERSITY OF TIMISOARA

Goal of the project

The overall goal of the project is to enable enhanced capacity for cross-country cooperation and interaction between and within the participating universities by providing high quality WiFi system and IP streaming system for the students, professors and researchers at the University of Debrecen and Politehnica University of Timisoara, aiming at supporting the synchronization of educational, research and development, and other scientific activities of the cooperating universities.

Short description of the project

• Interior and exterior WiFi service will be installed at both sites to be able to access from mobile notebooks and smart phones the partners data and services infrastructure and Internet services.
• The project implements the EDUROAM service in PUT. This common authentication service with other universities within Europe allows accessing WiFi Internet, increases the Internet accessibility for both academic partners and incoming students travelling to PUT and UD.
• IP streaming subsystem will be installed at both universities to be able to interchange the local multimedia content between the partners.

Project implemented by

• University of Debrecen, UD — Lead partner
• Politehnica University of Timişoara, UPT — Project partner

Main activities

• Communication and publicity activities;
• Acquisition of the specific equipments;
• Development and implementation of the specific WiFi network;
• Development and implementation of the specific IP streaming system.
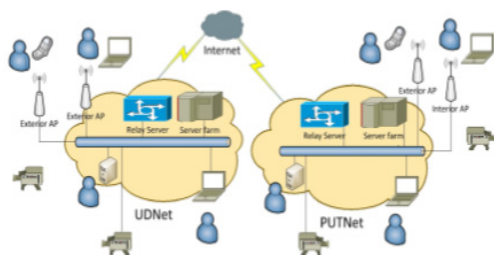
Implementation period

01.01.2013 – 31.05.2014

Results

• Several technical meetings took place both in Timişoara and Debrecen. As a consequence the inherently implementation problems were discussed and solved.
• The placement of the 200 Access Points covering the interior and exterior of the buildings of the faculties and student hostels from the campus was achieved and the connection to the specific infrastructure was done.
• The specific infrastructures for implementing the EDUROAM service and the IP streaming video service were developed and implemented.
• Tests were done and also the dissemination of the results was done.
• A closing event was organized.

Fields of interest:

• WiFi networks, IP streaming

Applicability and transferability of the results:

• Achievement of a secure WiFi network covering a large area, offering also the EDUROAM service and IP streaming service.
• Possibility to develop research oriented on IP streaming, network traffic and main features.

Research centre

• Research Center in Computers and Information

Financed through/by

• Hungary-Romania Cross-Border Co-operation Programme 2007-2013

Research team

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Projects supported by private funds

Universitatea
Politehnica
Timişoara

Field	Total number of projects	Number of projects presented
Automation and Computers	8	–
Electrical and Power Engineering	11	8
Electronics and Telecommunications Engineering	5	–
Chemical Engineering	13	2
Civil Engineering	31	4
Mechanical Engineering	61	5
Engineering and Management	3	–
Mathematics	1	1
Learning	1	–

PHOTOVOLTAIC SOURCES INTEGRATION IN THE ROMANIAN POWER SYSTEM. CASE STUDY FOR TIMIS AREA

Goal of the project

Power system analysis and optimization for the photovoltaic sources integration in the Timis area of the Romanian Power System (Enel Banat Distribution Operator).

Short description of the project

The renewable energy sources represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The projects refer to photovoltaic sources integration in the Timis area of the Romanian Power System (Enel Banat Distribution Operator). The analysis has been performed for the North-Western, Western, Central and South-Western part of the System. Various operating condition, with the consumption forecast for 2014, 2018 and 2023, were considered, taking into account all the renewable energy sources (wind, solar, biomass, hydro). The medium voltage network for the interest area was modelled in detail.

Project implemented by

- Enel Distributie Banat
- GML Bio Energy
- Eficient Solar
- Pro Dance Show Timisoara

Implementation period

2014-2015

Main activities

- power system data base validation;
- Enel Banat distribution network modeling and operating condition analysis;
- power consumption and renewable energy generation forecast;
- power flow computing for various operating condition of the North-Western, Western, Central and South-Western part of the Romanian Power System (peak and minimum type regimes, 2013, 2018, 2023);
- contingency analysis, in the presence / absence of the renewable energy sources.

Results

- power flow corresponding to 2013 year and forecasted 2018 and 2023 years;
- power flow corresponding to the medium voltage electrical network (Enel Banat Timisoara area);
- voltage value without / with the new producers;
- quick / slow maximum voltage variation value for critical buses;
- transformer loading without / with the new producers;
- power flow though the power system elements and loading level;
- integration solution validation and system reinforcement recommendations (if necessary).

Applicability and transferability of the results

Knowledge transfer to other photovoltaic power plants developers and designers. Electrical distribution network operator (Enel, CEZ, EON, Electrica in Romania).

Fields of interest

- photovoltaic energy sources;
- other renewable energy sources;
- renewable sources' integration in the power systems;
- distribution network operators.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Financed through/by

GML Bio Energy, Eficient Solar, Pro Dance Show Timisoara, total value: 18.786 RON (4.175 Euro)

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PHOTOVOLTAIC SOURCES INTEGRATION IN THE ROMANIAN POWER SYSTEM. CASE STUDY FOR TIMISOARA AREA

Goal of the project

Power system analysis and optimization for the photovoltaic sources integration in the Timisoara area of the Romanian Power System (Enel Banat Distribution Operator).

Short description of the project

The renewable energy sources represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The projects refer to photovoltaic sources integration in the Timisoara area of the Romanian Power System (Enel Banat Distribution Operator). The analysis has been performed for the North-Western, Western, Central and South-Western part of the System. Various operating condition, with the consumption forecast for 2014, 2018 and 2023, were considered, taking into account all the renewable energy sources (wind, solar, biomass, hydro). The medium voltage network for the interest area was modelled in detail.

Project implemented by

- Enel Distributie Banat
- AHM Smartel
- Ambra Service Timisoara

Implementation period

2014-2015

Main activities

- power system data base validation;
- Enel Banat distribution network modelling and operating condition analysis;
- power consumption and renewable energy generation forecast;
- power flow computing for various operating condition of the North-Western, Western, Central and South-Western part of the Romanian Power System (peak and minimum type operating conditions, 2014, 2018, 2023);
- contingency analysis, in the presence / absence of the renewable energy sources.

Results

- power flow corresponding to 2014 year and forecasted 2018 and 2023 years;
- power flow corresponding to the medium voltage electrical network (Enel Banat Timisoara area);
- voltage value without / with the new producers;
- quick / slow maximum voltage variation value for critical buses;
- transformer loading without / with the new producers;
- power flow though the power system elements and loading level;
- integration solution validation and system reinforcement recommendations (if necessary).

Applicability and transferability of the results

Knowledge transfer to other photovoltaic power plants developers and designers. Electrical distribution network operator (Enel, CEZ, EON, Electrica in Romania).

Fields of interest

- photovoltaic energy sources;
- other renewable energy sources;
- renewable sources' integration in the power systems;
- distribution network operators.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Financed through/by

AHM Smartel, Ambra Service Timisoara, total value: 18.848 RON (4.100 Euro)

Research team

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PHOTOVOLTAIC SOURCES INTEGRATION IN THE ROMANIAN POWER SYSTEM. CASE STUDY FOR LUGOJ AREA

Goal of the project

Power system analysis and optimization for the photovoltaic sources integration in the Lugoj area of the Romanian Power System (Enel Banat Distribution Operator).

Short description of the project

The renewable energy sources represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The projects refer to photovoltaic sources integration in the Lugoj area of the Romanian Power System (Enel Banat Distribution Operator). The analysis has been performed for the North-Western, Western, Central and South-Western part of the System. Various operating condition, with the consumption forecast for 2014, 2018 and 2023, were considered, taking into account all the renewable energy sources (wind, solar, biomass, hydro). The medium voltage network for the interest area was modelled in detail.

Project implemented by

- Enel Distributie Banat
- AroTenPower
- AroNinePower
- Aro11Power Timisoara

Implementation period

2014-2015

Main activities

- power system data base validation;
- Enel Banat distribution network modeling and operating condition analysis;
- power consumption and renewable energy generation forecast;
- power flow computing for various operating condition of the North-Western, Western, Central and South-Western part of the Romanian Power System (peak and minimum type regimes, 2013, 2018, 2023);
- contingency analysis, in the presence / absence of the renewable energy sources.

Results

- power flow corresponding to 2013 year and forecasted 2018 and 2023 years;
- power flow corresponding to the medium voltage electrical network (Enel Banat Timisoara area);
- voltage value without / with the new producers;
- quick / slow maximum voltage variation value for critical buses;
- transformer loading without / with the new producers;
- power flow though the power system elements and loading level;
- integration solution validation and system reinforcement recommendations (if necessary).

Applicability and transferability of the results

Knowledge transfer to other photovoltaic power plants developers and designers. Electrical distribution network operator (Enel, CEZ, EON, Electrica in Romania).

Fields of interest

- photovoltaic energy sources;
- other renewable energy sources;
- renewable sources' integration in the power systems;
- distribution network operators.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Financed through/by

AroTenPower, AroNinePower, Aro11Power Timisoara, total value: 18.228 RON (4050 Euro)

Research team

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MICRO-HYDRO POWER PLANTS INTEGRATION IN THE ROMANIAN POWER SYSTEM. CASE STUDY FOR CARAS-SEVERIN AREA

Goal of the project

Power system analysis and optimization for the micro-hydro power plants integration in the Caras-Severin area of the Romanian Power System (Enel Banat Distribution Operator).

Short description of the project

The renewable energy sources represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The projects refer to micro-hydro power plants integration in the Caras-Severin area of the Romanian Power System (Enel Banat Distribution Operator). The analysis has been performed for the North-Western, Western, Central and South-Western part of the System. Various operating condition, with the consumption forecast for 2014, 2018 and 2023, were considered, taking into account all the renewable energy sources (wind, solar, biomass, hydro). The medium voltage network for the interest area was modelled in detail.

Project implemented by

- Enel Distributie Banat
- Termoforest Toplet

Implementation period

2014-2015

Main activities

- power system data base validation;
- Enel Banat distribution network modeling and operating condition analysis;
- power consumption and renewable energy generation forecast;
- power flow computing for various operating condition of the North-Western, Western, Central and South-Western part of the Romanian Power System (peak and minimum type operating conditions, 2014, 2018, 2023);
- contingency analysis, in the presence / absence of the renewable energy sources.

Results

- power flow corresponding to 2013 year and forecasted 2018 and 2023 years;
- power flow corresponding to the medium voltage electrical network (Enel Banat Timisoara area);
- voltage value without / with the new producers;
- quick / slow maximum voltage variation value for critical buses;
- transformer loading without / with the new producers;
- power flow though the power system elements and loading level;
- integration solution validation and system reinforcement recommendations (if necessary).

Applicability and transferability of the results

Knowledge transfer to other photovoltaic power plants developers and designers. Electrical distribution network operator (Enel, CEZ, EON, Electrica in Romania).

Fields of interest

- photovoltaic energy sources;
- other renewable energy sources;
- renewable sources' integration in the power systems;
- distribution network operators.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Financed through/by

Termoforest Toplet, total value: 9.300 RON

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BIOMASS SOURCES INTEGRATION IN THE ROMANIAN POWER SYSTEM. CASE STUDY FOR TIMISOARA AREA

Goal of the project

Power system analysis and optimization for the biomass sources integration in the Timisoara area of the Romanian Power System (Enel Banat Distribution Operator).

Short description of the project

The renewable energy sources represent an important issue for the Romanian and EU energy policy and sustainable development strategy. The projects refer to biomass sources integration in the Timisoara area of the Romanian Power System (Enel Banat Distribution Operator). The analysis has been performed for the North-Western, Western, Central and South-Western part of the System. Various operating condition, with the consumption forecast for 2018 and 2023, were considered, taking into account all the renewable energy sources (wind, solar, biomass, hydro).

Project implemented by

- Enel Distributie Banat
- Cons Electrificarea Instal Timisoara

Implementation period

2014-2015

Main activities

- power system data base validation;
- Enel Banat distribution network modeling and operating condition analysis;
- power consumption and renewable energy generation forecast;
- power flow computing for various operating condition of the North-Western, Western, Central and South-Western part of the Romanian Power System (peak and minimum type regimes, 2013, 2018, 2023);
- contingency analysis, in the presence / absence of the renewable energy sources.

Results

- power flow corresponding to 2013 year and forecasted 2018 and 2023 years;
- power flow corresponding to the medium voltage electrical network (Enel Banat Timisoara area);
- voltage value without / with the new producers;
- quick / slow maximum voltage variation value for critical buses;
- transformer loading without / with the new producers;
- power flow though the power system elements and loading level;
- integration solution validation and system reinforcement recommendations (if necessary).

Applicability and transferability of the results

Knowledge transfer to other photovoltaic power plants developers and designers. Electrical distribution network operator (Enel, CEZ, EON, Electrica in Romania).

Fields of interest

- photovoltaic energy sources;
- other renewable energy sources;
- renewable sources' integration in the power systems;
- distribution network operators.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Financed through/by

Cons Electrificarea Instal, total value: 9.424 RON

Research team

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DOBROGEA ELECTRICAL DISTRIBUTION NETWORK ANALYSIS AND OPTIMIZATION

Goal of the project

Distribution network real technical losses evaluation for Enel Dobrogea Distribution System Operator. Power flow computing for various operating condition of the Southern and South-Eastern part of the Romanian Power System (peak and minimum type operating conditions) has been performed.

Short description of the project

The study was conducted for Enel Dobrogea Distribution System Operator. An algorithm is proposed by the authors being able to compute the load dependent and non-dependent technical losses. The analysis has been performed for the Southern and South-Eastern part of the Romanian Power System. Quantitative and qualitative on-field measurements are provided and discussed, followed by the technical losses computing based on the provided algorithm. Different necessary scenarios for the distribution network operator have been taken into consideration highlighting the optimal operating conditions. The wind farms operating in that area have been considered. Their influence (considering various operating conditions) over the real technical losses' value has been analyzed.

Project implemented by

- Enel Distributie Dobrogea
- Servelect Cluj-Napoca

Implementation period

2014-2015

Main activities

- on-field power flow monitoring in case of several overhead lines;
- algorithm development for technical losses evaluation;
- electrical distribution network modelling;
- optimal power flow considering different scenarios;
- wind farm modelling;
- comparison and analysis based on the these approaches.

Results

- algorithm used for technical losses evaluation;
- electrical distribution network simulation model;
- technical losses' reduction methods.

Research Centre

Research Centre for Power Systems Analysis and Optimization

Applicability and transferability of the results

The algorithm used for technical losses evaluation is able to be applied in case of any distribution network operator. Also, based on the achieved experience, other (or similar) technical losses reduction methods could be highlighted in case of other distribution operators.

Fields of interest

- distribution network analysis;
- technical losses computing;
- loss reduction methods;
- distribution system operators.

Financed through/by

Servelect Cluj-Napoca, total value: 9.796 RON

Research team

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ACTUAL TOPOLOGIES AND COMPONENTS FOR THREE-PHASE POWER FACTOR (PFC) FOR GRID TIED INVERTERS

Goal of the project

The Customer is a leading supplier for grid-tied motor control inverters for residential White Good applications like washing machines. It expects the market for inverters in residential ambient with power levels of up to 4kW to grow fast. For these inverters a new interface for residential grids must be designed which is EMC-conform. White Good applications with a power level of up to 1 kW uses passive chokes to fulfill the harmonic limits for the mains current drawn from the grid. The Subject of this contract is the compilation of a study dealing with the analysis and evaluation of current topologies and solutions for the three phase power factor correction (PFC) for 400V mains voltage.

Short description of the project

The evaluation of the current topologies was done in regards to electromagnetic compatibility (EMC) requirements including radio frequency interference (RFI) which is very important in the residential ambient. In a second step was decided if a standard PFC controller is used, or if the motor control DSC will also control the PFC power stage later on in the final design. For the 4 most promising topologies the efficiency versus output power (0-110%) calculation and filter requirement analysis (RFI and harmonics (EN 61000-3-2)) were done in an accurate approach to have a confident decision base. For these 4 topologies the losses in semiconductors (conduction and switching losses) and passive components (inductors, capacitors and EMI filter) were calculated. Two different topologies were selected by Diehl-Controls for prototype build for verification.

Project implemented by

Diehl AKO Stiftung & Co. KG Germany

Implementation period

6.01.2014 – 15.07.2014

Main activities

- Analysis of actual publications for three phase power factor correction (PFC) for 400V mains voltage for the power range of 1.5 kW up to 10 kW.
- Evaluation of current publications and state of the art in this field;
- Modeling and simulation

Research centre

Research Centre for Smart Energy Conversion and Storage

Fields of interest

It regards the market of grid-tied motor control inverters for residential White Good applications like washing machines. For these inverters a new interface for residential grids must be designed which is EMC-conform. White Good applications.

Financed through/by

Diehl AKO Stiftung & Co. KG Germany.

Results

- Analyzing all relevant three phase power factor correction (PFC) topologies currently existing for the power range of 1.5 kW up to 10 kW (passive PFC: single diode bridge rectifier system with smoothing inductor on the ac/dc side, passive 3-rd harmonic injection, multi-pulse rectifier system; low-frequency active PFC; high-frequency active PFC: phase modular system, direct three-phase system, buck type for 350 V dc bus, boost type; hybrid systems: 3-rd harmonic injection, combination of diode rectifier and dc/dc converter system (buck type – for 350 V dc bus, boost type), electronic reactance based rectifier system);
- Analyzing the currently existing methods for switching patterns and current sensing with high speed controllers;
- A decision matrix was prepared for different topologies;
- Two different topologies were be selected by Diehl-Controls for prototype build for verification.

Applicability and transferability of the results

Patentable inventions or parts in such inventions (hereinafter „inventions") made by one or several employees of the University within the course of carrying out the study considered here shall be notified and offered for transfer to the Customer by the University forthwith. Simultaneously, the University shall make available to the Customer any and all information potentially relevant for a realistic evaluation of the intrinsic value of such invention – as far as possible in writing.

Research team

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c. Assistant Mihaela Codruţa ANCUŢI , PhD
d. Assistant Marcus SVOBODA
e. Prof. Dorin POPOVICI
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HARDWARE IN THE LOOP WIND/HYDRO TURBINES EMULATORS

Goal of the project

The project was focused on design and testing a "Hardware-in-the-loop" (HIL) wind /hydro turbines emulators, for research and design activities in the field of renewable energies.

Short description of the project

The research and design activities in the field of conversion and control systems for renewable energy applications need to have the possibilities to evaluate the performances of the prototypes in various conditions. In laboratory such tests can't be easy performed because it is difficult to have the entire, real, equipment, and the corresponding input energy parameters.

In such cases, the emulations technologies can be used.

A wind/hydro HIL consists essentially of: a software part which implements the mathematical model of the turbine, and a physical part that provides the similar static and dynamic characteristics as the real studied system.

The HIL structure in this project contains: a dSPACE control board, a voltage source inverter with direct torque control (DTC), a three phase induction machine (IM) with gearbox (GB) – the wind turbine equivalent, and a permanent magnet synchronous generator (PMSG) – the real system generator, with resistive load (Fig. 1).

Main activities

- Wind/hydro turbines mathematical model implementation;
- Design the entire system and the software elements;
- Testing and validation the emulator for various simulated input energy parameters and different control and conversion systems.

Results

- A full scale prototype (Fig. 2), with various software packages.
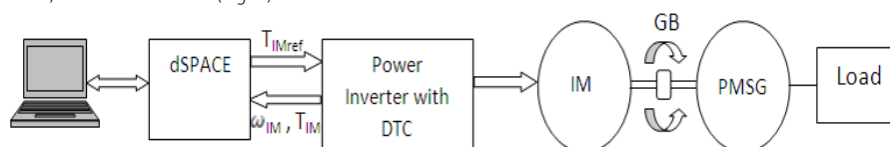
The emulator control was implemented in Matlab/Simulink and it runs in real time on dSPACE board. The control output signal (torque reference TIMref) is send to the DTC inverter, which returns the real (estimated) IM torque (TIM) and the drive (estimated) rotating speed (ωIM).

Project implemented by

National Institute of Research and Development in Electrochemistry and Condensed Matter

Implementation period

2014

Financed through/by

OXYGEN Cmputers Ltd. Timişoara, România

Applicability and transferability of the results

- The possibility to produce such equipment for research, design and testing companies in the field of renewable energies.
- Consultancy, design and testing activities for developers of power electronics and control equipment for energy conversion systems.

Research Centre

Research Centre for Smart Energy Conversion and Storage

Research Team

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REMOVAL OF BITTER TASTE FROM LINSEED OIL OBTAINED BY COLD PRESSING

Goal of the project

Removal of the bitter taste in unrefined cold pressed linseed oil, to make it more appealing for human consumption.

Short description of the project

Linseed oil has been used for a very long time as basis in oil paint and for linoleum fabrication, based on its short drying time and ability to form an uniform film. These qualities originate from the high content in unsaturated fatty acids, mostly α-linolenic acid (omega-3) and linoleic acid (omega-6) together with oleic acid. The high content in unsaturated fatty acids and the high percent of omega-3 and omega-6 made linseed oil very attractive for the human food industry, as well. However, there are some drawbacks concerning its utilization for human consumption, like as the susceptibility to oxidation during the extraction process and the unpleasant bitter taste that begins to develop after only a few days.

The most commonly used extraction method of linseed oil designated for human consumption is cold pressing, which leads to less oxidation.

As bitter taste develops far too early to be attributed to fatty acid oxidation, the main objective of the project is identification and removal of the components responsible for this deficiency. The implemented method must be in concordance with organic production regulations.

Project implemented by

Faculty of Industrial Chemistry and Environmental Engineering, Department of Organic Chemistry and Engineering of Natural Organic Compounds

Implementation period

01.08.2014 – 31.07.2015

Main activities

1. Evaluation of linseed oils from obtained by cold pressing of different cultivars, to determine the most convenient one for the production of good quality organic cold pressed linseed oil for human consumption;
2. Gas-chromatographic analysis for determination of the fatty acid profile;
3. HPLC and HPLC-MS analysis for identification of the compounds responsible for the bitter taste.
4. Influence of different factors on the oxidation of the oil;
5. Removal of the bitter taste by procedures compatible with the organic production regulations.

Applicability and transferability of the results

The results of this project will be used to develop a process for the organic production of cold pressed linseed oil, with improved marketability than the presently commercialized product.

Research Centre

Research Centre in Organic, Macromolecular and Natural Compounds Chemistry and Engineering

Financed through/by

S.C. SOLOVERDE S.R.L. Timişoara

Research team

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MONITORING THE QUALITY OF WASTES FROM TEHNOLOGICAL PROCESS

Goal of the project

The project objective is to monitoring the quality of wastes from tehnological process.

Short description of the project

During the project various parameters of wastes are analyzed periodical from samples collected by the beneficiaries. The analyzed parameters and the times for the samples collections are commonly agreed by the beneficiaries and by the execution team. The analysis of the main parameters for the monitoring the quality of wastes are required for their storage according to law.

Project implemented by

Faculty of Industrial Chemistry and Environmental Engineering.
Department of Applied Chemistry and Engineering of Inorganic Compounds and Environmental.

Implementation period

01.10.2014-01.10.2015

Main activities

- During the project will be analyzed the volatile organic compounds and (COV) analyzed the waste from Waste Water Treatment.
- Its determinates the concentration of the following parameters: Cr, Cu, Ni, Cd, Pb, Nt, Pt, pH, humidity and loss on ignition from water.
- The main parameter are analyzed dailies and other are analyzed monthly in accordance with the achieving plan established by the both parts involved in the project.

Applicability and transferability of the results

The results are consistent with the legislative framework in force.

Research Centre

Research Centre for Environmental Science and Engineering

Financed through/by

Research-Development and Consultancy Contract with S.C. FLEXTRONICS ROMANIA S.R.L.

Research team

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EXPERTISE ON DRINKING WATER LOSSES IN WATER SUPPLY SYSTEMS IN THE AREA OF OPERATION OF AQUATIM S.A.

Goal of the project

Expertise on drinking water losses in water supply systems in Timisoara

Short description of the project

Within expertise ,the following factors that influence water losses in a water supply system were analyzed:
- the age of the distribution networks
- the material used in distribution networks
- location and the execution of the distribution networks
- the corrosion of the networks
- the operating mode of the networks and the working pressure
- the density of connections per kilometer of distribution network (connections, fountains , hydrants)
- The number of accidents . The quality and execution time of distribution

Project implemented by

AQUATIM S.A.

Implementation period

01.05.2014–17.05.2014

Main activities

- Managing water loss is a complex technical problem and it takes a long time (20-40 years) to achieve. It involves a variety of factors in each system as well as technological progress in the field. In this framework there are developed the following concepts : a systematic approach , technical and financial support and long-term commitment.
- Splitting water supply system in counted sectors enables directing the detection activity in that part of the distribution system with the largest loss, it allows to identify the investments needed and clasify investments in order of priority. In this regard , Timisoara's distribution network was divided into 19 sectors, and for two of them the designing and implementing procedures have started.

Research Centre

Research Centre for Hidrotechnics

Financed through/by

AQUATIM S.A.

Research Team

Constantin FLORESCU, Ion MIREL, Cristian STĂNILOIU, Carabet Adrian CARABET, Corneliu Eusebiu PODOLEANU

Results

- Analyzing the effects of AQUATIM strategy applied over the years throughout the area of operations, there can be observed a reduction in physical losses from over 40 % in 2002 to below 35% in 2013.
- Therefore , the decrease of relevant losses can be achieved over several years of efforts , the more it tends to lower the levels of losses the more difficult the process becomes, which is why there must always be a balance between the losses and costs of repair / rehabilitation.
- A continuous concern of the AQUATIM leaders is the continuous improvement of personnel and the acquirement of special equipments . The loss detection team from 2012 was equipped with a device for Prelocation defects called " Logger noise and frequency for monitoring piping networks" which simultaneously measures the noise level and frequency spectrum of the water loss .
- With this equipment, in 2013, there were detected with 220 % more conduction defects in the water distribution network of Timisoara City, which did not come up in the year 2012. This led to a visible reduction of real losses .

Applicability and transferability of the results

Currently, AQUATIM extended their active management strategy concerning the tracking of the losses in all operating area. Thus were audited all water distribution systems in the grounds surrounding Timisoara, and in the future there will be audited the water distribution systems of the localities belonging to the Subsidiary.

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With this equipment, in 2013, there were detected with 220 % more conduction defects in the water distribution network of Timisoara City, which did not come up in the year 2012. This led to a visible reduction of real losses .

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BUILDING OF ENCOURAGEMENT AND SUPPORTING CENTER FOR SMALL AND MIDDLE SIZE ENTERPRISES IN TIMISOARA

Goal of the project

Tests for the determination of the concrete class

Short description of the project

There were made destructive tests on cast concrete samples for verification of the concrete class.

Project implemented by

BCO ISET COMPANY SRL TIMISOARA

Implementation period

2014

Main activities

- Mechanical tests on concrete samples

Results

- Establishing the concrete class.

Applicability and transferability of the results

- The results were presented during the laboratory classes with the students

Financed through/by

BCO ISET COMPANY SRL TIMISOARA

Research Centre

Politehnica University of Timisoara, Building Faculty

Research team

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TECHNICAL EXPERTISE DN 18 BAIA MARE – SIGHETU MARMATIEI, PART B KM 15 + 000 − 38 + 104 AND PART E KM 52 + 202 − 62 + 234

Goal of the project

The project aims at drawing up a technical expert report and providing technical consultancy services in relation to the road pavement and the culverts on the mentioned sections of the national road DN 18 with a view to proposing a new road pavement solution

Short description of the project

The contract involves the elaboration and delivery of the Technical Expert Report, including investigations on site, technical consultancy, typical profiles and all necessary supporting documents; it implies sustaining the technical expert report in front of the Beneficiary's Technical Economical Committee.

Project implemented by

The project will be implemented by C.N.A.D.N.R. Bucuresti – D.R.D.P. Cluj for changing the solution proposed in the initial project.

Implementation period

2014-2015

Main activities

Multidisciplinary activity domain, comprising chapters of investigation concerning the degradation condition, of comparative calculations concerning the dimensioning of the proposed road pavement versus the newly proposed solution and engineering structures.

Results

By applying the results offered by the Technical Examination Report the newly proposed technical solution was accepted and will be implemented.
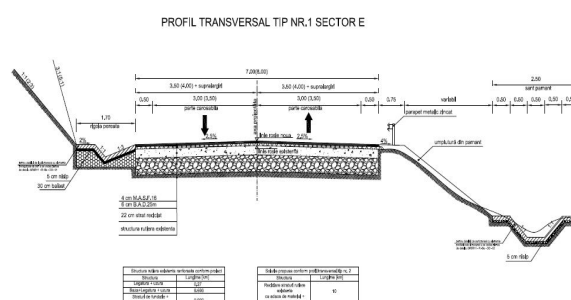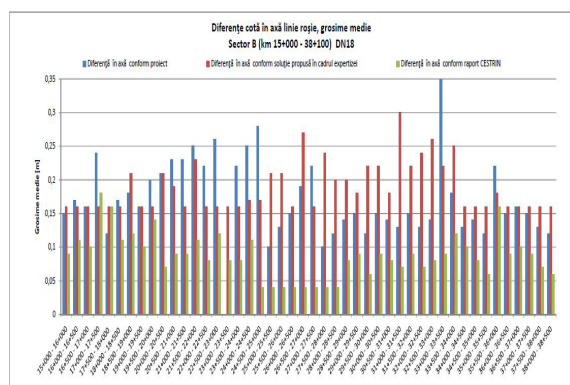
Applicability and transferability of the results

Based on the solutions offered by the Technical Expert Report, the newly proposed design solution is much more efficient due to the reduced time and cost of execution.

Financed through/by

C.N.A.D.N.R. Bucuresti - D.R.D.P. Cluj

Research Centre

Research Centre of Infrastructures for Constructions and Transportation -ICT-

Research team

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Prof. Florin BELC, PhD
Assoc. Prof. Adrian BOTA, PhD.
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TECHNICAL-ECONOMICAL DOCUMENTATION REGARDING THE REHABILITATION MEASURES OF THE EMBANKMENT "PRAG 09 – INTERNATIONAL AIRPORT SIBIU"

Goal of the project

The purpose of the technical-economical evaluation was to design the necessary construction works for the embankment rehabilitation of "Prag 09 – International Airport Sibiu", including estimation and detailing of the necessary costs for execution of the construction works and the technological stages of execution.

Short description of the project

The extension of the Airport runway, within the modernization and expansion works of the International Airport Sibiu, required achieving an embankment up to 28 m height in the western direction. On august 2010, at the western end of the Airport runway, a collapse of the embankment has occurred, manifested through the fall of the soil mass on a depth of approximately 10 m in the runway axis and approximately 3-4 m on the edges of the embankment. The dimension of the collapsed area is approximately 250 m in length and 100 m wide.

The collapse of the tall embankment from the western part of the International Sibiu Airport was a very complex phenomenon, where numerous factors concurred, including the foundation ground, embankment profile, fill material used at the execution of the embankment, faults in the collection and drainage of the surface water, implemented drainage system.

Project implemented by

TGiven the fact, that this technical-economical evaluation is part from a judicial expertise, the project will be implemented at the end of the trial settlement agreement in which the International Airport Sibiu, designer, consultant and constructer are part of.

Implementation period

2014-2015

Main activities

Multidisciplinary activity domain, comprising chapters of soil mechanics, foundation engineering, geodesy, roads and engineering structures.

Results

By applying the solutions given by the technical-economical evaluation, the resistance and the stability of the embankment will be fulfilled, thus ensuring the integrity of the runway and normal landing and departure conditions of airplanes at the International Airport Sibiu.

Financed through/by

International Airport Sibiu

Research Centre

Research Centre of Infrastructures for Constructions and Transportation -ICT-

Research team

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Senior Lecturer Octavian ROMAN,PhD.
Senior Lecturer Monica MIREA, PhD
Senior Lecturer Alexandra CIOPEC, PhD
Assistant Professor Luiza ROMAN, PhD.

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RESEARCH AND MONITORING EMITTED AIR POLLUTANTS FROM FLUE GASES

Goal of the project

Identification, evaluation and monitoring of air pollutants, NO, NO2, NOx, CO, CO2, O2, NH3, VOC, Zn, particles and thermodynamic parameters from several sources at Berg Banat Făgăraş zinc platting plant.

Short description of the project

The project consists in quarterly measurements of air pollutants resulted from the zinc platting main activity of the BERG BANAT Făgăraş branch plant. Thru these measurements the plant operator tunes its equipment's both for productivity and quality of its products and environmental protection.

Project implemented by

Politehnica University of Timisoara/ Faculty of Mechanical Engineering

Implementation period

18.03.14 – 22.12.14

Main activities

- Quarterly measurements episodes for air pollutants NO, NO2, NOx, CO, CO2, O2, NH3, VOC, Zn, particles.
- Thermodynamics parameters of flue gases and residuals are also monitored to optimize the zinc platting procedures.

Results

An extensive database for main air pollutants for large zinc platting industrial units.

Applicability and transferability of the results

- Zinc Platting emissions,
- Thermodynamics,
- Environmental engineering,
- Environmental protection,
- Combustion.

Financed through/by

BERGBANAT, Fagaras Branch

Research Centre

Research Center for Thermal Machines and Equipment, Transportation and Pollution Control

Research team

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Adrian Eugen CIOABLĂ

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RESEARCH REGARDING SOLID AND GASEOUS EMISSIONS EMITTED BY PYROLYSIS INSTALLATION

Goal of the project

Evaluation of a new pyrolysis installation impact on the suburban environment

Short description of the project

The research partner has purchased and further developed a pyrolysis installation for thermal treatment of Polyethylene Terephthalate (PET). The main product id a high density molasses with a high energy content to be used as renewable energy source. The byproduct is biogas and our goal is to evaluate its quality and suitability to be used as main fuel for pyrolysis process.

Project implemented by

Politehnica University of Timisoara/ Faculty of Mechanical Engineering

Implementation period

22.04.14 – 22.12.14

Main activities

In-situ measurements of SO_2, NO ($NO+NO_2$), CO, CO_2, O_2, VOC, heavy metals, suspended particles emissions and thermodynamic parameters

Results

- Evaluation of pyrolysis efficiency.
- Evaluation of installation environmental impact.
- Evaluation of biogas quality.

Applicability and transferability of the results

- PET pyrolysis techniques.
- Renewable energy sources.
- Urban waste management.

Financed through/by

POWEROIL COMPANY Timisoara

Research Centre

Research Center for Thermal Machines and Equipment, Transportation and Pollution Control

Research team

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NUMERICAL SIMULATION OF HEAT CONVECTION FOR A WASHING MACHINE HEATING SYSTEM FUNTION OF THE THICKNESS OF LIMESTONE LAYER

Goal of the project

The project goal is investigate by numerical simulation the limestone accumulation on electrical heating elements for domestic and industrial applications.

Short description of the project

Many industrial applications require the use of electrical heating elements with wires arrangements, to functioning as heating device for industrial and domestic applications. Such devices have to be designed according to the availability of space in the device containing them. A measure of the evolution of such equipment, therefore, is the reduction in size, or in occupied volume, accompanied by the maintenance or improvement of its performance. When the heaters accumulates a lot of limestone, part the heat generated by the heating wire is transferred to the thermal fuse, which opens the heating circuit. Thermal fuse acts as safety device by interrupting the current in case that the heater is energized when it is not completely immersed in water.

Project implemented by

Politehnica University of Timisoara, Research Centre for Engineering of Systems with Complex Fluids

Implementation period

20.08.2014 – 04.09.2014

Main activities

The main activities consisted in:
- heat transfer simulation at imposed operating conditions using geometry reconstruction of the heat exchanger,
- computational domain discretization,
- problem setup for flow simulation with heat transfer,
- post processing and data analysis .

Results

The results will help to design new heating elements, increasing the performance and lifetime.

Applicability and transferability of the results

Knowledge transfer and increase the database of the company at different operating conditions which may appear in reality.

Financed through/by

- Zoppas Industries Romania SRL
- IRCA - Italy
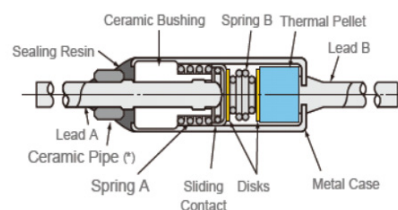
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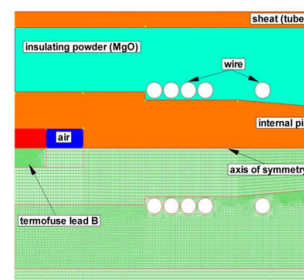
Computational domain mesh. Both structured and unstructured mesh is used in order to obtain the optimal mesh size for a accurate results.

Experimental measurements of the heat exchanger
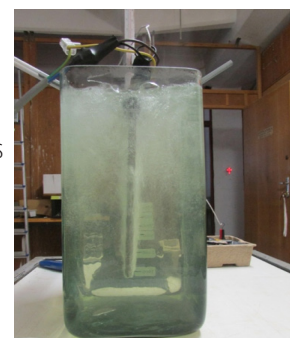
Research team

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Sandor BERNARD, PhD, Senior Researcher
Professor Romeo SUSAN-RESIGA, PhD
Mariana TODIRUTA, Eng, Researcher

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RESEARCH AND TECHNICAL ASSISTANCE FOR IMPROVING THE GEOMETRICAL PRECISION OF AUTOMOTIVE PRODUCTS

Goal of the project

To improve the quality of the drawings representation and hence the dimensional and geometrical precision of the injected plastic parts used especially in the automotive industry.

Short description of the project

Geometric product specification (GPS) is a language for communicating engineering design specifications. In this research have been studied different ways of representation of molded parts in accordance with the principles of GPS and a method of tolerance allocation that uses optimization techniques to assign component tolerances that minimize the cost of production of an assembly.

3D measuring principle of the plastic parts has been also analyzed. For each plastic parts studied, used in the automotive industry, has been developed the optimal reference system and strategy for measuring according to the characteristics of the part and dimensional and geometrical part precision requirements.

Project implemented by

Design Department, S.C. Continental Automotive Romania S.R.L.

Implementation period

03.03.2014 – 30.05.2014

Main activities

In a dynamic area as the automotive is difficult to keep up with all the requirements and technical news occurring. The research mission is to overcome these difficulties by an optimisation approach in the design phase of the plastic parts, that combine the following major activities:

- analyzing and deepening the different ways of drawings representation of molded parts accoding the GPS principles, that includes all the symbols, definitions, mathematical formulae, and application rules necessary to embody a viable engineering language
- tolerance allocation using least cost optimization
- 3D measuring principles of the plastic parts.

Results

Transfer to the technical staff of the company the design metods according to the GPS, ISO standards, tolerance analysis and 3D measuring principle in order to improve the quality of the products.

Applicability and transferability of the results

All the research results are useful, especially, in the design department. The methods developed can be used for design optimization of different plastic parts even in other companies.

Financed through/by

S.C. Continental Automotive Romania S.R.L.

Research Centre

Integrated Engineering Research Center

Research team

Assoc. Prof. Aurel TULCAN, PhD
Assist. Prof. Dan Teodor MĂRGINEANU, PhD
Assist. Prof. Liliana Georgeta TULCAN, PhD

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RESEARCH AND INVESTIGATION REGARDING THE IMPROVEMENT OF THE DIMENSIONAL PRECISION OF THE ENGINE INJECTED PLASTIC PARTS

Goal of the project

To transfer knowledge to the technical staff in order to improve the quality of their parts by understanding the geometrical product specification method (GPS) and the assumptions and risks that go along with each tolerance analysis method.

Short description of the project

- The first part of the project analyzed the geometrical product specifications method (GPS) and the ISO standards used for the engine plastic injection parts from the automotive industry.
- In the second part, according with project items the group of technical staff has been familiarized with statistical knowledge used in statistical process control, multi-Dimensional Tolerance Analysis (Manual and Automated Method) and Minimum-Cost Tolerance Allocation.
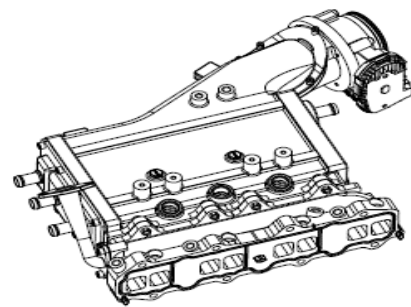
Project implemented by

Design Department, S.C. MAHLE Componente de motor S.R.L., Timişoara, Romania

Implementation period

06.05.2014-30.05.2014

Main activities

- The technical staff, assisted by the research team analyzed the requirements for the parts and how to make drawings according to the ISO standards using the Geometrical products specifications method.
- Also, they made a tolerance analysis, that is the process of taking known tolerances and analyzing the combination of these tolerances at an assembly level.
- For the specific parts has been defined the process for analyzing tolerance stacks. It has shown how to set up a loop diagram to determine a nominal performance/assembly value and the techniques to calculate variation from nominal.

Results

Transfer of geometrical product specification, statistical knowledge and tolerance analysis methods to technical staff for improving the quality of technical documentation in the design phase and during the fabrication of the products.

Applicability and transferability of the results

The results of the project are applicable in the Mahle Company for improving the quality of their products and for increase the productivity. The experience accumulated with this project is very useful for monitoring and optimizing different products in other companies.

Financed through/by

S.C. MAHLE Componente de motor S.R.L., Timişoara, Romania

Research Centre

Integrated Engineering Research Center

Research team

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NEW CLASSROOM MATERIALS FOR COMPUTER AIDED MATHEMATICS

Goal of the project

The project objective is to improve teaching practice, to develop GeoGebra applications which are useful to understood abstract mathematical notions and to produce dynamic and interactive documents dedicated to the first-year mathematics courses.

Short description of the project

All applets take advantage of GeoGebra's dual graphic view capability, which allow to simultaneously visualize two graphical representations and facilitates the study of transformations of the complex plane and of complex variable functions.

Project implemented by

Department of Mathematics and GeoGebra Institute of UPT

Implementation period

26.06.2012–01.06.2015

Main activities

- Weakly meetings with students at Geogebra Institute of UPT
- Support materials for life-long education of math teachers.
- Periodic uploads to GeoGebra Tube.

Results

- Applets for Calculus: Convergent sequence and its limit, The Taylor polynomial, Fourier series and Gibbs phenomenon, The Young's inequality, Random integral sum, The Cubic root of complex numbers, Simple convergence versus uniform convergence.
- Applets for Linear Algebra and Geometry: Linear transformations in the real plane and 2x2 matrices; Dynamically generated 2D curves, About oriented curves.
- Applets for Applied Mathematics: Differential equations and stability, About Shannon sampling theorem.
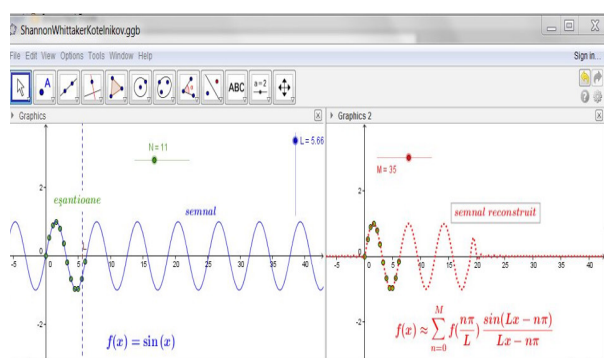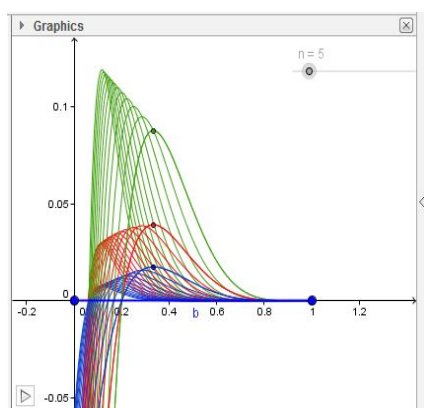
Applicability and transferability of the results

All GeoGebra applets can be classified ad didactical modeling and are appropriate to be utilized in the classroom.

Financed through/by

- Deparment of Mathematics
- SC ANCA ELECTRIC SYSTEMS SRL, Timişoara

Research Centre

GeoGebra Institute of UPT

Research team

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Patents

INVENTORS: HEPUŢ TEODOR, SOCALICI ANA, ARDELEAN ERIKA, ARDELEAN MARIUS, CONSTANTIN NICOLAE, BUZDUGA MIRON, BUZDUGA RADU

PATENT NO. 126946/2014

Tubular briquette from ferrous pulverous waste

The invention relates to a tubular briquette made of ferrous wastes as powder and smalls, meant to be used in the ferrous metallurgy, in reduction equipments, such as in pig-iron furnaces or in installations for the direct iron reduction from ores, with a view to obtaining iron sponge. According to the invention, the briquette is tube-shaped, having an external diameter $D = 60...70$ mm, an internal diameter $d = 20...25$ mm, the height $h = 40...45$ mm and having an external cylindrical surface, an internal cylindrical surface, two flat surfaces equal to each other, a cavity, and is obtained by the compression of a mixture in a mould, using a hydraulic press, the mixture comprising 40...60% steel foundry dust, 8...12% blast-furnace dust, 8...12% blast-furnace agglomeration slag, 5...9% iron scale, 5...8% coal dust, 5...8% the ferrous fraction of the steel foundry slag, 3...5% graphite, 2...4% bentonite, 2...4% lime and 4...8% water.
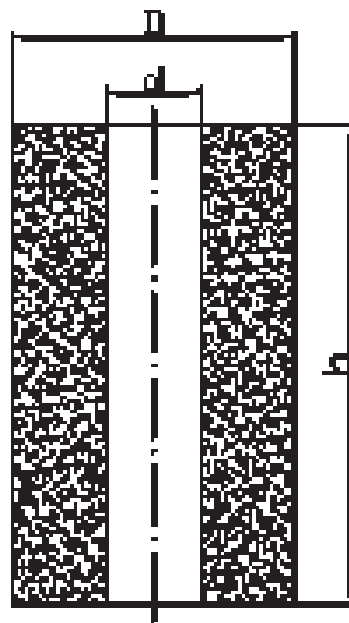
Patent Requests

INVENTORS: ICLĂNZAN TUDOR ALEXANDRU

INSTALLATION FOR COLLECTING   GARBAGE

• The invention relates to an installation for collecting garbage in a public space or in the proximity of dwellings. According to the invention, the installation consists of some support and turret assemblies, respectively, the support assembly being placed underground and consisting of a pedestal plate, provided with a central opening, for the full access of a container, which is fixed on a pedestal, which delimits the mouth of an underground compartment, on the plate there being fixed three columns, which support, inside the compartment, a common reinforcing plate, so that a leading screw supported in the plates, actuates a leading nut mounted on a mobile intermediary support plate, whereon the container is placed, on the lower side of the intermediary plate, in front of the column opposite to the leading screw; there being placed a profiled apron roll, on a shaft supported by some supports fixed on the intermediary plate, the turret assembly consisting of a thin-walled semi-cylindrical cover, between some straight lateral walls thereof there being provided a lamellar protuberance which enables the supporting of the cover of the container in semi-opened position, on the semi-cylindrical cover there being provided a sectorial radial opening, closed by an oscillating semi-circular valve, which has an undercut frontal sector covered with a transparent plate () which allows the filling condition of the container to be viewed, the turret assembly made this way being tiltable into the discharging position due to some hinges by means of which it is attached to the support assembly.

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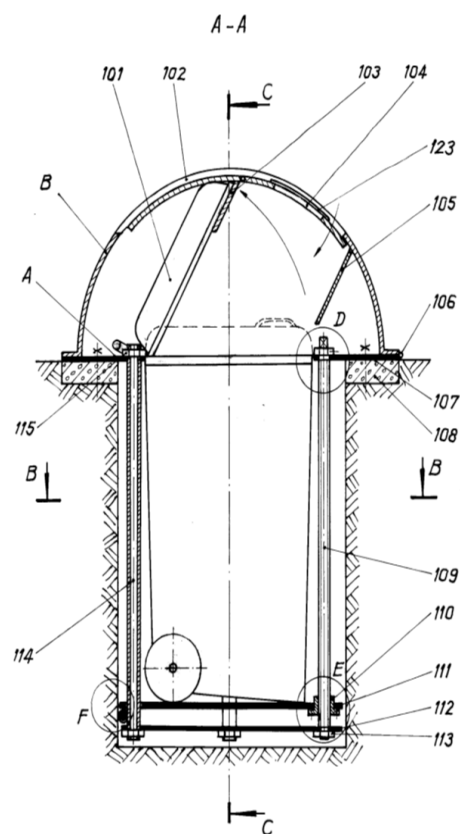
INVENTORS: ICLĂNZAN TUDOR ALEXANDRU

INSTALLATION FOR COLLECTING MUNICIPAL GARBAGE
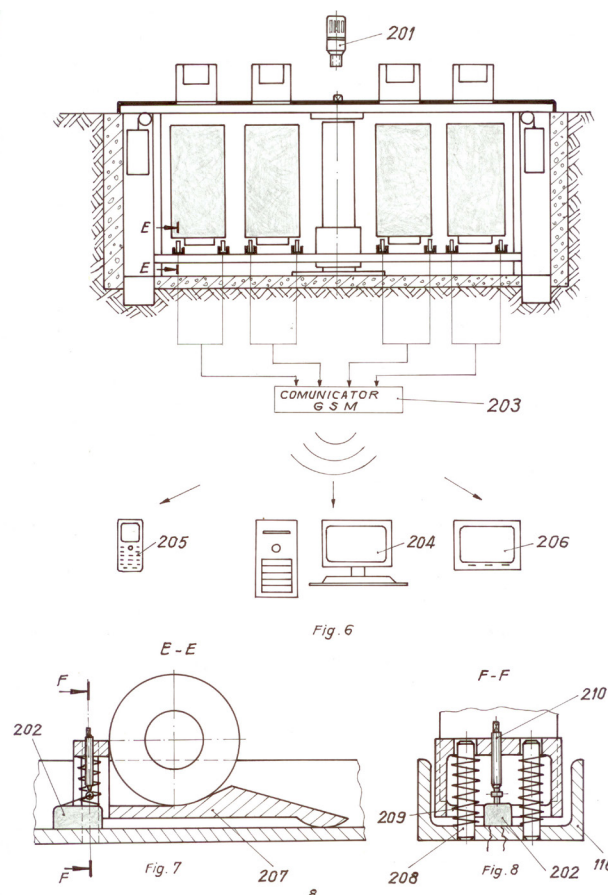
Fig. 6

Fig. 7

Fig. 8

• The invention relates to an installation for collecting garbage in a public space or in the proximity of dwelling houses. According to the invention, the installation consists of a parallelipipedal concreted enclosure, wherein there may be vertically moved a parallelipipedal metallic frame which, at the upper side has a cover, consisting of many segments, provided with some turrets for supplying some containers placed within the frame on some rail-type supports , the frame touching with the base the ground of the enclosure, and its weight and that of the containers is balanced by two counter-weights, which are suspended by four cables at the upper side of the enclosure, an end of the cables being connected to the base of the frame, and the other end to the counter-weights, the cables passing over four rollers, placed at the corners of the structure of the frame, in the central part of the frame there being placed a sleeve with a certain clearance, which guides the outer end of a leading screw, which may rotate inside an actuating nut, mounted on a cylindrical support, which is supported, at the opposed end, on the lower part of the ground from the concreted enclosure, a bushing fixed in the lower side of the frame carrying out a sliding adjustment with the cylindrical support and, consequently, the vertically guided movement when the leading screw is rotated, during the lifting and lowering operations, the lifting and lowering of the frame structure bearing the containers may be carried out with a portable direct current gearmotor, by coupling them at the outer end of the leading screw by an operator.

INVENTORS: MICEA MIHAI VICTOR, STANCOVICI ANDREI, CREŢU VLADIMIR IOAN

SYSTEM AND METHOD FOR ORIENTATION AND RELATIVE LOCALIZATION OF AUTONOMOUS SUBSYSTEMS
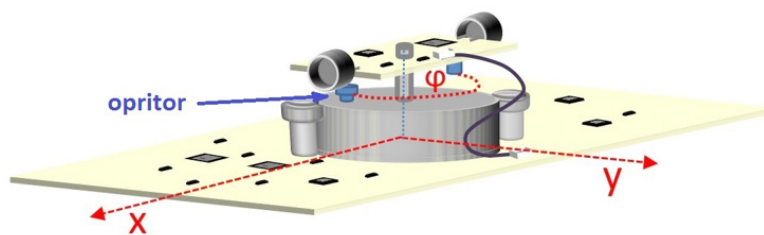
• The invention relates to a system and a method for orientation and relative localization of autonomous subsystems as related to a common reference system. According to the invention, the system consists of a set of autonomous subsystems, each of which are provided with an orientation and localization hardware device, and communicating by electromagnetic and mechanical waves, and a central node having the role of summarizing the coordinates, which can be a steady equipment or a preset system. The method, as claimed by the invention, comprises a first stage of subsystem localization based on mobility prediction, a second stage of localization by distributed processing and cooperation with the proximal subsystems and a third stage of coordinate summarizing and subsystem mobility management with a view to maintaining the localization accuracy coefficient at high values.
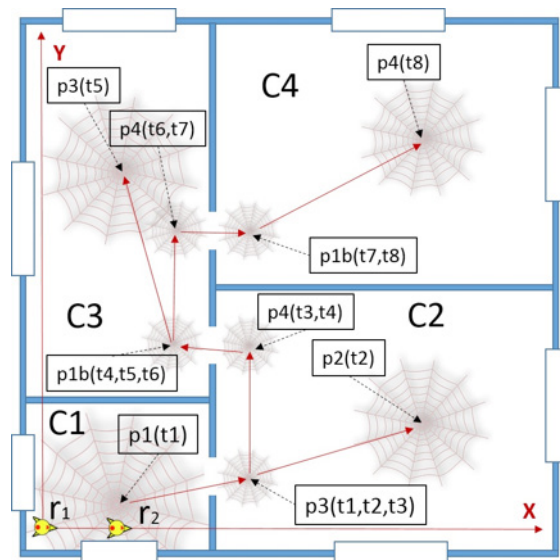
INVENTORS: POPA GABRIEL NICOLAE, POPA IOSIF, DEACONU SORIN IOAN

ELECTRONIC TIME RELAY FOR USE IN CONTROL INSTALLATIONS OF ELECTRIC DRIVERS, HAS TWO DELAY CIRCUITS WITH VARIOUS DELAYS
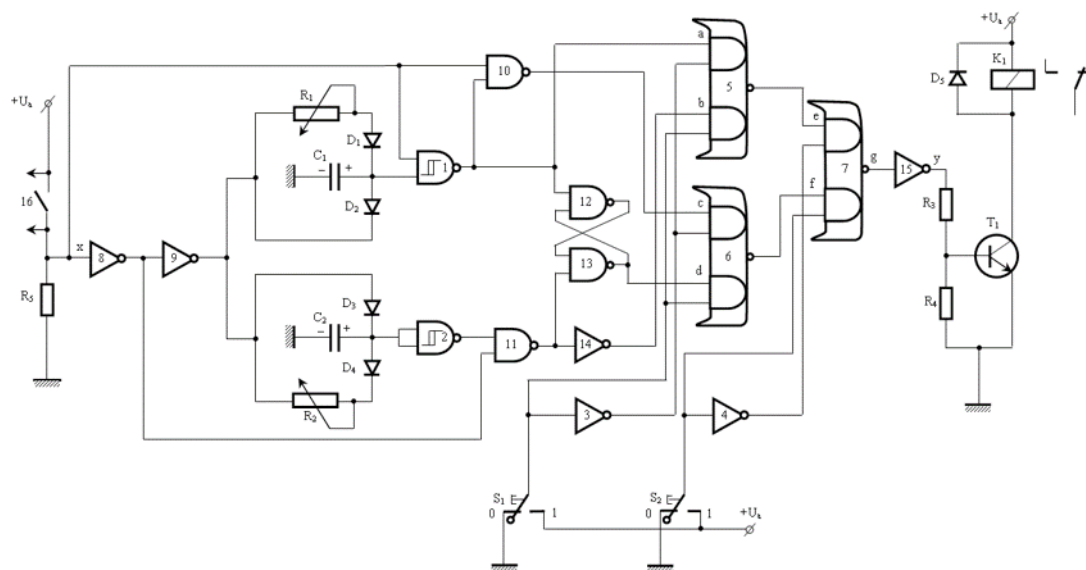
• The invention relates to an electronic relay for all normal functions, with actuating an electromagnetic relay which can be used in plants for the control of electric drives. Electronic time relay ensures that after the state of bi-positional switches, perform the following tasks: attracting delay, or delaying the release, or to keep it attracted a certain time, or delay the release of attracting mobile armature electromagnetic relay, with local control or from a command facility.

• The problem to be solved by the invention is to provide an electronic relay for all functions which are customary requirements by means of bi-positional switches in connection with AND-OR-NOT gates integrated circuits.

• The invention relates to an electronic time relay which may be used in the control installations of the electric drivers. According to the invention, the relay comprises two delay circuits (1, R1, C1, D1, D2; 2, R2, C2, D3, D4), with various delays, where to the command is transmitted by means of two inverters (8, 9), the output of the first delay circuit (1, R1, C1, D1, D2) being connected, on the one hand to the input of a first AND-OR-NOT gate (5), on the other hand through an AND-NOT gate (10), which has the other input connected to the input of the first inverter (8), to an input into a second AND-OR-NOT gate (6), and on the other hand to the SET input of a flip-flop circuit R-S (12, 13) which has the output connected to another input of the second AND-OR-NOT gate (6), and the second delay circuit (2, R2, C2, D3, D4) has the output connected to another AND-NOT gate (11) which has the other input connected after the first inverter (8) and whose output is connected, on the one hand, to the RESET input of a flip-flop circuit R-S (12, 13), and on the other hand, through an inverting gate (14) it is connected to an input of the first AND-OR-NOT gate (5), the outputs from the two AND-OR-NOT gates (5, 6) are connected to the inputs into a third AND-OR-NOT gate (7) whose output, through an inverting gate (15) and a logical amplifier with transistor (R3, R4, T1), controls an electromagnetic relay (K1), the functions of the electronic time relay being changed by means of two bi-positional switches (S1, S2) connected both directly and by means of some inverters (3, 4), to the free inputs of the three AND-OR-NOT gates (5, 6, 7) so as to allow the transmission, in four different ways, of the commands given from a contact (16) at the input of the first inverting gate (8), to the coil of the electromagnetic relay (K1).

Utility Models

INVENTOR: PAVEL ȘTEFAN

ELECTRIC INSTALLATION FOR DENTAL MEDICAL UNITS AIR DESINFECTION

The invention refers to an installation for air disinfection for dental medical units like a way for completion the cleaning and chemical disinfection measured in 10 minutes time of functioning.

The technical problem which the invention resolves, is the obtaining a fixed electric installation for air disinfection in dental medical units and it's incorporated in the general lighting installation, the commanding of the installation is made by a return press button, a general programing watch and a programing reel from the distance, which uses a telephone network (wired/GSM).

The electric Installation for dental medical units air disinfection is made from a light bull with a mirror lens, performance electronic ballasts and fluorescent lights with a color rendering index Ra= 94 and color temperature of 5200K, between this is positioned a germicidal lamp UV-C with wavelength of 253.7mm and UV-C radiation of 15.0W. The fluorescent lights are used for general lighting and the germicidal lamp is used for disinfection the space destined for dental medical unit.

The installation's command made optionally by a return press button, a general programing watch and a programing reel from distance which uses a telephone network (wired/GSM).

The invention's advantages are:

1. Lower costs for production because the disinfection lamp is incorporated in the general lighting lamp;
2. The installation disinfects the air in 10 minutes time with the condition that the general lighting system has to be designed and built as required in terms of the lighting regulations;
3. Each hour monitoring germicidal lamp operating time required for installation's efficient maintenance;
4. The installation's possibility of scheduling the operation;
5. The possibility to connect the disinfected air and the remote ordering system through GSM network and telephone;
6. The energy efficiency through lower power consumption;
7. The safe operation of air disinfection facility;
8. The electrical control's simplicity;
9. The simple maintenance by cleaning or replacing the lamps dust when the number of operating hours expires.

Doctor Honoris Causa

DOCTOR HONORIS CAUSA
Professor Peter George Oliver FREUND – University of Chicago

Professor Peter George Oliver Freund was born on September 7th 1936 in Timisoara and graduated the "C. D. Loga" high school in 1953. He completed his undergraduate studies between 1953-1958 at the Electrotechnic Faculty of the Politehnica University (former Polytechnic Institute in Timisoara). He earned the diploma of engineer in 1958 with a diploma work under the guidance of Professor Plautius Andronescu, a prominent educator, who profoundly influenced his way of thinking for the entire career.

A fundamental feature of his scientific thought has been the fact that he has been convinced from the start of the necessity of a radical change in modern physics concerning perception of the concept of physical field and its dimensions. Consequently, throughout his career, he devoted himself to research and description of physical phenomena in spaces with a higher number of dimensions in the larger context of unification of physical fields . He obtained a series of pioneering results in the field of supersymmetry, in string theory (i.e. theory of elementary particles seen as extending in space – strings – rather than point like objects). He proposed a hypothesis in string theory, the so-called Freund-Harari conjecture whose validity has been confirmed in many experiments.

In the scientific world, Professor Freund is best known and praised mainly for his contributions in two-component duality, in multi-dimensional unification, in superstrings with 26 dimensions and in p-adic strings. Professor Freund authored or co-authored more than 400 scientific papers that he published or presented at scientific conferences in his field of expertize. Scientific databases (Scopus, Web of Knowledge or Google Academic) count almost 4500 citations of his work at the present time, and this number is constantly increasing.

Professor Freund demonstrated his creative capabilities not only in the scientific domain, but also in literature, by publishing volumes of memories and fiction. We remark his books: A Passion For Discovery (2007), West of West End (2008), Tales in a Minor Key (2012) and the very interesting one Dialog across the Atlantic (written through the Internet together with his friend from childhood, the writer Radu Ciobanu), of which two editions have been already issued.

Professor Emeritus

PROFESSOR EMERITUS
Professor Hans-Jörg BULLINGER - Fraunhofer Gesellschaft

Professor Hans-Jörg Bullinger is the Doctor Honoris Causa of the Politehnica University of Timisoara since 2004. Professor Bullinger was president of the Fraunhofer Society between 2002-2012 and is currently a member of the Senate at the Research Network. In 2013, he was awarded the Hans-Peter-Stihl prize for his achievements in the development of the Stuttgart region.

He began his career working as a manufacturer for the Daimler-Benz company in Stuttgart, after which he obtained a degree at the University of Stuttgart, graduating with a Master's degree and Ph.D. in Manufacturing. After two years of lecturing at the University of Hagen, Dr. Bullinger was asked to become a full-time lecturer at the University of Stuttgart.

Besides his role as chairman of the University, Dr. Bullinger is also the head of the Institute for Human Factors and Technology Management (IAT) and the Fraunhofer-Institute for Industrial Engineering (IAO).

At present, the Fraunhofer-Gesellschaft maintains more than 80 research units in Germany, including 59 Fraunhofer Institutes. The majority of the 17,000 staff are qualified scientists and engineers.

With its clearly defined mission of application-oriented research and its focus on key technologies of relevance to the future, the Fraunhofer-Gesellschaft plays a prominent role in the German and European innovation process.

Professor Bullinger is a member of acatech, the German academy of science and engineering.

1998: Order of the Federal Republic of Germany (Bundesverdienstkreuz), medal and ribbon, awarded for outstanding services to German science, industry and society,

2003: First Class Order of the Federal Republic of Germany (Bundesverdienstkreuz erster Klasse), awarded for extraordinary services to German science and research

2006: Order of merit of the Federal Republic of Germany for promoting the transfer of knowledge between science and industry

2009: Verdienstorden des Landes Baden-Württemberg (Merit of the State of Baden-Wuerttemberg)

2012: Leonardo European Corporate Learning Award in the "Thought Leadership" category.[2]

2013: International Fellow[3] of the Royal Academy of Engineering[4]

Habilitation Theses

EFFECTIVE TECHNIQUES TO ENHANCE IMAGES AND VIDEOS

Author: Cosmin ANCUȚI

Abstract

In this habilitation thesis are presented my research activity and the main academic results obtained after obtaining my PhD, from the second half of 2009 to date. In the following are described the main directions of my research in image processing and computer vision fields: color-to-grayscale conversion, image dehazing, fusion-based enhancing techniques, preprocessing techniques for computer vision applications and enhancing underwater images.

Color-to-grayscale conversion refers to mapping three dimensional color information onto a single dimension while still preserving the original appearance, contrast and finest details. We present the main contributions of our effective decolorization algorithm that preserves the appearance of the original color image. Image dehazing refers to the process of enhancing the visibility in images degraded by haze. In outdoor environments, light reflected from object surfaces is commonly scattered due to the impurities of the aerosol, or the presence of atmospheric phenomena such as fog and haze yielding images characterized by poor contrast, lower saturation and additional noise. In our work we developed an alternative approach to solving this challenging problem. Our technique is based on the remark that the distance from the observer to the scene objects is highly correlated with the contrast degradation and the fading of the object colors.

Image dehazing refers to the process of enhancing the visibility in images degraded by haze. In outdoor environments, light reflected from object surfaces is commonly scattered due to the impurities of the aerosol, or the presence of atmospheric phenomena such as fog and haze yielding images characterized by poor contrast, lower saturation and additional noise. In our work we developed an alternative approach to solving this challenging problem. Our technique is based on the remark that the distance from the observer to the scene objects is highly correlated with the contrast degradation and the fading of the object colors.

Preprocessing techniques for computer vision applications. Firstly, in our previous work we introduced a decolorization technique that is suitable to match images based on local feature points
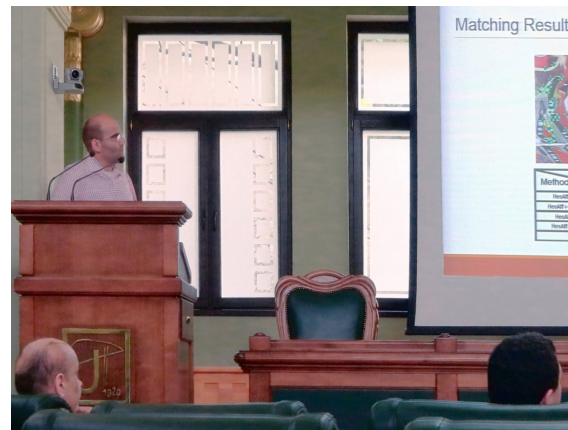
Enhancing Underwater Images. We describe a technique published in our work that is able to enhance underwater images. It aims to yield a final image that overcomes the deficiencies existing in the degraded input images by employing several weight maps that discriminate the regions characterized by poor visibility.

The full abstract at:

http://www.upt.ro/img/files/2013-2014/ doctorat/ abilitare/ Ancuti/Rezumat_abiltare_Cosmin%20Ancuti_lb_eng.pdf

Habilitation Commission

Prof.univ.dr.ing. Mihai DATCU
Universitatea Politehnica din București;
Prof.univ.dr.ing. Constantin VERTAN
Universitatea Politehnica din București;
Prof.univ.dr.ing. Radu VASIU
Universitatea Politehnica Timișoara

CONTRIBUTIONS TO THE BEHAVIOUR OF COMPOSITE ELEMENTS FOR BUILDINGS PLACED IN SEISMIC AREAS AND HIGH QUALITY CONSTRUCTION WORKS THROUGH MONITORING

Author: Daniel DAN

Abstract

The present thesis summarizes the research of activity, after the PhD thesis was defended at the Politehnica University of Timisoara and confirmed by the Ministry of Education and Research, on the basis of Order no. 3896 / 24. 04. 2003.

The habilitation thesis presents two main research activities that I performed and omits a series of activities considered secondary and complementary to the main ones.

My first research area consists in theoretical and experimental studies regarding the behaviour of steel composite elements for buildings placed in seismic areas.

This PhD research domain was further studied and supplemented with the discovery and the use of innovative composite solutions.

The second research area is focused on monitoring the structural health of special constructions or highly important buildings, on monitoring certain constructions in order to validate certain calculus principles. Within this research I have studied various applicative construction issues, i.e.: the subjects approached are closely connected to the execution activity and to the monitoring of the buildings behaviour in time. Therefore, I have applied new concepts for the energetic efficient buildings, as regards their construction and monitoring in order to validate the energetic performances.

In the field of the behaviour of steel concrete composite shear walls with high strength concrete I aim to:
- Identify innovative solutions for composite steel-concrete shear walls with partially encased profiles, for solid composite walls and with various configurations of openings;
- Find new technologies to make shear walls using fibre reinforced concrete;
- Strengthen composite shear walls using Fiber Reinforced Polymers as possible strengthening solutions for structural elements damaged under seismic events.

In the field of monitoring the structural health of special constructions or highly important buildings and monitoring certain constructions in order to validate certain calculus principles I plan to:
- Find efficient solutions for sustainable buildings in Romania;
- Finish the research programme of monitoring the passive house and nearly energy building;
- Provide a practice guide based on recorded data.

The full abstract at:
http://www.upt.ro/administrare/dgac1/file/2013-2014/abilitare/Dan_Daniel/Abstract_Habilitation%20Thesis_Daniel_DAN_EN.pdf

Habilitation Commission

Prof. univ. dr. ing. Nicolae ȚĂRANU
Universitatea Tehnică "Gheorghe Asachi" din Iaşi
Prof. univ. dr.ing. André PLUMIER
Universitatea din Liege, Belgia
Prof. univ. dr. ing. Adrian IOANI
Universitatea Tehnică din Cluj

CONTRIBUTIONS TO THE BEHAVIOR OF STRUCTURES UNDER EXTREME LOADING

Author: Florea DINU

Abstract

The Habilitation Thesis presents the past activity of the candidate after defending the PhD Thesis at The Politehnica University Timişoara and also plans of future research and personal developments. The PhD Thesis, entitled "Behaviour of MR steel frames with semirigid joints" was prepared under the coordination of Acad. Dan Mateescu. The doctoral degree was confirmed by The Ministry of Education and Research, Order no. 1300/112/C, from 23.12.2004.

Within the period 2004-2014, most of activity concentrated on extending the research topics developed during the PhD period. Starting from the seismic behavior of steel framed buildings, performance based seismic design methodology and the factors that affect one of the key properties, i.e. ductility of members and connections, the research activity extended to other extreme actions, with the aim of providing a complete set of design requirements under any type of extreme loading. These new topics partially continued the previous activity, but there were also new topics that emerged from the previous activity. As a direct consequence of the research activity, efforts have been paid to bring these new concepts into real applications. Thus, there were several projects that may be viewed as innovative, from the point of view of the structural system, connections, detailing and use of materials or analysis techniques. For their innovative character, some applications have been awarded by prestigious national and international organizations.

A great support for the activity that followed after the PhD, may be attributed to the participation of the candidate to national and international projects and also to the cooperation with industrial partners. This can be justified by the publication of more than 40 papers, mostly in international conferences and journals. The main achievements and results are presented in detail in the Thesis.

In what concerns the future activities and development plans, the following research topics will be further developed or started:

- Guidelines for the collapse control performance based design of multi-story frame buildings against accidental actions

- Improved structural systems and application to buildings
- New structural systems based on removable dissipative members
- New hysteretic devices with improved damping characteristics
- Application of new braced systems to design of new buildings or for refurbishing existing buildings.
- Durability of structures under climate change effects
- Evaluation of the reliability and durability of structures along the designed lifetime
- Methodologies for Performance Based Evaluation / Design of construction for progressive climate action exposures;
- Intervention strategies and adaptive building technologies

The full abstract at:

http://www.upt.ro/img/files/2013-2014/ doctorat/abilitare/Dinu/Rezumat_teza_eng_Dinu.pdf

Habilitation Commission

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Universitatea Tehnică din Cluj-Napoca;
Prof.univ.dr.ing. Ioannis VAYAS
Universitatea Naţională Tehnică din Atena - GRECIA;
Prof.univ.dr.ing. Radu VĂCĂREANU
Universitatea Tehnică de Construcţii din Bucureşti

NEW ANALYTICAL APPROACHES TO NONLINEAR VIBRATIONS

Author: Nicolae Horațius HERIȘANU

Abstract

This habilitation thesis briefly presents the achievements of the authors in the scientific research developed after defending his PhD thesis within "Politehnica" University of Timisoara. These results are presented in 25 journal papers published in prestigious journals indexed by Science Citation Index, having significant impact factors, a monograph published by Springer Verlag – Berlin and other conference papers presented at national and international conferences as well as other journal papers.

The thesis is structured on 6 Chapters; the first 5 Chapters present the achievements of the authors in the last years and the last Chapter presents some evolution and development plans.

The main research direction on which this thesis is built-up is based on the study of nonlinear vibration using original analytical methods, which have been published in the literature by the author and his collaborators in the last decade.

After a brief introductory Chapter, the next 4 Chapters are intended to present the 4 original analytical methods proposed by the author in the literature: the Optimal Homotopy Asymptotic Method (OHAM), the Optimal Variational Iteration Method (OVIM), the Optimal Homotopy Perturbation Method (OHPM) and the Optimal Iteration Perturbation Method (OIPM).

All these original methods published in the literature by the author of the thesis and his collaborator Vasile Marinca after a close and fruitful collaboration, have a common idea, allowing obtaining solutions to problems related to nonlinear dynamical systems from mechanical engineering in an optimal approach. The analytical solutions depend on several initially unknown parameters, called "convergence-control parameters" whose optimal values are determined through a rigorous algorithm intended to minimize the residual obtained after replacing the analytical solution in the initial equation, so that the solutions converge to the exact ones with a remarkable rapidity.

The key of the problem which ensure the success of these methods consist in the determination of the optimal values of convergence-control parameters, which task can be accomplished in various ways, using some approaches such as the least square method, the collocation method, the Galerkin method, and so on, which are implemented using a computer and specific programs.

Finally, the last Chapter of the thesis is intended to identify some opportunities concerning possible development of researches and a continuation of increasing the performances of the proposed methods so that these methods would became mature ones, applicable with less computational efforts and largely accessible for anyone. There is identified significant opportunities to obtain new results by enlarging the research team which will involve future PhD students which will be enrolled.

The full abstract at:

http://www.upt.ro/img/files/2014-2015/doctorat/abilitare/herisanu/Abstract.pdf

Habilitation Commission

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Universitatea "Dunărea de Jos" din Galați;
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Academia Română;
Prof.univ.dr.ing. Livija CVETICANIN
University of Novi Sad, Serbia

INTELLIGENT MONITORING SYSTEMS ACHIEVEMENT APPLIED IN POWER SYSTEMS

Author: Doru VĂTĂU

Abstract

IIn the frame of the habilitation thesis are prezented the most important personal achievements on scientific, professional and academical plan that I´ve obtained in the period of time January 1997 – June 2014. This period follows to my public presentation of the PhD thesis that took place on January 17th, 1997 (later confirmed by the Order of the Ministry of Education No. 3991 from June 2nd, 1997).

The habilitation thesis is structured in three parts: the abstract, the technical presentation and the bibliographic references.

The habilitation thesis starts with an abstract that includes the synthesis of the habilitation thesis. The second part of the thesis, named „Technical Presentation" includes five sections. In the first section are presented briefly the remarkable achievements obtained through research and educational activities (list with publications and grants classified on three research directions, new disciplines introduced in the education plans, taught courses, contributions brought to the development of the syllabus, invited professor, practice activities with students, conducting license and dissertation theses, endowed laboratories and library, international cooperation, management activities, etc.). The second section presents the contributions adequate to the first research direction

"Systems for monitoring and analysis of the technical status of the materials, electrical machines and electrical equipment used in power systems". The third section makes reference to the contributions obtained in the second research direction „ Power quality monitoring equipment designed for the connection points between

the transmission and distribution network". The fourth section presents the contributions from the third research direction „Power generation, transmission and delivery environment impact monitoring systems".

The last section presents the evolution and development plan regarding the professional, scientific and academic career, as well as exact methods of putting them into practice.

The conceived action plan includes three directions of research/ teaching / practical applications that are: renewable energy sources; materials, equipments, methods and work techniques under high voltage; the impact of electrical installations on the environment.

The full abstract at:
        hhttp://www.upt.ro/img/files/2014-2015/doctorat/ abilitare/vatau/Teza_abilitare1_en_Vatau_Doru.pdf

Habilitation Commission

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Universitatea Politehnică din Bucureşti
Prof.univ.dr.ing. Dumitru Marcel ISTRATE –
Universitatea Tehnică "Gh. Asachi" din Iaşi

FIRE DESIGN OF CIVIL ENGINEERING STRUCTURES

Author: Raul Dan ZAHARIA

Abstract

The thesis summarizes a part of the research activity of the candidate after defending the PhD Thesis at the Politehnica University of Timisoara in February 2000. The selected activity was considered to be relevant in terms of originality and importance, in order to anticipate an independent development of the further research and teaching career. The presentation of the post-doctoral activity is developed within the main thematic direction: "Fire design of civil engineering structures". A secondary direction is also considered: "Design assisted by testing".

The candidate was involved in the main topic "Fire design of civil engineering structures" since 2000, after the defense of the PhD thesis, when he obtained a research grant of one year, offered by the Services for Scientific and Cultural Affairs of the prime Minister of Belgium. The research was lead by Prof. Jean Marc Franssen from Liege University in Belgium, a world-wide recognized pioneer in the field of the fire design of civil engineering structures, with decisive contributions in the relatively recent topic of calculation of the fire resistance of structures. The research was focused on the fire behaviour of high-rise steel rack structures and a description of the main results of the research is presented in Part B section 2.5.1 "Fire resistance analysis of high-rise rack structures".

The relevance of the scientific activity and the recognition of the national and international activity in the field of the first main direction "Fire design of civil engineering structures" is emphasized by the publications of the candidate, mostly in cooperation with European researchers, but also by the involvement in two European technical committees. Another relevant aspect for the recognition of the international activity of the candidate in the field is that he was member of the Scientific Committees for the recent editions of the only two specialised international conferences dedicated exclusively to the structural analysis component of the fire engineering.

The implementation of the fire design principles is still an on-going process in Romania.

However, in the last decade, the candidate calculated the fire resistance of the structural elements for some structures built in Romania. This was a premiere in Romania and, up to this moment, no other similar design cases exist.

The ful abstract at:
http://www.upt.ro/administrare/dgac1/file/2013-2014/abilitare/Raul_Zaharia/Abstract-Raul_ZAHARIA_en.pdf

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Universitatea Tehnică din Cluj;
Prof.univ.dr.ing. Jean Marc FRANSSEN
Universitatea din Liege, Belgia

MONETARY POLICY, FINANCIAL STABILITY AND ASSET PRICES

Author: Claudiu Tiberiu ALBULESCU

Abstract

The present habilitation thesis includes two main sections, namely the part covering the scientific contributions and the career development plan. The first section highlights the candidate's contributions in the field of monetary policy, financial stability and asset prices since the completion of the PhD program up to present, while the second part covers the candidate's projects for his academic activity, including future research directions.

The first part of the thesis summarizes our main scientific contributions in the field of monetary policy, financial stability and asset prices, in the context of the European economic and financial integration. Our scientific contributions are grouped considering three related directions: the link between the monetary policy and the systemic financial stability, the exchange rate stability and the relationship between the integration process, the stability and the financial volatility.

In the field of monetary policy and financial stability, the main contributions is represented by the construction of an aggregate financial instability index Albulescu (2010) and the way in which the European Central Bank considered the financial instability in its monetary policy decisions (Albulescu, 2012; Albulescu, 2013; Albulescu et al., 2013), in an augmented Taylor rule framework.

In the field of the exchange rate stability, we report two main contributions. The first is focused on the assessment of the equilibrium exchange rate determinants for the Central and Eastern European countries (Albulescu and Goyeau, 2011a). To this end, we use a panel data analysis and a behavioral model and discover that, for the analyzed period, in Latvia and Romania, the nominal exchange rate seems to be undervalued in comparison with the equilibrium exchange rate. The second contribution in this area is the assessment of the impact of movements in international oil prices, on the real exchange equilibrium rate in Romania, using a wavelet framework. We identify several periods of influence, at different frequencies, between the oil price and the exchange rate. Moreover, we prove that positive shocks have a more powerful impact on the exchange rate movements in the short run.
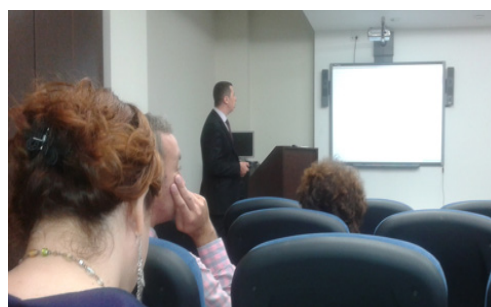
Finally, in the field of integration, financial stability and financial volatility, we show on the one hand that the financial stability plays an important role in promoting the economic and financial integration and the foreign direct investments inflows (Albulescu et al., 2010; Albulescu, 2011). Regarding the bidirectional causality between the equity index derivatives and the volatility of their underlying assets, Albulescu and Goyeau (2011b) use a vector auto-regression model and Granger causality tests and show that there is no clear evidence regarding this bidirectional causality, while Albulescu and Tiwari (2013) document several asymmetric bidirectional relationships.

The full abstract at:

http://www.uvt.ro/en/educatie/studii-universitare-de-doctorat/ordine-privind-acordarea-titlului-de-doctor/abilitare-albulescu/

Habilitation Commission

Prof.univ.dr. Marilen PIRTEA
Universitatea de Vest din Timişoara
Prof.univ.dr. Bogdan DIMA
Universitatea de Vest din Timişoara
Prof.univ.dr. Mihai MUTAŞCU
Universitatea de Vest din Timişoara

PhD Theses

Industrial Engineering

Marius CĂLIMANU Supervisor prof. T. Fleşer	*Studii privind îmbinarea nedemontabilă a materialelor compozite cu matrice de aluminiu* (Studies regarding the joining of aluminium metal matrix composite)
Gabriel DAMACUS Supervisor prof. D. Ţucu	*Cercetări privind optimizarea sistemelor de ambalare pentru alimente în cazul folosirii maselor plastice* (Research on optimization of packaging for food when using plastic)
Mircea Adrian DUNGAN Supervisor prof. D. Ţucu	*Soluţii constructive şi tehnologice pentru optimizarea sistemelor de frânare ale materialului rulant* (Constructive and technological solutions to optimize braking systems of railway rolling stock)
Stelian Cornel FLORICA Supervisor prof. G. Drăghici	*Contribuţii privind concepţia colaborativă a produsului în platforme PLM distribuite* (Contributions to collaborative product design in distributed PLM platform)
Ionela Ramona GUŞETOIU Supervisor prof. D. Ţucu	*Aspecte privind diagnoza şi evaluarea relaţiilor de muncă în cadrul proceselor tehnologice* (Aspects concerning diagnosis and evaluation of labor relations within technological processes)
Anca IANCU Supervisor prof. D. Ţucu	*Contribuţii la optimizarea calităţii în sistemele tehnologice pentru fabricarea pastelor făinoase aglutenice* (Contributions to optimize quality in technological systems for making gluten free pasta)
Octavian Victor OANCĂ Supervisors prof. I. Bordeaşu Supervisors prof. I. Mitelea	*Tehnici de optimizare a rezistenţei la eroziunea prin cavitaţie a unor aliaje CuAlNiFeMn destinate execuţiei elicelor navale* (Optimization techniques of the resistance to erosion by cavitation for alloys CuNiFeAlMn destined of the marine propellers execution)
Alexandru-Silviu SMARANDA Supervisor prof. D. Ţucu	*Analiza tehnologicităţii industriale a materialelor plastice compozite din resurse regenerabile* (Analysys of the industrial manufacturability of plastic material composites from renewable resources)

Mechanical Engineering

Flavia BĂLĂNEAN Supervisor prof. M. TOTH-TAŞCĂU	*Studii şi cercetări privind implanturile pentru articulaţia cotului* (Research and studies on elbow implants)
Ion Silviu BOROZAN Supervisor prof. I. Maniu	*Determinarea parametrilor cutiilor de viteze automate în scopul îmbunătăţirii caracteristicilor tehnico-funcţionale ale acestora* (Automatic gearboxes parametric quality analysis regarding the improvement of the technical and functional characteristics)
Tiberiu CIOCAN Supervisor prof. R. Susan-Resiga	*Optimizarea curgerii cu rotaţie la intrarea în tubul de aspiraţie al turbinelor hidraulice* (Optimization of the swirling flow at the draft tube inlet of hydraulic turbines)
Remus-Daniel ENE Supervisor prof. L. Bereteu	*Studii şi cercetări în mecanica mediilor continue prin aplicarea unor noi metode analitice aproximative* (Studies and researchers in continuum mechanics by applying new approximate analytical methods)

Cristina FLOREA Supervisors prof. A. DAVIDESCU prof. R. KORHONEN	*Caracterizarea proprietăților de material ale cartilajului articular, condrocitelor și a osului prin tehnici la scară nano și micro* (Characterization of articular cartilage, chondrocyte and bone properties using nano and microscale techniques)
Nina GORIE Supervisor prof. V. Dolga	*Contribuții la studiul unui sistem mecatronic pentru recuperarea persoanelor cu dizabilități* (Contributions to the study of a mechatronic system for recovery of persons with disabilities)
Tiberiu Adrian MEDGYESI Supervisor: prof. L. Bereteu	*Contribuții la dezvoltarea unor metode vibro-acustice pentru determinarea unor caracteristici mecanice ale structurilor sudate din plăci subțiri* (Contributions to the development of vibroacoustic methods for determining the mechanical properties of thin plate welded structures)
Alina MONDOC Supervisor: prof. V. Dolga	*Analiza teoretică și experimentală a aspectelor aleatorii din scena de lucru a unui robot mobil* (A theoretical and experimental approach of aleatory aspects in the workspace of a mobile robot)
Ioan NEAMȚ Supervisor: prof. I. Ionel	*Cercetări teoretice și experimentale privind posibilitatea valorificării energetice a nămolului din stațiile de epurare municipal* (Theoretical and experimental reserch concerning the possibilities of energy recovery using the sewage sludge from municipal waste water treatment plants)
Niculai PAȘCA Supervisor prof. L. Marșavina	*Evaluarea durabilității componentelor hidroagregatelor* (Durability assessment for hydropower components)
Oana Maria PAȘCA Supervisor prof. M. TOTH-TAȘCĂU	*Studii și cercetări privind ortezele de gleznă și picior* (Research and studies regarding ankle and foot orthosis)
Cristian TOADER-PASTI Supervisor: prof. L. Bereteu	*Cercetări privind dezvoltarea sistemelor de testare ale protezelor de gleznă* (Researches regarding the development of the systems used in ankle prosthesis testing)
Maria Silvia PERNEVAN Supervisor prof. L. Marșavina	*Caracterizarea mecanică a materialelor compozite ranforsate cu fibre și puzderii liberiene* (Mechanical characterization of composite materials reinforced with bast shives and bast fibers)
Mariana-Claudia VOICU Supervisor prof. I. Maniu	*Optimizarea comportamentului dinamic al sistemelor de imprimare* (Optimization of dynamic behaviour of printing roller systems)

Chemical Engineering

Radu Ovidiu ARDELEAN Supervisor prof. C. M. Davidescu	*Noi tipuri de materiale avansate obținute prin modificarea chimică a unor matrici polimere și evaluarea performanțelor lor în calitate de adsorbanți* (New types of advanced materials obtained by chemical modification of polymer matrices and their performance evaluation as adsorbents)
Marian BOBINĂ Supervisor prof. N. Vaszilcsin	*Utilizarea produșilor naturali ca inhibitori de coroziune pentru metale și aliaje* (The use of natural products as corrosion inhibitors for metals and alloys)

Mircea Laurenţiu DAN Supervisor prof. N. Vaszilcsin	*Comportarea electrochimică a perovskiţilor cobaltului cu structură stratificată de tip 112 şi 114* (The electrochemical behavior of cobalt perovskite - type layered structure 112 and 114)
Ioniţa Firuţa FIŢIGĂU Supervisor prof. F Peter	*Modificarea enzimatică a ligninei şi a fracţiunilor de lignină obţinute în urma pretratamentului biomasei lignocelulozice* (Enzymatic modification of lignin and lignin fractions obtained by pretreatment of lignocellulosic biomass)
Maria ILICI Supervisor: prof. M. Ştefănescu	*Sinteza, caracterizarea fizico-chimică, structurală şi potenţialul coordinativ al unor noi compuşi heterociclici din clasa 1,3,4 –tiadiazolului* (Synthesis, physico-chemical, structural characterization and coordinative potential of new heterocyclic compounds from 1,3,4-thiadiazole class)
Georgeta MIHOC Supervisor prof. C. Păcurariu	*Materiale avansate utilizate ca adsorbanţi pentru eliminarea unor poluanţi din ape reziduale* (Advanced materials used as adsorbents for the removal of pollutants from wastewater)
Oana Ramona Maria PAŞKA Supervisor prof. C. Păcurariu	*Contribuţii privind adsorbţia unor coloranţi din ape reziduale* (Contribution to the adsorption of synthetic dyes from wastewaters)
Iulia Maria PĂUŞESCU Supervisor: prof. M. Ştefănescu Supervisor: prof. F. Peter	*Studii privind aromaticitatea unor combinaţii heterociclice* (Studies on the aromaticity of some heterocyclic compounds)
Elena Alina TĂCULESCU Supervisor prof. C. Păcurariu	*Noi abordări privind sinteza şi utilizarea unor nanomateriale cu proprietăţi magnetice* (New approaches regarding the synthesis and the use of some nanomaterials with magnetic properties)

Materials Engineering

Iuliana BADEA Supervisor prof. I. Grozescu	*Studiul obţinerii materialelor termoelectrice pe bază de Bi2Te3. Caracterizarea şi testarea proprietăţilor termoelectrice* (The study of thermoelectric materials obtained based on Bi2Te3. Characterization and testing of thermoelectric properties)
Victoria HARANGUŞ Supervisor prof. T. Heput	*Contribuţii privind creşterea gradului de siguranţă şi securitate în muncă la oţelăriile electrice* (Contributions to incresing the level of ocupational safety and security in the electric steelworks)
Georgiana MELCIOIU Supervisor prof. V.A. Şerban	*Studii şi cercetării privind limitarea apariţiei şi dezvoltării excrescenţelor de tip whiskers la aliajele de lipire pe bază de staniu* (Studies and researches to mitigate occurrence and development the growths whiskers at the tin-based soldering alloys)
Daniel OCHIAN Supervisor prof. I. Mitelea	*Contribuţii privind procesul de sudare a oţelurilor aliate destinate execuţiei pânzelor de ferăstrău* (Contributions on the welding process of alloyed steels for saw blades)
Adina PĂUCĂ Supervisor prof. T. Heput	*Cercetări privind îmbunătăţirea caracteristicilor cilindrilor de laminor şi comportarea acestora în exploatare* (Research on improving the characteritics of rolling cylinders and their behavior in service)

Florina Ştefania RUS Supervisor prof. I. Grozescu	*Nanomateriale oxidice de tipul AB2O4 cu aplicaţii în senzoristică* (AB2O4 type oxide Nanomaterials with applications in sensors)
Cristian STOIAN Supervisor prof. V. A. Şerban	*Dezvoltarea aliajelor de brazare amorfe pe bază de cupru utilizate pentru îmbinări Cu-Cu/Inox* (Development of amorphous brazing alloys of copper user for joints Cu-Cu/Inox)
Maria Laura STRUGARIU Supervisor prof. T. Hepuţ	*Cercetări privind valorificarea subproduselor rezultate de la epurarea apelor industrial* (Research on the recovery of by-products from industrial wastewaters)
Adela Susana TODORUŢ Supervisor prof. T. Hepuţ	*Cercetări privind gestionarea şi valorificarea deşeurilor mărunte şi pulverulente, rezultate din industria de materiale, în contextul dezvoltării durabile a judeţului Hunedoara* (Management research and recovery of small and powdery wastes, resulted from materials industry, for sustainnable development of Hunedoara area)

Electronics and Telecommunication Engineering

Florentina Anica BOTEZATU Supervisor prof. C. I. Toma	*Contribuţii la evaluarea asistată de calculator a testelor psihologice folosind tehnici de prelucrare a imaginilor* (Contributions to the computer-assisted assessment of psychological tests using image-processing techniques)
Aurel CIREŞAN Supervisor prof. D. Lascu	*Convertoare CUK de generaţia a doua* (Second generation CUK converters)
Eugen-Victor CUTEANU Supervisor prof. A. Isar	*Metode de reducere a PAPR în sistemele de comunicaţii bazate pe OFDM* (PAPR reduction methods in OFDM based Communication systems)
Vasile-Daniel DRĂGHICI Supervisor prof. D. Lascu	*Comenzi digitale predictive în curent pentru convertoare dc-dc în comutaţie* (Predictive digital current-mode control in switching dc-dc converters)
Andrei Marius GABOR Supervisor prof. R. Vasiu	*Baze de date multimedia* (Multimedia databases)
Lucian MORGOŞ Supervisor prof. M. Naforniţă	*Contribuţii privind îmbunătăţirea tehnicilor de egalizare ale canalelor radio* (Radio Channels equalization techniques improvement)
Dan Mihai MIHĂILESCU Supervisor prof. C. I. Toma	*Contribuţii la diagnosticul asistat de calculator în imaginile de ultrasonografie abdominală* (Contributions to computer-aided diagnosis in abdominal ultrasound imagery)
Alexandru Sorin PEŢAN Supervisor prof. R. Vasiu	*Sisteme multimedia interactive adaptive cu aplicaţii în e-learning, divertisment şi formare profesională* (Interactive adaptive multimedia systems applied in e-learning, entertainment and professional development)
Mihai POMARLAN Supervisor prof. V. Tiponuţ	*Planificatoare de mişcare pentru multiple interogări bazate pe hărţi compacte pentru medii dinamice şi dificile* (Multi-query motion planners based on sparse roadmaps for changing and difficult environments)

Florin VANCEA Supervisor prof. I. Nafornița	*Detecția atacurilor informatice și a anomaliilor din rețele de calculatoare prin supravegherea caracteristicilor de trafic folosind tehnici de prelucrare a semnalelor* (Detection of security attacks and of other anomalies in computer networks by monitoring traffic characteristics using signal processing methods)
Gheza Gavril DOHI TREPSZKER Supervisor prof. C. I. Toma	*Tehnici de supraveghere video a râurilor* (Video surveillance techniques for rivers monitoring)
Laviniu ȚEPELEA Supervisor prof. V. Tiponuț	*Noi metode pentru deplasarea asistată în medii cu obstacole a persoanelor cu deficiențe de vedere* (New methods for assisted movement in obstacle environments for visual impairments)

Power Engineering

Mihaela FRIGURĂ-ILIASA Supervisor prof. P. Andrea	*Contribuții privind îmbunătățirea performanțelor funcționale ale varistoarelor pe bază de oxizi metalici* (Contributions concerning the functional performance improvement for metal oxide based varistors)
Monica Mirela MOLNAR-MATEI Supervisor prof. F. D. Șurianu	*Metodă fuzzy-clustering de clasificare a golurilor de tensiune trifazate din rețeaua electrică* (Fuzzy-clustering method for three phase voltage dips classification from electrical network)
Ioan Sorin RANCOV Supervisor prof. P. Andrea	*Cercetări privind creșterea randamentului instalațiilor electrice fotovoltaice* (Researches about increasing the efficiency of photovoltaic electrical instalations)
Attila SIMO Supervisor prof. Ș. Kilyeni	*Planificarea dinamică a extinderii rețelelor de transport al energiei electrice utilizând tehnici de inteligență artificială* (Artificial intelligence based transmission network dynamic expansion planning)
Răzvan Petru TESLOVAN Supervisor prof. Ș. Kilyeni	*Planificarea extinderii rețelelor electrice de distribuție* (Distribution network expansion planning)

Computers and Information Technology

Kristian BEREȘ Supervisor prof. N. Robu	*Model de învățare amestecat cu "Managerul de clasă Virtuală", ca un factor în eficiența sistemului de educație în situații obișnuite și de urgență* (Blended learning model with Virtual Classroom Manager as a factor in efficiency of education system in ordinary and emergency situations)
Adela Diana BERDIE Supervisor prof. O. Proștean	*Contribuții privind evaluarea multicriterială a tehnologiilor SAP* (Contributions regarding the multicriteria evaluation of the SAP technologies)

Daniel DRAGU Supervisor prof. V. Stoicu-Tivadar	*Contribuţii privind integrarea cunoaşterii medicale utilizând standardul Topic Maps* (Contributions on medical knowledge integration using Topic Maps standard)
Iulia Maria HARAGOŞ Supervisor prof. Ş. Holban	*Contribuţii la modelarea analitică a traficului rutier cu elemente din teoria şirurilor de aşteptare* (Contributions on analytical modeling of road traffic with elements of queuing theory)
Valentin Mircea LUPEA Supervisor prof. Ş. Holban	*Contribuţii la creşterea eficienţei neuronului cu ponderi numere complexe şi funcţie periodică de activare* (Contributions to efficiency improvement of multi-valued neurons with a periodic activation function)
Elisa Valentina ONEŢ (MOISI) Supervisor prof. V. I. Creţu	*Reconstrucţia imaginilor binare în cadrul tomografiei discrete folosind reţeaua de celule triunghiulare* (Binary images reconstruction for discrete tomography using triangular grid)
Vasile TOPAC Supervisor prof. V. Stoicu-Tivadar	*Îmbunătăţirea accesibilităţii textului şi a înţelegerii informaţiei de specialitate* (Improving text accessibility and understanding of domain-specific information)

Systems Engineering

Cristina-Elena COMAN Supervisor prof. G. D. Andreescu	*Strategii de conducere pentru aplicaţii cu maşini sincrone cu magneţi permanenţi* (Control strategies for permanent magnet synchronous motor applications)
Eugen Horaţiu GURBAN Supervisor prof. G. D. Andreescu	*Soluţii de conducere pentru climatizarea serelor* (Control solutions for greenhouse climate systems)
Pal-Ştefan MURVAY Supervisor prof. I. SILEA	*Securitate criptografică pentru magistrala de date controller area network în vehicule* (Cryptographic security for vehicular controller area networks)
Alexandra-Iulia STÎNEAN Supervisor prof. Ş. Preitl	*Contribuţii la dezvoltarea unor soluţii de reglare dedicate sistemelor de acţionare electrică cu parametri variabili şi cu intrări variabile în timp* (Contributions to the development of control solutions for electrical drive systems with variable parameters and variable references)

Electrical Engineering

Ioan Cristian ABRUDEAN Supervisor prof. I. Şora	*Cercetări privind echipamente şi procese electrotermice performante în câmp de microunde* (Research on efficient electrothermal equipments and processes in microwave field)
Mircea BABA Supervisor prof. I. Boldea	*Convertoare Z cu PWM cu 4 elemente de comutaţie în acţionări cu motoare de inducţie* (4 Switch Z PWM convertes in induction motor drives)
Ovidiu Roman PELAN Supervisor prof. N. Muntean	*Convertoare DC-DC hibride pentru sisteme automotive şi energii regenerabile* (Hybrid DC-DC converters for autotmotive and renewable energies systems)
Dragoş URSU Supervisor prof. I. Boldea	*Maşini multifazate reactive fără perii în acţionări electrice* (Brushless DC multiphase reluctance machines and drives)

Civil Engineering

Marius ADAM Supervisor prof. I. SÂRBU	*Optimizarea instalaţiilor de ventilare/climatizare în regim de răcire în scopul asigurării eficenţei energetice şi a confortului în clădiri de birouri* (Optimization of the air conditioning systems in cooling mode to ensure energy efficiency and comfort in office buildings)
Iulian Zoltan BOBOESCU Supervisor prof. I. Mirel	*Tehnologii bioenergetice pentru epurarea apelor reziduale* (Bioenergetic technologies developed for wastewater treatment processes)
Alexandru BOTICI Supervisor prof. D. Dubină	*Studiul soluţiilor de reabilitare pentru clădiri de locuit din panouri mari prefabricate din beton armat* (Studies on rehabilitation systems of residantial collective buildings built with large precast concrete panels)
Felicia NICULESCU-ENACHE Supervisor prof. M. Marin	*Contribuţii la studiul folosirii materialelor geosintetice pentru realizarea sistemelor de fundare a construcţiilor supuse la solicitări statice şi dinamice* (Contributions to the study using for systems geosynthetics building foundations subjected to static and dynamic loads)
Monica ISACU Supervisor prof. I. Mirel	*Contribuţii cu privire la eficientizarea staţiilor de epurare orăşeneşti* (Contributions on improving the efficiency of urban wastewater treatment plants)
Marius HÂRŢA Supervisor prof. V. Stoian	*Impactul structurilor metalice în arhitectura modernă – reflecţii asupra procesului de preluare şi punere în valoare a potenţialului structurilor metalice în arhitectură* (The impact of metal load bearing structures in architecture - reflections on the process of assimilation and harnessing of the potentialities of metal load bearing structures in architecture)
Paul MOLNAR Supervisor prof. T.E. Man	*Lucrari hidrotehnice pentru asigurarea continuitatii ecohidraulice a raurilor interioare si a fluviului Dunarea* (Structures for the restoration of longitudinal continuity of the Danube and inland rivers)
Florin-Cătălin MIRON Supervisor prof. M. Marin	*Soluţii de consolidare a clădirilor degradate în timp din cauze diverse* (Consolidation measures for buldings which sufferd time degradation by reason of multiple causes)
Corina Mihaela PANFIL Supervisor prof. I. Mirel	*Studiul sistemelor alternatice de canalizare a apelor uzate din centrele populate* (A study of alternative sewage systems for wastewater in populated areas)
Ramona-Maria RUSU Supervisor prof. G. Creţu	*Cercetări privind impactul urbanizării asupra scurgerilor hidrologice* (Study regarding the impact of urbanization on storm water runoff)
Izabella Ştefania SZIGYARTO Supervisor prof. I. Mirel	*Consideraţii cu privire la implementarea sistemelor vacuumate de canalizare-Studii de caz Comuna Borş, judeţul Bihor, Comuna Pericei, judeţul Sălaj* (Considerations regarding the implementation of vacuum sewerage systems - Case studies village Bors, Bihor County, village Pericei, Salaj County)
Mirela-Adriana SZITAR Supervisor prof. D. M. Grecea	*Locuinţa colectivă versus locuinţa individuală urbană prin prisma dezvoltării durabile în Câmpia Banatului* (Collective dwellings versus individual urban housing through sustainable development perspective in Banat plain)

Octavian STANA Supervisor prof. T.E. Man	*Dezvoltarea rurală durabilă a infrastructurii unei localități rurale. Studiu de caz: localitatea Periam, județul Timiş* (Sustainable rural development of rural infrastructure, case study: Periam locality, Timis county)
Raluca VĂDUVA Supervisor prof. I. David	*Planificarea integrată a teritoriului în condiții de incertitudine a riscului la inundații* (Integrated spatial planning in the context of flood)
Clara - Beatrice VÎLCEANU Supervisor prof. M. Marin	*Utilizarea tehnologiilor geodezice moderne pentru monitorizarea, prelucrarea şi analiza unor alunecări de teren şi construcții din pământ armat* (Monitoring, modeling and analysis of landslides and reinforced-earth constructions using modern geodetic technologies)

Engineering and Management

Adrian ADAM Supervisor prof. G. Proştean	*Contribuţii privind transferul cunoaşterii în managementul proiectelor de implementare a sistemelor ERP* (Contributions regarding the knowledge transfer in the project management of ERP systems implementation)
Olga-Ioana AMARIEI Supervisor prof. C. D. Dumitrescu	*Contribuţii privind modelarea, simularea şi optimizarea fluxurilor de producţie utilizând programe dedicate* (Contributions regarding modelling, simulation and optimisation of manufacturing flows using dedicated software programs)
Ana-Maria BRANEA Supervisor prof. M. Izvercian	*Contribuţii la managementul urban aplicat pentru guvernarea comunităţilor* (Contributions to urban management applied for community governance)
Cella Flavia BUCIUMAN Supervisor prof. M. Petrea Izvercian	*Contribuţii privind modelarea sistemelor de marketing* (Contributions regarding marketing systems modelling)
Sabin-Ioan IRIMIE Supervisor prof. C. D. Dumitrescu	*Managementul dezvoltării durabile al unui sistem energetic comunitar - cu referire la Valea Jiului* (The management of sustainable development of a community energy system - with refernce to Jiu Valley)
Dorina-Alina RADU Supervisor prof. M. Izvercian	*Contribuţii privind competitivitatea resursei umane* (Contributions on human resources competitiveness)
Patrick ŞTEFĂNESCU Supervisor prof. M. Mocan	*Contribuţii la eficientizarea transportului public de persoane în mediul urban şi periurban, aferent Municipiului Timişoara* (Contributions to public transport efficiency in urban and peri-urban environment, afferent to Timisoara Municipality)
Nicoleta MĂNESCU TRANDAFIR Supervisor prof. C. D. Dumitrescu	*Studiu privind sustenabilitatea proceselor specifice industriei pielărie* (Study the sustainability of the specific processes from the leather industry)

Scientific Conferences

Scientific Conferences held in 2014

IEEE 9th International Symposium on Applied Computational Intelligence and Informatics SACI 2014
15-17 May 2014, Timişoara
Organizer: Politehnica University of Timisoara, Faculty of Automation and Computers, and Óbuda University, Hungary
http://conf.uni-obuda.hu/saci2014/

- SACI 2014 conference focuses on theory and application on the field of applied computational intelligence and informatics.
- The aim is to provide platform for scientists, teachers, researchers and students as well to publish their papers, and discuss the results. SACI conference appears on the AUSTRALIAN RESEARCH COUNCIL list, in class C.

15th International Conference Polymers and Organic Chemistry 2014
10-13 June 2014, Timişoara
Organizer: Faculty of Industrial Chemistry and Environmental Engineering
http://www.poc2014.upt.ro/Information_conference-program_38.html

- The main goal of POC 2014 Conference was to share the most recent information between scientists dealling with synthesis and application of polymers. POC 2014 was a successful scientific events attend by over 100 registred patrticipants from 28 countries. The conference presentationes focused on six topics: Advances in polymer synthesis, Novel functional polymers, Polymers for catalysis and energy applications, Biocatalysis in polymer synthesis, Polymers for separations and environmental protection, Polymers in medicine, biochemistry and agriculture.
- The conference was organized under the sponsorship of IUPAC - The International Union of Pure and Applied Chemistry.

The 9th International Workshop on Electromagnetic Compatibility CEM 2014
3-5 September 2014, Timişoara
Organizer: Politehnica University of Timisoara, National Institute for R&D in Electrical Engineering ICPE-CA
http://www.icpe-ca.ro/ro/cem2014_449

- The workshop was a good resean for the dissemination and promoting of the Romanian and foreign scientific researches results, knowledge of the newest achievements in electomagnetic compatibility in the domanins electronics, communications systems, industrial systems; biocompatibility; human exposition effects to the electromagnetic fields, electromagnetic non-distructive evaluation, standardization issues.
- The paper was published in the Journal Advanced in Electrical and Computer Engineering, accepted in ISI Thomson database.

International Conference Social Media in Academia: Research and Teaching SMART 2014
18-21 September 2014, Timişoara
Organizer: Politehnica University of Timisoara, West University of Timisoara, EduSoft Bacau
http://www.edusoft.ro/smart2014/index.php#.VDTMxBidLct

- Social Media in Academia: Research and Teaching provides relevant theoretical frameworks and the latest research on social media the challenges in the educational and political context. Our conference is essential for professionals aiming to improve their understanding of social media at different levels of education and civic/social/political engagement as well as researchers in the fields of e-learning, educational science, political science, new media, and information and communication sciences and much more.
- The proceedings of the conference published by Medimond - Monduzzi Editore, Bologna, Italy, It will be indexed by Thomson Reuters (Conference Proceedings Citation Index).

International Conference on Applied Sciences ICAS2014
2-4 October 2014, Hunedoara
Organizer: Politehnica University of Timisoara, Military Economics Academy of Wuhan
http://www.fih.upt.ro/v3/ICAS2014/index.htm

The topics of the conference covered a comprehensive spectrum of issues:
- Economical Sciences, Engineering Sciences, Fundamental Sciences, Medical Sciences
The conference proceedings or in supporting journals, was indexed in recognized International Data Bases:
- The Annals of Faculty of Engineering Hunedoara
- Acta Technica Corviniensis
- Review of the Air Force Academy
- EcoTerra

The 3rd Conference „Microactuators and Micromechanisms" MAMM 2014
2-4 October 2014, Timişoara
Organizer: Mechatronics Department, Politehnica University of Timisoara
http://mamm-2014.mec.upt.ro/

- The aim of the conference is to bring together researchers, scientists, industry experts and students to provide, within a collegial and stimulating environment, the opportunity for know-how exchange and build up collaboration in various disciplines referring to micro systems technology. The paper was published in a book edited by Springer MMS Series.
- TOPICS OF INTEREST FOR THE CONFERENCE: Microactuators and micro-assembly, Micro sensors involving movable solids, Micro-opto-mechanical device, Mechanical tools for cell and tissue studies, Micromanipulation and micro-stages, Micro-scale flight and swimming, Micro-robotics and surgical tools, Micron-scale power generation, Miniature manufacturing machines, Micromechatronics and micro-mechanisms., Biomechanics micro and nano scales, Control issues in microsystems.

Regional South East European Conference 2014 (RSEEC 2014) - Innovation for efficient and effective management, solutions for power systems of the future!
8-10 October 2014, Timişoara
Organizer: Politehnica University of Timisoara, CIGRÉ's Romanian National Committee, CNTEE Transelectrica (the Romanian TSO) and ALSTR (the Romanian technical authority in the field of Live Maintenance),
http://www.rseec2014.org/

- The conference brings together power systems engineers, decision makers, economists, academics and others with interest in the domain. The conference also promotes CIGRÉ as a strong technical organization, capable of contributing to the technical expertise and know-how through its study committees, conference proceedings and the technical documents.
- Main Topics was: Electrical networks of the future, State of the Technology and Future Trends, Power system solutions for renewable sources (RES), Challenges in education of power system workforce, Live working.

The 12th edition of the IEEE International Symposium on RObotic and SEnsors Environments ROSE 2014
16-18 October 2014, Timişoara
Organizer: Politehnica University of Timisoara, Department of Computer Science
http://rose2014.ieee-ims.org/content/organizers

- ROSE is a high level scientific conference, organized annually by the IEEE Instrumentation and Measurement Society, USA. It is attended by top international experts and has a large visibility in the field. Previous editions of ROSE have been held in Canada, USA and in several European countries, such as Germany, Austria, Sweden and Italy.
- Celebrating its 12th edition this year, ROSE 2014 was enjoyed the presence of experts from USA, Canada, Japan, Taiwan, Germany, Italy, Austria, France, Greece, Norway and Romania, who presents significant scientific contributions and technological advances in the top fields of robotic systems and intelligent sensing environments.

International Symposium on Electronics and Telecommunications ETC 2014 Eleventh Edition
14-15 November 2014, Timişoara
Organizer: Faculty of Electronics and Telecommunications
http://conference.etc.upt.ro/isetc2014/home.php

- Since 1994, when the first edition of the International Symposium on Electronics and Telecommunications took place, scientific event has grown from a national happening to an important international event, organized every two years.
- The Symposium is organized by the Faculty of Electronics and Telecommunications and the Association of Electronics Engineers from Timisoara under the aegis of IEEE Romanian Section and Romanian Academy of Technical Sciences.
- Since 2010 the Symposium has become independent and the papers are published in dedicated proceedings. Papers of 2010, 2012 and 2014 editions were included in IEEE eXplore. Moreover in 2010 and 2012 proceeding is included in Thompson ISI databases, which we intend to do this year too.

INFER Workshop Monetary Policy, Asset Prices and the Real Economy in Central and Eastern Europe
12-13 December 2014, Timișoara
Organizer: INFER (International Network for Economic Research), RCEM (Research Centre for Engineering and Management), ECREB (East-European Center for Research in Economics and Business)
http://www.ecreb.ro/?p=361

- This workshop provided an opportunity for all those interested in monetary policy, asset prices and real economy to discuss their research and to exchange ideas.
- The purpose of the workshop is to address the Central and Eastern European (CEE) countries case, characterized by important changes in their monetary policy framework in the eve of their accession to the EMU, by the development of their financial markets and by the fluctuations of their real economy in the context of the recent financial crisis.

The 8th PhD International Seminar On Computational Electromagnetics and Electromagnetic Compatibility CEM & EMC 2014
2-4 September 2014, Timisoara
Organizer: Department of Fundamental Physics for Engineers

- The PhD International Seminar On Computational Electromagnetics and Electromagnetic Compatibility started in 2004. The first edition was organized in Budva, Montenegro.
- The present 8th International Ph.D. seminar, entitled Computational Electromagnetics and Electromagnetic Compatibility is a continuity of the previous seminars. At the seminar we have participants of the Ilmenau University of Technology (Germany), Technical University of Sofia (Bulgaria), University of Nis and University of Novi Sad (Serbia), University of Skopje (Macedonia), University of Banja Luka (Bosnia and Herzegovina), University of Osjek (Croatia), and Politehnica University of Timisoara (Romania).

1st International Workshop on "Open Educational Resources and Massive Open Online Courses", co-located with the 10th eLearning and Software for Education Conference - eLSE 2014
24-25 April, Bucharest
Co-organizer: CeL and CS Department, UPT
http://www.elseconference.eu/pages/view?page=open_education_open_online_courses

- The primary goal of the workshop is to bring together educational actors or stakeholders as teachers, trainers, technologists, researchers, course designers, doctoral students in the fields of new technologies, pedagogies an policies related to Open Educational Resources (OER) and Massive Open Online Courses (MOOC) in order to share knowledge, approaches, strategies, models, solutions and applications in an educational context.
- The book of workshop is indexed by ISI Web of SCIENCE, CEEOL - Central and Eastern European Online Library, ProQuest, EBSCO HOST.

14th International Conference on OPTIMIZATION OF ELECTRICAL AND ELECTRONIC EQUIPMENT OPTIM 2014
22- 24 May 2014, Brasov
Co-organizer: Politehnica University of Timisoara, Transilvania University of Brasov, Tehnical University of Cluj-Napoca
http://www.info-optim.ro/index.php

- OPTIM is organized every two years in the same mountain region of Transylvania, Romania - a multiethnic region with strong medieval architecture treasures - by three major Romanian Universities totalling more than 40,000 engineering students.
- Traditionally OPTIM was (is) technically sponsored by IEEE-IAS, IEEE-PELS, IEEE-IES (USA), IEEE Romania, the Romanian Academy, the Academy of Technical Sciences in Romania, Romanian Electrotechnical Committee.
- The technical spectrum of OPTIM is similar in breadth to IEEE-IAS Meetings, though at a reduced scale, as expected.
- Presented papers were published in the conference Proceedings that is indexed by IEEE Xplore and ISI Thomson.

The 24th International Conference NOISE AND VIBRATION
29 - 31 October, 2014, Niš, Serbia,
Co-organizer: Acoustics and Vibration Laboratory,Politehnica University of Timisoara, and the University of Niš, Faculty of Occupational Safety
http://www.znrfak.ni.ac.rs/SERBIAN/009-NAUKA/NOISE2014/Index.html

- The main objective of this Conference is to provide an international forum with advanced scientific knowledge on noise and vibration.
- The conference is organised under the auspices of the Ministry of Education and Science of the Republic of Serbia.

Major topics of interest:

- Noise generation and propagation, Vibration control, Noise control, Environmental noise, Effect of noise and vibrations, Analysis of noise and vibration

Scientific Journals

Transactions on Automatic Control and Computer Science, Volume 59 (73), Issue 1, 2
http://www.ac.upt.ro/journal/

The history of this Journal of the Politehnica University of Timisoara is strongly related to its creation under the name Polytechnic School of Timisoara (Ecole Polytechnique de Timisoara).
The journal is dedicated to publishing original theoretical and applicative research results and overviews on the current Research status in Automation, Computer Science and Applied Informatics.
Transactions on Automatic Control and Computer Science is indexed by: Index COPERNICUS (Journals Master List), VINITI (All-Russian Institute of Scientific and Technical Information), (CNCSIS B+ journal).
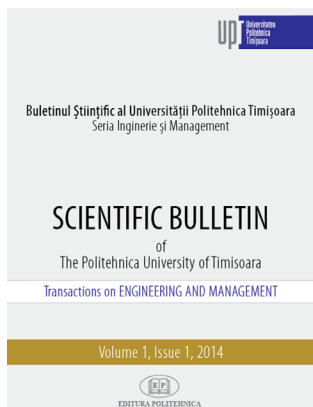
Transactions on Engineering and Management, Volume 1, Issue 1
http://www.mpt.upt.ro/eng/research/buletin-stiintific.html

The Scientific Bulletin of the Politehnica University of Timisoara, **Transactions on Engineering and Management** aims to present the latest thinking and scientific research on major topics:

- management;
- engineering economy.

Transactions on Hydrotehnics, Volume 59(73), Issue 1, 2
http://www.ct.upt.ro/buletinhidro/index.htm

The Scientific Bulletin of the Politehnica University of Timisoara, Transactions on Hydrotechnics is coordinated since 1992 by the Faculty of Hydrotechnical Engineering. Published papers in the journal focus on engineering sciences, civil engineering, theoretical and applied hydraulic, mathematics and numerical modeling, hydrology and water management, hydrotechnical developments and constructions, land improvement (irrigations, drainage, erosion control), engineering and sustainable rural development, water supply and sewerage systems, wastewater treatment, hydraulic structures and technologies.
The Journal is published entirely in English, with abstracts and keywords, with international exposure.
The revue is known for experts from home and abroad, is included in the database (Viniti, Russia) and international catalogs (SUWECO, Czech Republic). The Bulletin is broadcast in 26 foreign institutions and foreign publications received in exchange are in number of 19.
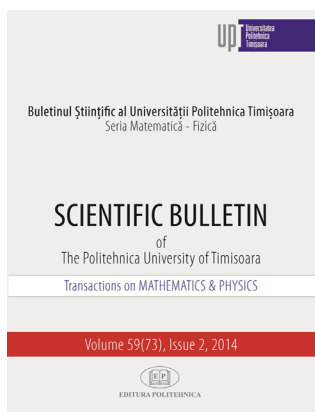
Transactions on Mathematics and Physics, Volume 59, (73) Issue 1, 2

http://www.upt.ro/cercetare/mate_fizica.php

The journal "Bulletin Scientifique de l'Ecole Polytechnique de Timisoara" was founded in 1923, when the head of the Polytechnical School of Timişoara was mathematicians Victor Vâlcovici (1885-1970).

The first two issues appeared in 1925, respectively in 1926. In the first years, the journal has been contained mostly the mathematical articles (the authors being some famous national and foreign mathematicians as well V. Alaci, G. Alexich, M. Ghermănescu, D. Pompeiu, Ch. Brunold, G. Bouligand). This fact confer to actual journal "Transactions on Mathematics and Physics" of the Scientific Bulletin of "Politehnica" University of Timisoara, Romania the justification to realize the continuity of the old "Bulletin Scientifique.

The **Transactions on Mathematics and Physics** is indexed CNCSIS , B+.

Transactions on Modern Languages, Volume13, Issue 1

http://www.cls.upt.ro/publicatii/buletinul-stiintific/history

The Transactions on Modern Languages, published by the Department of Communication and Foreign Languages, has its origin in The Social Sciences and Humanities Series, started in 1991 under ISSN 1223-1959.

The Transactions on Modern Languages publishes original papers in all areas of theoretical and applied linguistics: Linguistics, Translation and Interpreting Studies, Discourse Analysis, Pragmatics, Rhetoric, Terminology, LSP, Foreign Language Teaching.

The journal is included in the CEEOL, Fabula and EBSCO data bases.

Journal of Electrical Engineering, Volume 14, Edition 1, 2, 3, 4

http://www.jee.ro/index.php

JEE continues the prestigious "Scientific Bulletin" of the Politehnica University of Timisoara, Electrotehnical section, but in electronic form.

It also aims to become a fully international archival journal.

Its scope includes all issues of widespread generic interest to engineers who work in the field of electrical engineering.

The **Journal of Electrical Engineering i**s indexed byScopus, and IEE INSPEC.

Academic Journal of Manufaturing and Engineering, Volume 12, Issue 1, 2, 3, 4
http://eng.upt.ro/auif/journal.html

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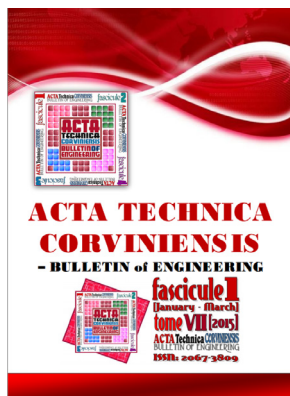
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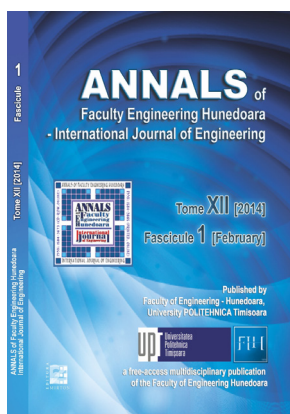
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