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ENGINEERING FOR EVOLUTION

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University of Beira Interior

Faculty of Engineering Covilhã :: Portugal



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ICEUBI 2019

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Congress on Engineering



International Congress on Engineering
University da Beira Interior
“Engineering for Evolution”

Covilhã (Portugal), November 27-29, 2019

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FACULDADE DE ENGENHARIA DA UNIVERSIDADE DA BEIRA INTERIOR
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→ ICEUBI 2019

INTERNATIONAL CONGRESS ON ENGINEERING UNIVERSITY OF BEIRA INTERIOR - ENGINEERING FOR EVOLUTION

→ ORGANIZED BY

FACULTY OF ENGINEERING OF UNIVERSITY OF BEIRA INTERIOR
CALÇADA DA FONTE DO LAMEIRO
6200-358 COVILHÃ | PORTUGAL
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➤ PREFACE

We welcome ICEUBI2019 - International Congress on Engineering - Engineering for Evolution, promoted by the Faculty of Engineering of the University of Beira Interior, in Covilhã, Portugal, with the sponsorship of the University Rectory and the institutional support of the City Council and the Portuguese Engineers Chamber. The event aims to promote the contribution and concern of Engineering for human society, makes a preview of the collective future - ensuring contact between researchers and practitioners from different fields of engineering, and allows the dissemination of its research, innovation, and development within several economic activity sectors. The ICEUBI2019 is in the sequence of successful previous editions (iceubi.ubi.pt) and includes in its program two invited lectures, three invited speakers, and 140 full papers presentations - of 23 different thematic and distributed by 30 parallel sessions.

The University of Beira Interior signed an agreement with KnE Publishing Services to include the ICEUBI2019 proceedings on the KnE Publishing Services website within the KnE Conference Proceedings Series, with the objective of providing a stable online version of the proceedings and raising its online visibility.

Thus, ICEUBI2019 proceedings will be submit to both Elsevier for indexing in Scopus and to Clarivate Analytics (formerly Thomson Reuters and ISI) for inclusion in the Web of Science (individual proceedings), mainly those papers that fulfil the highest publishing standards. After the Congress, a set of articles will have the possibility to be published in Special Issues of Open Engineering Journal, Materials Journal, Energies Journal, as in Millenium - Journal of Education, Technology, and Health, and Case Studies on Transport Problems Journal. Thus, the ICEUBI2019 Organizing Committee aims strongly to reinforce the internationalization of the event and raise its standard of quality.

Welcome to Portugal, to Covilhã, and the Faculty of Engineering of the University of Beira Interior, and... enjoy this experience!

Covilhã and UBI, November 27, 2019.

Silvio Mariano

Faculty of Engineering President



Jorge Silva

Organizing Committee Chairman



→ INTRODUCTION

The event aims to promote the contribution and concern of Engineering for human society, makes a preview of the collective future - ensuring contact between researchers and practitioners from different fields of engineering, and allows the dissemination of its research, innovation, and development within various economic activity sectors.

The ICEUBI2019 is in the sequence of successful previous editions (iceubi.ubi.pt) and includes in its program two invited lectures, three invited speakers, and 140 full papers presentations - of 23 different thematic and distributed by 30 parallel sessions.

→ OBJECTIVES

The event conceived as a forum for discussion, aims to:

- Promote the contribution of Engineering to Society;
- Ensure the contact between researchers and practitioners from different fields of engineering;
- Permit the dissemination of the activities of research, innovation and development within several sectors of economic activity.

→ SPECIAL SESSIONS

SS-01 - Construction Sustainability

SS-02 - Challenges in Education: Inclusive Learning, Methodological Trends, and Research Innovations

SS-03 - Inspection, Diagnosis, Maintenance, and Rehabilitation of Buildings for the Future

SS-04 - Re-Architectures - The Industrial Heritage

SS-05 - Passive Solutions in the Rehabilitation and Energy Efficiency of Buildings

SS-06 - Building Information Modelling in Education and Construction Activity

SS-07 - Technologies in Agriculture and Agroindustry - Trends and Innovations

SS-08 - Novel Advances in Technologies and Processes In Stone Fruit Production

SS-09 - Innovative Trends in the Energy-Water Nexus

SS-10 - Intelligent Bio-Inspired Algorithms Applied to Power and Energy Conversion Systems

SS-11 - Geotechnical Solutions for Environmental Problems

SS-12 - Aeronautics & Space: Improving Safety and Environmental Protection

CONFERENCE TOPICS

Aeronautics and Astronautics

- 01- Aerodynamics
- 02 - Air vehicle Systems Design
- 03 - Aeronautical Computational Design
- 04 - Air Transportation Engineering Management
- 05 - Materials and Structures
- 06 - Aircraft and Spacecraft Engineering

Informatics

- 07- Programming Fundamentals
- 08 - Algorithms and Complexity
- 09 - Programming Languages
- 10 - Computer Architecture and Organization
- 11 - Operating Systems
- 12 - Networked Computing
- 13 - Human Interaction with the Computer
- 14 - Computer Graphics and Visual
- 15 - Smart Systems
- 16 - Software Engineering
- 17 - Information Systems
- 18 - Informatics Professionals and Social Aspects

Civil Engineering

- 19 - Structures and Materials
- 20 - Geotechnics
- 21 - Transportation
- 22 - Water and Environmental
- 23 - Construction Management
- 24 - Sustainability & Green Structures
- 25 - Building structures
- 26 - Bridges
- 27 - Dams and Special Structures
- 28 - Foundations and Modelling of the Land
- 29 - Building Materials
- 30 - Rehabilitation of Buildings
- 31 - Regional and Urban Planning

- 32 - IS - Information Systems

Textile Science and Technology

- 33 - Fashion Design
- 34 - Textile Engineering
- 35 - Brand Management, Fashion Design, and Product Development
- 36 - Advanced Materials and Processing

Electrotechnical and Mechanical Engineering

- 37 - Industrial Design
- 38 - Bioengineering
- 39 - BioTechnologies
- 40 - Industrial Engineering and Management
- 41 - Electrotechnology
- 42 - Electric Machines and Power Electronics
- 43 - Instrumentation and Data Acquisition
- 44 - Telecommunications
- 45 - Automation and Control (including Planning and Control of Electric Power Systems)
- 46 - CAD / CAM
- 47 - Prototyping and Product Design
- 48 - Mechanics of Materials
- 49 - Energy and Thermal Machines
- 50 - Thermodynamics and Heat Transfer
- 51 - Hydrodynamics
- 52 - Fluid Mechanics and Hydraulic Machines
- 53 - Mechanical Systems

→ PREVIOUS ICEUBI

This event came in the sequence of the successful “ICEUBI2017” (iceubi2017.ubi.pt), “ICEUBI2015” (iceubi2015.ubi.pt), “ICEUBI2013” (iceubi2013.ubi.pt) and “ICEUBI2011” (iceubi2011.ubi.pt). In ICEUBI2015 were presented over than 220 communications of 150 participants and the event was considered as a reference organisation in the field of engineering.



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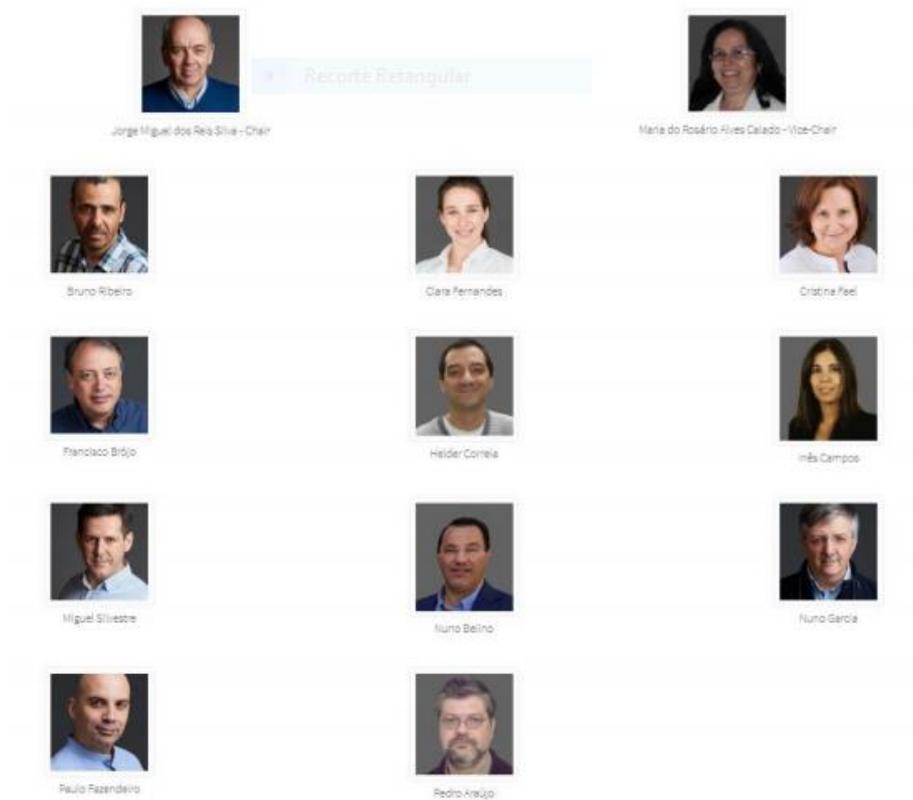
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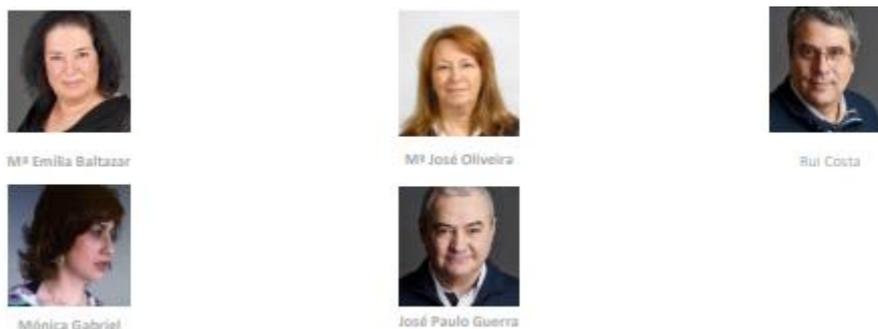
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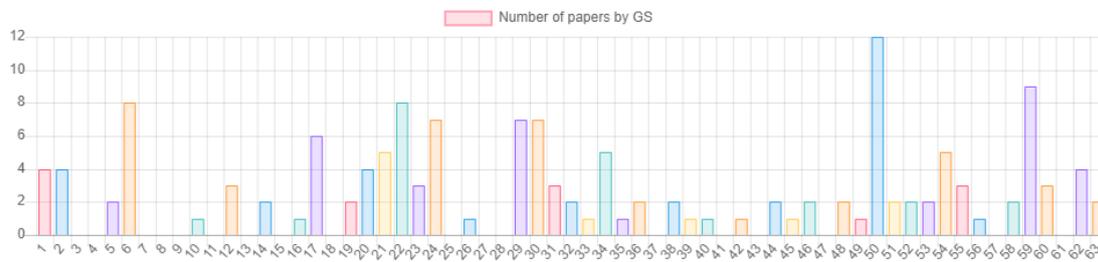
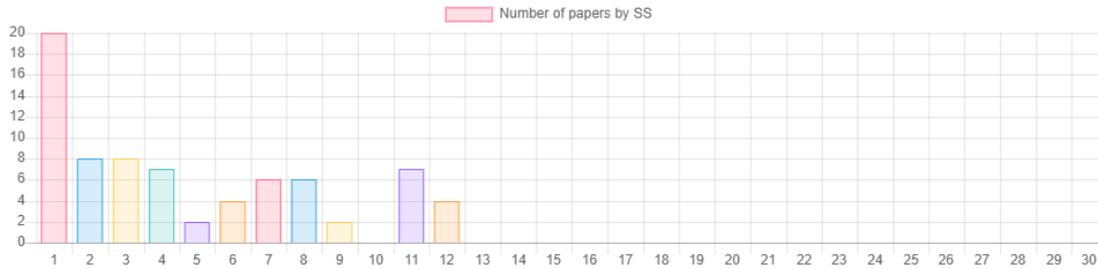


Secretariat

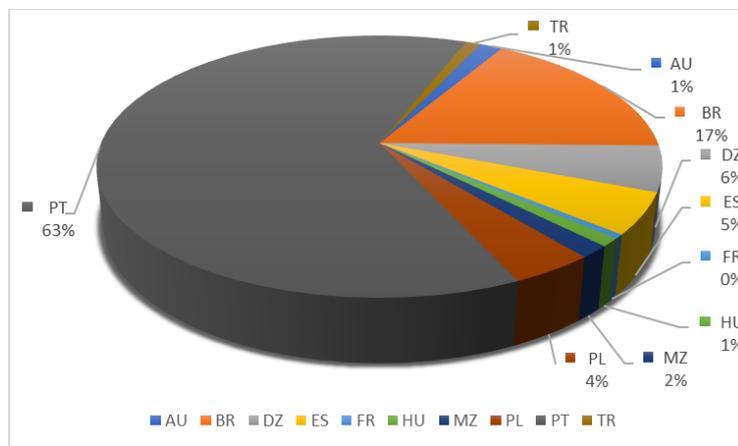


-ICEUBI 2019 STATISTICS

A total of 154 papers were submitted to ICEUBI2019.



Distribution by country



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→ CONGRESS PROGRAM

Time	NOV 27, 2019	Place
08.30 h	Registration (until 17.30h)	MSc Room FEUBI
10.00 – 11.00h	OPENING CEREMONY	AUDITORIUM 8.1 FEUBI
11.00 – 13.00 h	INVITED LECTURES	AUDITORIUM 8.1 FEUBI
13.00 – 14.00 h	Lunch	SIEMENS OLD SWITCHBOARD ROOM
14.00 – 15.30 h	Recorte Retangular PARALLEL SESSIONS	Auditorium 8.1 Rooms 8.6 – 8.8 – 8.10 – 8.12
15.30 – 16.00 h	Coffee Break	Hall of AUDITORIUM 8.1
16.00 – 18.00 h	PARALLEL SESSIONS	AUDITORIUM 8.1 FEUBI
19.00 h	RECEPTION BY THE MAYOR OF COVILHÃ, AND COCKTAIL	COVILHÃ CITY HALL
Time	NOV 28, 2019	Place
08.30 h	Registration (until 17.30h)	MSc Room FEUBI
9.00 – 10.30 h	PARALLEL SESSIONS	Auditorium 8.1 Rooms 8.6 – 8.8 – 8.10 – 8.12
10.30 – 11.00 h	Coffee Break	Hall of AUDITORIUM 8.1
11.00 – 13.00 h	KEYNOTE SPEAKERS	AUDITORIUM 8.1
13.00 – 14.00 h	Lunch	SIEMENS OLD SWITCHBOARD ROOM
14.00 – 15.30 h	PARALLEL SESSIONS	AUDITORIUM 8.1 Rooms 8.6 – 8.8 – 8.10 – 8.12
15.30 – 16.00 h	Coffee Break	Hall of AUDITORIUM 8.1
16.00 – 18.00 h	PARALLEL SESSIONS	AUDITORIUM 8.1 FEUBI
20.00 H	CONGRESS DINNER	PURALÃ HOTEL
Time	NOV 29, 2019	Place
08.30 h	Registration	MSc Room FEUBI
09.00 – 10.30 h	PARALLEL SESSIONS	Rooms 8.6 – 8.8 – 8.10 – 8.12
10.30 – 11.00 h	Coffee Break	Hall of AUDITORIUM 8.1
11.00 – 12.30 h	KEYNOTE SPEAKERS	AUDITORIUM 8.1
12.30 – 13.00 h	CLOSING CEREMONY	AUDITORIUM 8.1 FEUBI
13:00 – 14.00 h	Lunch	SIEMENS OLD SWITCHBOARD ROOM
15.00 – 18.00 h	SPAGHETTI BRIDGE CONTEST	AUDITORIUM 8.1 FEUBI

→THE CITY



Covilhã is a welcoming city in the centre of Portugal, combining an ancient history with a social dynamism, full of contemporaneity and future. It's in this sense that this vibrant and academic town, owner of a healthy economic and social life, cultural and sports vitality, offers to its visitors a wide range of social-cultural and sports equipment, hotel service, health infrastructure, in addition to the prestigious and acknowledged human and environmental surrounding.

Located at the base of Serra da Estrela, these county borders are the neighbour municipalities Penamacor, Belmonte, Manteigas, Seia, Oliveira do Hospital e Fundão. Geographically, Covilhã extends along the Serra da Estrela slopes and in adjacent green valleys of Cova da Beira, surrounded by the Zêzere River and its confluence. It's centred location, gives it a prominent position in the development axis, marked by the three major cities of the region: Guarda - Covilhã - Castelo Branco.



In a cultural landscape dominated by Serra da Estrela, the natives of Covilhã cultivate the art of hospitality, where sympathy, quality and excellence, it's a given.

In this stunning city with a mild climate, calm, quiet and safe, located at 700 meters, with a 550 thousand hectares area and an estimated population of about 50 thousand people. There are recognised hotels and restaurants responding with excellence to any request; gastronomic sins based on rare ingredients like wild parsnip, shrub, juniper, mountain cheese or edible mushroom; museums that highlight different arts like religious art, wool or cheese; beyond the health tourism with a particular reference to Unhais da Serra Spa. Also, modernity reduced barriers and created needs, but not annihilated traditions and characteristics that make the soul of this region. All this implies the creation of symbolic ties of identification that generate confidence, taste and sense of belonging.

Covilhã, weaving the future. <http://www.cm-covilha.pt>

→ UNIVERSITY OF BEIRA INTERIOR



The first steps towards what is now the University of Beira Interior were given in the 70's, when the Polytechnic Institute of Covilhã first opened, in 1973. The city, once regarded as the “Portuguese Manchester“, for its long tradition of the wool industry. The dynamics and quality of its textile production had been affected during this decade, by a crisis at the industry level: large and small factories begin to reveal serious weaknesses that led to its closure, with disastrous social and economic consequences for the region.

It was against this backdrop, which the idea of creating a higher education institution in the region appeared; this allowed its population the chance to continue their studies without migrating to other parts of the country, most often permanently. This Higher education institution was within the activities of the working group for the Regional Planning of Cova da Beira. Thus, following the publication of Decree-Law No. 402/73 of 11 August under the so-called “Veiga Simão Reformation”; which led to the expansion and diversification of higher education. Thus, it was created the Polytechnic Institute of Covilhã (IPC), which received its first 143 students in 1975, enrolled in its two primary programs of Textile Engineering and Management and Accounting. In July 1979, six years later, the institution became the University Institute of Beira Interior, through the publication of Law No. 44/79 of 11 September, which makes it effective.

The conversion of the University Institute in the University of Beira Interior happened in 1986, through the publication of Decree-Law 76-B/86, 30 April. The first Rector of the Institution was Professor Dr Cândido Manuel Passos Morgado, who remained in office between August 21st, 1980 and January 19th, 1996, when Prof. Dr Manuel Santos Silva assumed his duties as Rector, remaining in office until June 19th, 2009. Now, sworn in as the fourth Rector of the institution, Professor Dr António Carreto Fidalgo.

Historical note

One of the most interesting physical characteristics of UBI is recovering ancient buildings of high historical, cultural and architectural value. Besides maintaining the city's landmarks, these are revitalized in spaces which are now devoted to teaching and research. The building of the Polytechnic Institute had also begun by restoring the old premises of the headquarters of the Battalion of Hunters 2, installed in the Marquis de Pombal established Royal Textile Factory, of an important architectural value, located in one of the traditional centres of industrial concentration in Covilhã, along the Ribeira da Degoldra. During the works of redevelopment in 1975, it has been discovered buried archaeological structures belonging to the Royal Textile Factory dyeing

facilities, a leading manufacturer of woolen goods, built in the eighteenth century by the Marquis of Pombal.

After two campaigns of archaeological intervention and a full investigation, it was created the University of Beira Interior Wool Museum, opened in 1996. Thus, the old factory buildings located in the south entrance of Covilhã became quite naturally, not only a logical solution and of continuity with regard to the physical expansion of the institution, but an option that resulted in an enormous benefit to the city in terms of urban planning and environmental impact. Through the recovery of abandoned buildings or in ruins, which constitute a significant part of the industrial heritage of Covilhã, making the institution a unique case in the Portuguese University.

Among the most iconic properties, you will find the Convent of Santo António, in Campus II, where the Rectory is located. The former palace of family Melo e Castro; the buildings of the Rato Factory; the Carpets Factory; the Factory of Moço; the Paulo Oliveira Factory; the Wool Manufacturing Company; and the Chapel of São Martinho, a Romanesque monument of the late twelfth century, classified as of public interest that supports the religious service of UBI. It was also acquired the former house of the family Mendes Veiga, which today houses the Central Library of the University, after having completed the restoring project. In Campus I, the urban redevelopment culminated in the completion of the program Polis, an interesting leisure park that serves as a natural extension to the campus and that includes the project of the historic Ribeira da Degoldra. In the 1990s, it was decided to expand the University for the Northern End of town, near Ribeira da Carpinteira, where it was created Campus IV. UBI continues to grow. In 2004, the construction of the Faculty of Health Sciences began at Campus III, which was inaugurated the 30th April 2007 meeting thus the setup of the infrastructure of the medical school. With a physical space that already reaches 134,500 m², the University welcomes nearly 7,000 students today.

Old factories converted in educational facilities

The university, in terms of education, is divided into faculties, which embrace the areas of knowledge that, by nature, belong to each one of them. Therefore, UBI comprises five faculties: Faculty of Science, Faculty of Engineering, Faculty of Social Sciences and Humanities, Faculty of Arts and Letters and Faculty of Health Sciences. You will find below a brief description of the engineering faculty, stating the main programs they offer. The structure of the programs at the University follow a three (years of graduation), two (years of Masters) and three (years of doctorate) scheme, with some exceptions of five years of graduation, including an integrated Masters. The European Commission has recognized UBI for excellence in implementing the diploma supplement with the award of the DS Label.

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ICEUBI2019 SESSION - 1

Construction Sustainability - 1





Characterization of a self compacting concrete based on silica fume using non destructive testing methods (NDT)

Allali Ibtissem, Belagraa Larbi, Beddar Miloud

Abstract

The self-compacting concretes are distinguished by an extreme fluidity, allowing their placement without vibration. Mineral additions and admixtures are two essential components for the formulation of self-placing concretes (SCC). They are introduced into the concrete to improve their rheological behavior in the fresh state, but also to participate in enhancing the mechanical properties and durability of concretes, especially in the case of active additives.

In this study, a test program was carried out on self-placing concretes composed of cement and silica fume and lime filler as mineral addition. The series of tests were carried out using methods based on workability tests (Flow table, L-box and sieve stability tests) to determine the rheological parameters, mainly the fluidity, the ease of placing, the segregation. And the viscosity was measured using the rheometer at the fresh state. Mechanical characterization was performed by means of the direct (compressive) and non-destructive testing methods(NDT), ultrasonic velocity and rebound hammer for the assessment of the mechanical responses in the hardened state.

The results obtained showed an advantageous effect of these combined additions with an optimal dosage of 10% (5 % Silica fume + 5 % Limestone), with regard to the improvement of the rheological and physico-mechanical properties of the self-compacting concrete mixtures studied.

Keywords

Self compacting concretes, rheological parameters, viscosity, mechanical response, Non-destructive testing methods(NDT)



Combined Effect of Brick Waste and Glass Powder on the Porosity and Absorption of Geopolymer Mortar

Zine El Abidine Rahmouni, Nadia Tebbal, Imen Yamina Omri

Abstract

The mechanical properties of alkali-activated materials prepared by activation of a brick waste and Glass Powder by alkaline solution (alkali + water glass) are presented in this paper. The effect of combined of Brick Waste (BW) and Glass Powder (GP) on the Porosity and absorption of Geopolymer Mortar prepared from one type of brick dust was monitored.

The replacing GP binder by brick waste (by 10 percentages) upon its hardened properties such as compressive, porosity and absorption of alkali-activated mortar was concurrently examined. The results of investigated parameters showed the differences in relation to the ratio of glass powder to brick binder. It is concluded that alkali activated mortar incorporating 10 % BW and 90 % GP could be used in the construction industry with the almost negligible amount of environmental problems

Keywords

Geopolymer Mortar, Brick powder, Glass powder, Porosity, Absorption



Effect of Specific Surface on Behavior of Alkali activated glass waste

Imen Yamina Omri, Zine El Abidine Rahmouni, Nadia Tebbal

Abstract

Despite recycling efforts, most recycled materials are typically used for road works. Clinker, one of the essential ingredients in the composition of materials, is responsible for a large part of the CO₂ emissions released into the atmosphere. Because the chemical similarity and the high cementitious powers of the glass waste, it is used in the generation of geopolymer in a cement total replacement. This research focused on the study of the behaviour of a mineral glass waste establishing the specific surface of glass used. Prepared geopolymers were tested for the compressive and density, porosity, water absorption and mass loss were examined. The alkali-activation was done using a combination of sodium hydroxide and sodium silicate. The test parameters include: Heat curing at 60 °C and Alkali content (100%) of the mass of waste glass. It has been found that type of glass and Alkali content has significant effects on the physical and mechanical properties of Alkali activated glass waste.

Keywords

Alkali activated glass waste, porosity, compressive strength, Glass waste, absorption



Experimental investigation of the behavior of activated mortars based on dune sand and blended cement CEM II/ B 42.5

Ladjal Djelloul, Belagraa Larbi, Zairi Moncef, Kessal Oussama

Abstract

The different methods of accelerating setting and hardening of the mortar as well as the desired characteristics are of great importance with regard to the use of mortars and their different applications in civil engineering.

The main objective of this experimental study is to analyze the influence of chemical effect activators on the physicochemical properties of mortars based on dune sand. Also, the mechanical responses of mortar (compressive and flexural strengths) were studied.

The present research work uses two types of activating agents alkaline solutions (KOH and NaOH) at different dosages (0%, 2% and 4%). The experimental program investigated the properties of a based cement matrix with dune sand and blended cement type CEM II/ B grade 42.5 at fresh and hardened state.

The results obtained showed the beneficial effect of the chemical activation modes mainly, an improvement of the mechanical response (compressive and flexural strengths).

In conclusion, this activation showed a beneficial effect for the development of mechanical resistance (compression and flexion) of short-term activated mortars as well as acceptable medium and long-term values in the cured state. The numerical results were compared using previous results of research work tests performed in our laboratory.

Keywords: Self Mortars, chemical activation, mechanical strength, Hardening, alkaline solutions.

Keywords

Mortars, chemical activation, mechanical strength, Hardening, alkaline solutions



Study of Different Solutions to Build Sustainable Facades

Elaine Garrido Vazquez, Eduardo Linhares Qualharini

Abstract

This article aims to analyze the limitations present in Brazilian norms by comparing with Portuguese regulations and highlighting possible proposals that may contribute to a more demanding methodology. As a case study, selected a residence, with the constructive standards defined in the Programa my Casa, My Life (PMCMV), for three Brazilian cities with different bioclimatic zones and with this, analyzed the results obtained through the following Methodologies: i) of the simplified method of the Brazilian norm NBR 15575; II) The prescriptive method of RTQ-R; III) of the computer software Design Builder. Through the analysis of the results and the comparison with the methodology of the Portuguese Regulation (REH), identified the main limitations in the norms, as well as the elements that constructive with greater influence on the gains and losses of heat of Building. Thus, it was possible to conclude that the prescriptive methodology of Brazilian norms restricts the analysis of the elements of walls and coverage, ignoring the contribution by the glazed spans, as well as presents limits and differentiated methodologies For the same evaluation parameters among the norms, which can lead to different interpretations. Since the norms already have a relatively adequate structure, the incorporation of the proposals in the regulation emerges as a viable contribution to a more demanding methodology, by valuing the constructive elements that determine the Building.

Keywords

sustainability, architecture, efficiency



ICEUBI2019 SESSION - 2

Construction Sustainability - 2

ICEUBI2019





Quantitative assessment of comfort criteria compliance in three university buildings in operation

Venecia Chavez, Claudia Valderrama-Ulloa, Fabien Rouault

Abstract

In recent years, Chilean universities have begun to raise awareness for the development of sustainability and the comfort of their users, this is how in 2010 the first Clean Production Agreement is signed where the Universities express their commitment to sustainability, evidencing it in its basic guidelines. But for the university community to be more oriented and understand the nature of sustainability, it is necessary to make measurements in buildings of the most relevant parameters that are already being evaluated internationally through different certifications such as LEED, BREEAM and HQE. The following study analyzes the indoor environmental quality in three office buildings of the Pontifical Catholic University of Chile as it is correlated with user satisfaction and is also accompanied by the characteristics and forms of use of these buildings. Finally, the comfort level of the buildings is evaluated based on the acceptable criteria and range established by international environmental certifications.

Keywords

Indoor Environmental Quality, Office buildings, Measurement



Influence of Affinity Between Agregate and Bitumen in Bituminous Mixtures Performance

Maria Manuel Araújo Sá Maia, Fernando da Conceição Gonçalves Martinho, Marisa Sofia Fernandes Dinis de Almeida

Abstract

Over the past few decades, road administrations around the world have become aware of the importance of extending the life cycle of materials that make up the different layers of road pavements. One of the main problems encountered in road pavements is the formation of rut depth due to increase in the volume of road traffic and the successive passage of heavy vehicle, especially in areas with low speeds. The existence of rut depth makes the conditions of comfort and safety of road users decrease, favoring the water accumulation on the pavement surface, reducing tire / pavement friction, which can lead to hydroplaning phenomena.

The main objective of this dissertation is to study bituminous mixtures design to be applied in surface layers to improve the affinity between aggregate and bitumen and, consequently, to increase resistance to permanent deformation.

Keywords

Affinity, Asphalt concrete, Cellulosic fibers, Permanent deformation, Stone Mastic Asphalt



Soil characterization of land constructions in Mozambique

Michael Mendes Santos, Ana Teresa Vaz Ferreira, Dinis Gardete

Abstract

Gorongosa National Park (PNG) was created in 1960 and has 4,067 km² that make up the Gorongosa Mountain and as local communities living near the nature park.

This work consists of the characterization of traditional dwellings in the natural park, presents as building typologies created, where land constructions are recurrent, and the most common technology is the covering earth in wood structures with different geometries, different shapes and dimensions. . The results of the laboratory tests performed and that allow us to analyze how the resources to be used in these constructions are presented.

The material used as raw material in earth construction consists only of the mineral phase of the soil. This phase consists of minerals of varying size, ie clay, silt and sand, which are also mixed in varying proportions. As for the visual classification of colors can say that the soil is thin with obvious plasticity and the same is found in clods. With a dark color (black) and organic smell.

The results show that the soils present a strong plasticity index, a high liquidity limit and a plasticity limit above the maximum recommended by the CRATerre group.

According to the Unified Classification (ASTM, 2006), which is based on granulometry and plasticity, or soil classified as SC - Clay Sand.

According to AASHTO classification (AAHSTO M145) or individual classification as: A-7-6 (4). Despite the presence of organic matter, do not consider that the soil can be classified in group A-8.

According to GTR15 Classification or individual classification as A2. Despite the presence of organic matter, do not consider that the soil can be classified in group F1.

Keywords

African traditional building, Constructive characterization, Técnicas de construção em terra, Soils



Identification of vertical frequency response of masonry arch bridges for numerical analysis

Anelise Dick, Manuel Braz Cesar, João Roque

Abstract

Masonry arch bridges are generally old structures with historical and patrimonial value built based on empirical rules for small traffic loads. Identification of the dynamic properties could be an important parameter to evaluate the response of such bridges to actual traffic loads and to update numerical models used to study its structural response. Thus, this paper presents a expedite method to determine vertical natural frequencies for a set of several masonry arch bridges located in Bragança district, Portugal. The dynamic properties were obtained through environmental vibration tests allowing to identify the dynamic properties in the frequency domain. The identification of the natural frequencies allowed the analysis of the influence of some geometrical parameters of the bridges and the relationship between these and the frequency range of the excitation source. Moreover, the database of the study can be used in future analysis to update FEM models of these structure.

Keywords

Masonry arch bridges, Dynamic properties, Identification



ICEUBI2019 SESSION - 3

*Inspection, Diagnosis,
Maintenance, and Rehabilitation of
Buildings for the Future - 1*

ICEUBI2019





Noise as a factor of green areas soundscape creation

Małgorzata Sztubecka, Marta Skiba, Maria Mrówczyńska, Michael Mathias

Abstract

The research subject presented in the paper is acoustic perception, the perception of a sound landscape by a human. The paper aim was formulated - knowing the sources of noise based on the subjective assessment of recipients allows for sustainable management of green areas (city parks). The need to shape a harmonious landscape may contribute to finding a new function and attractive form for the studied areas.

Research carried out for selected city parks in Bydgoszcz (Poland) concerns the registration of responses of people assessing the sound landscape (subjective approach). Completed studies allow "translating" subjective assessments into meaningful values using fuzzy cognitive maps. The scenarios completed show the possibility of using tools supporting the decision-making process in urban planning of city parks in relation to existing acoustic conditions.

Keywords

noise, soundscape, green areas, urban planning, environment



Analysis of the Effectiveness of Urban Requalification through the Rehabilitation of Historical Heritage in Brazil

Camilla de Abreu e Silva, Eduardo Linhares Qualharini

Abstract

The evolution of the demands of society, inherent in its own development, suggests the refunctionalization of the urban fabric, seeking its constant innovation and renewal. On the other hand, buildings of value recognized by the Public Patrimony are testimonies of the past of a region, as well as potentialities for supplying housing needs and strengthening the offer of services infrastructure in its surroundings. Even so, these buildings and their surroundings are subjected to the reality of inexistence and / or inadequacy of preventive and corrective maintenance routines of unavoidable pathologies and preservation of their historical characteristics. Recognizing the importance of rehabilitatory strategies for the enhancement of these properties and the reintegration of their surroundings and their inhabitants, urban policies were promulgated in Brazil. Thus, the implementation of the APAC initiative - "Areas for the Protection of the Cultural Environment" aims at the rehabilitation of the built historical heritage and useful and effective reinsertion in its surroundings, contributing to the requalification of areas previously neglected by the social and economic sectors of their own city. Likewise, the present research uses bibliographic reviews and critical analysis to verify if the buildings rehabilitation can be a device for urban requalification. In the case study conducted, the improvements achieved in the buildings themselves and the scenery in which they are inserted (APAC 01) are raised, including through interviews with professionals considered authorities in the subject, about the symbolic and architectural relevance of the heritage property and its economic, social and environmental fitness promoted by urban requalification.

Keywords

Building Rehabilitation, Historical Heritage, Urban Requalification, Cultural Environment Protection Area - APAC, Museu de Arte do Rio - MAR



PROPOSAL AND APPLICATION OF SAFETY AND HEALTH ASSESSMENT MODEL IN HOUSING BUILDINGS

Marisa Monteiro, Ramiro Pastorinho, João C.G. Lanzinha

Abstract

Nowadays, people spend most of their time inside their homes. However, the current use of the spaces involves the presence of chemical substances, originating from both synthetic coating materials, occupation and equipment, which will contaminate the interior environment. In this way, the prevailing interior conditions in terms of comfort and quality of the interior environment may pose high risks to the health of the inhabitants. Therefore, a good quality of the interior environment is essential since, in addition to the dangers present in indoor air (e.g. industrial chemicals), also extreme temperatures, relative humidity levels, pests, infestations, noise, diseases Airborne infections, water contamination can cause physical injuries, respiratory diseases, internal organ damage and poisoning, as well as harmful effects on occupant mental health. Given this problem, we intend to make a contribution to the study and devise a methodology for assessing risks for occupants of habitable spaces, integrated in the generic theme of housing and health of its occupants. Therefore, it proposes a model of safety and health assessment in the housing, which will be described throughout this document, as well as its application to two cases of real study and six simulations of study. The application of the model of safety and health assessment in housing to cases of study and simulations, will allow to assess its applicability to households with distinct composition and ages, different types of localization and ages of construction of Housing, and properties with distinctive architectural features.

Key-Words: Safety, Health, Housing, Evaluation, MASSH

Keywords

Model, Safety, Evaluation, Health, Housing



Analysis in the industrial sector of waste generation and industrial activity of São Luís - MA

Bárbara Stéphanie Guedes Lima, Aleff Viegas Abreu

Abstract

Solid waste develops in two totally different contexts, in terms of agent responsibilities and management dynamics (including commercial) and management (physical), they are: waste from public services (public cleaning, sanitation, public works); and wastes from the productive sector (companies and industry organizations, commerce and services). The focus of this paper is an analysis of the industrial sector of the city of São Luís - MA, Brazil, taking into consideration potential solid waste generators and companies that in their official activities return work with solid waste, either with recycling, reuse, storage, transport, disposal or waste management. The sectors analyzed in this document are: recycling, sanitation, construction, electricity and gas, manufacturing industry, extractive industries and forestry production. These are extremely important data and information surveys that help control and monitor what is produced, used and discarded, since there are records of the existence of approximately 490 dumps in São Luís, and industrial waste must follow a rigorous system of proper and appropriate final disposal.

Keywords

Analysis, Industrial sector, Waste generation, Diagnosis, Industrial activity



ICEUBI2019 SESSION - 4

Challenges In Education: Inclusive Learning, Methodological Trends, and Research Innovations





Line Codes for Communication Systems

Antonio D. Reis, Jose F. Rocha, Atilio S. Gameiro, Jose P. Carvalho

Abstract

The coder is a generic device where exist a big types diversity.

In base digital systems, the coder is a device that codifies the active input position in a number, normally, binary natural. If we have N inputs they are codified with n bits, $N=2^n$. This is a parallel coder.

The line coder is a serial coder, that transforms a bits sequence, normally NRZ (No Return to Zero) in an electric sequence appropriated to the transmission line.

The objective of this work is to develop some of the line codes more utilized in communication systems.

Keywords

Line codes, digital systems, transmission systems



Coder and Decoder of Block mBnB Principally the 1B2B or Manchester

Antonio D. Reis, Jose F. Rocha, Atilio S. Gameiro

Abstract

This work presents the coder and decoder of block mBnB of the type 1B2B or Manchester. In the coder 1B2B each block/word of 1 input bit is coded in the block / word of 2 output bits. In the decoder 1B2B happen the inverse, each block of 2 input bits is newly converted in the original block of 1 output bit.

The coder injects in the transmission line a number of 1's exactly equal to the number of 0's, what guarantees a DC constant component and maximizes the transitions number.

The objective is to implement the pair coder and decoder 1B2B so that it improves the transmission quality and increases the information security.

Keywords

Block codes, digital systems, transmission lines



SHS (Simple Housing Solution) Methodology: Community (re) building in critical situations

Leandro Torres Di Gregorio, Assed Naked Haddad, Daniel Aloysio Shiguematsu Menezes Freitas Lima, Marina Costa Urquiza Tenório, Gustavo Vaz de Mello Guimarães

Abstract

The SHS - Simple Housing Solution - methodology aims to present knowledge with potential to facilitate the process of (re) construction in critical situations (post-disaster, post-conflict, refugee settlement, relocation of populations from risk areas, among others). It was conceived with the philosophy of gathering basic knowledge that can be useful in the (re) construction of housing units and basic collective equipments (schools, health clinics), in a joint effort (community working system), from the use of low cost constructive technologies. The idea is to help communities that are victims of disasters and conflicts to be better organized for their own recovery, with the guidance and supervision of qualified technical assistants (engineers and / or architects) to be hired by their own community, government or NGOs, for these purposes. This paper aims to present the Simple Housing Solution methodology and the main results of SHS Project, focusing on investigations related to the construction technology of partially reinforced masonry with soil-cement bricks. Currently, new research is being conducted to improve the current model of residency for critical situations, seeking to broaden its working range. After the current phase is concluded, the next step will be the construction of a prototype house in natural scale, on a seismic platform, to study the effects of simulated seismic actions on the house. In order to achieve this task, financial support is sought from sponsors, as well as technical cooperation with LNEC - National Laboratory of Civil Engineering, in Portugal.

Keywords

Disaster recovery, Housing recovery, Conflict recovery, Refugee settlements, Risk management



The Fabrics Design Influence in Real and Simulated Drape of Clothing

Rui Miguel, Benilde Reis, Clara Fernandes, João Barata, José Lucas, Madalena Pereira, Manuel Santos Silva, Sónia Melo

Abstract

This research work aims to study the influence of the fabrics in the wear performance of clothing. For this, an experimental work was developed with two fabric samples having the same weight/m², one single and another double, and a jacket prototype. Through a comparative analysis of the mechanical properties, very interesting results were obtained in the evaluation and characterization of the two fabrics performance in designing the same jacket, namely the drape and the corresponded aesthetic fabrics behaviours during wear. The structural characteristics and mechanical properties of each fabric were introduced into Marvelous Designer Version 8 software to simulate the virtual draping of fabrics in a skirt. The analysis of the drape profile of each fabric given by the software and the drape of the real fabrics evaluated in laboratory indicates, coherently, that the double fabric falls less than the single, but in a more harmonious way, what evidence the close links between technology and design of fashion products.

Keywords

Fabrics Design, Fabrics Mechanical Properties, Clothing Drape, Real and Simulated Drape



Can New Technologies finally solve the smart fitting room issue?

Clara Eloise Fernandes, Ricardo José Pinheiro Morais

Abstract

With new technologies come new solutions, and with consumers used to smart gadgets, stakes are high when it comes to showing present them products in an innovative and alluring manner. Smart fitting rooms and interactive mirrors have been in the fashion retail game for a few years, yet they are still commonly confused with each other. This paper seeks to assess new technological advances that could change forever the way we buy our clothes. The literature review will distinguish interactive mirrors from smart fitting rooms and aims to address the lack of information and functionality that these devices are missing.

The methodology used in this study is exploratory, as we tackle an issue that has been present in the fashion e-commerce market for as long as customers are able to buy clothes online. Therefore, we present an assessment of past projects, new solutions, the differences between several technologies aiming at solving this issue, such as magic mirrors and smart fitting rooms. Finally, we conclude our study with what can really be expected in terms of future solutions, and what is to expect from new technologies, to create a proper solution that could benefit retailers, customers, as well as the environment, since returns are not only expensive for retailers, their cost is highly damaging to our planet.

Keywords

E-commerce, New Technologies, Virtual Fitting Rooms, smartphone, Fashion Design



ICEUBI2019 SESSION - 5

Energy and Mechanical Systems

ICEUBI2019



Inertial dynamometer for Shell Eco-Marathon engine: validation

Daniel Filipe da Silva Cardoso, João Manuel Figueira Neves Amaro, Paulo Manuel Oliveira Fael

Abstract

This paper aims to validate the construction of an inertia dynamometer. These types of dynamometers allow easy characterization of internal combustion engines. To validate the dynamometer, tests were carried out with the same engine (Honda GX 160) installed in the UBIAN car and kart, which after calculating the inertia and measuring engine acceleration in each test performed, allows to create the torque characteristic curve from the engine.

Keywords

Inertia, Dynamometer, Torque, Flywheel, UBIAN

Shale Oil - Present and future

Marco Rocha, Pedro D. Almeida, Pedro D. Silva, Luís C. Pires

Abstract

The current production of Shale Oil (SO) is based almost exclusively on North America (United States and Canada), but it has made a major contribution to the growth of world oil production over the last few years, being the main factor that has allowed global production to keep up with world demand for oil. SO production over the past decade is the main reason why oil prices have remained below \$ 100 since 2014. In this paper we study the evolution and future prospects of SO in order to understand and forecast the scenarios of world oil supply and demand. The study, based on official EIA data, shows that the initial productivity of new wells increased significantly over several years, reaching annual growth values of over 30% in 2015 and 2016, but then began to decline significantly. This decline in productivity already turned to negative values. This confirms the qualitative information that has been reported on the practical limitations found in the most recent wells and shows that a transition has already taken place to a new reality in which new wells already have lower production than those put into operation a year earlier. This new reality shows that technological advances in the SO extraction industry have already become insufficient to compensate for the progressive depletion of the best production areas. We predict that a progressive shortage of oil will soon begin to be noticed and a significant rise in the prices of oil and its derivatives can be expected.

Keywords

Peak Oil, Shale Oil, Well productivity, Oil Supply



Short-Term Hydro-Thermal Coordination by Lagrangian Relaxation: a new algorithm for the solution of the dual problem

Pedro Bento, Filipe Pina, Silvio Mariano, Maria do Rosario Calado

Abstract

For decades, researchers have been studying the unit commitment problem in electrical power generation. To solve this complex, large scale and constrained optimization (primal) problem in a direct manner is not a feasible approach, which is where Lagrangian relaxation comes in as the answer. The dual Lagrangian problem translates a relaxed problem approach, that indirectly leads to solutions of the original (primal) problem. In the coordination problem, a decomposition takes place where the global solution is achieved by coordinating between the respective subproblems solutions. This dual problem is solved iteratively, and Lagrange multipliers are updated between each iteration using subgradient methods. To tackle, time-consuming tuning tasks or user related experience, a new adaptative algorithm, is proposed to better adjust the step-size used to update Lagrange multipliers, i.e., avoid the need to pre-select a set of parameters. A results comparison against a traditionally employed step-size update mechanism, showed that the adaptive algorithm manages to obtain improved performances in terms of the targeted primal problem.

Keywords

Hydro-Thermal Coordination, Lagrangian Relaxation, Lagrangian Dual Problem, Lagrange Multipliers, Subgradient Methods



Study on the manipulation of plasma density around a CubeSat using magnetohydrodynamics

Filipe Dias, Carlos Xisto, José Páscoa

Abstract

During hypersonic flight regime or re-entry flights, a phenomenon known as radio blackout occurs, in which the high velocities attained lead to a significant increase in temperature surrounding the vehicle. This raise is so substantial that the molecules around the vehicle start to ionize, surrounding the vehicle in electrons. These electrons will prevent electromagnetic waves from leaving or reaching the aircraft, preventing all communications.

Several blackout mitigation schemes have been proposed, among which is the magnetic window. In this scheme, a magnetic field is imposed near the nose of the aircraft, which will then prevent electron movement, generating a spectral window through which the electromagnetic waves can pass.

In this work, the effectiveness of this method in affecting the plasma density is tested. The mesh is tested for grid independency, ensuring an accurate solution in a sensible amount of time. The effect of different magnetic field intensities is then tested for a CubeSat flying in hypersonic flight regime, in order to determine the effect of the magnetic field in the electron number density.

Keywords

Magnetohydrodynamics, Radio Blackout, Magnetic Window, CubeSat



Experimental determination of the friction coefficients of a Shell Eco-Marathon Urban Concept

Daniel Filipe da Silva Cardoso, Paulo Manuel Oliveira Fael, João Manuel Figueira Neves Amaro

Abstract

This paper presents and explains the experimental tests performed by the UBicar Team. These tests were performed in order to know and characterize the curve and straight friction coefficients of the vehicle built to participate in the Shell eco-marathon.

Keywords

Friction coefficient, Rolling friction, Turn friction, UBIAN



ICEUBI2019 SESSION - 6

*Building Information Modelling in
Education and Construction
Activity*

ICEUBI2019





Comparison Between Codes for Building's Thermal Behaviour - Brazil and Portugal

Ana Vaz Ferreira, J Mendes Silva, Natália Romeiro,

Abstract

This article aims to analyze the limitations present in Brazilian norms by comparing with Portuguese regulations and highlighting possible proposals that may contribute to a more demanding methodology. As a case study, selected a residence, with the constructive standards defined in the Programa my Casa, My Life (PMCMV), for three Brazilian cities with different bioclimatic zones and with this, analyzed the results obtained through the following Methodologies: i) of the simplified method of the Brazilian norm NBR 15575; II) The prescriptive method of RTQ-R; III) of the computer software Design Builder. Through the analysis of the results and the comparison with the methodology of the Portuguese Regulation (REH), identified the main limitations in the norms, as well as the elements that constructive with greater influence on the gains and losses of heat of Building. Thus, it was possible to conclude that the prescriptive methodology of Brazilian norms restricts the analysis of the elements of walls and coverage, ignoring the contribution by the glazed spans, as well as presents limits and differentiated methodologies For the same evaluation parameters among the norms, which can lead to different interpretations. Since the norms already have a relatively adequate structure, the incorporation of the proposals in the regulation emerges as a viable contribution to a more demanding methodology, by valuing the constructive elements that determine the Building.

Keywords

Thermal performance, Desempenho Térmico, REH, NBR 15220, Norma Brasileira 15220



Identification of construction solutions using thermography

Ana Vaz Ferreira, Pedro Miguel Vaz Ferreira, Cátia Marcelino

Abstract

In the context of building rehabilitation, the phase of inspection and diagnosis is essential to identify the materials and techniques applied, thus seeking intervention strategies compatible with the existing building. The use of infrared cameras for this phase of diagnostic may contribute to a less intrusive survey, without the need to use tests that damage the element. The work performed consisted of a survey of study cases representing the utilization of different techniques and materials. With the objective of identifying the constructive solutions and applied materials, the active thermography was used, using the sun as a source of heating of the element, and Thermograms were acquired during the cooling process of the elements. The thermograms were visually analyzed in order to interpret the temperature variation and radiation emission by the elements.

The work allowed to assess the use of singular constructive solutions, namely the ' Cruz de Santo André ' or ' Taipa de Fasquio ', as well as current construction solutions with the use of masonry of stone or brick and structure in concrete.

Keywords

IR Thermography, 0, Termografia ativa, Buildings survey



Smart ventilation: a contribution to smart building

Manuel Pinto, João Viegas

Abstract

Smart ventilation is a process to continually adjust the ventilation system in time, and optionally by location, to provide the desired IAQ benefits while minimizing energy consumption and other non-IAQ costs (such as thermal discomfort or noise). The use of Smart ventilation systems not only provides better IAQ, more adjusted to pollutant production and concentration but also facilitates the reduction of energy consumption. The design criterion is the use of exposure to a pollutant generated indoors (often CO₂) and the risk of condensation related to ambient relative humidity (RH). A minimum air flow for periods without occupants is also often required to ensure acceptable IAQ when occupants return home and to minimize the risk of RH-related condensation. In this paper, using the CONTAM software, a sensitivity analysis of a 2 bedroom apartment, located on the 2nd floor of a multifamily building, located on the outskirts of Porto city, was performed. The selected ventilation systems are intended to represent the vast majority of ventilation systems installed in residential buildings in Portugal. As a main conclusion of the sensitivity analysis, it can be noted that the smart ventilation sizing criteria adopted, namely, in Spain and France, are quite restrictive when applied to the most common systems in Portugal.

Keywords

Ventilation systems, Smart ventilation, Demand-Control Ventilation, ACH, Relative humidity



Building information modelling and LCA integration in a real building: a case study

Fernanda Rodrigues, Kamar Aljundi, Ana Cláudia Dias

Abstract

Construction sector has been growing since the industrial revolution, increasingly contributing to negative environmental impacts that cannot be ignored and demanding nowadays for more sustainable solutions, which can be the last claim to decrease the pressure of the construction sector on the Planet. Building Information Modelling (BIM) currently is a challenging technology in the construction sector allowing organizing the information during the entire life cycle of a building since the conceptual design phase. Cooperating Life cycle assessment (LCA) with BIM help to achieve more sustainable and environment-friendly alternatives that can be evaluated in advance to optimize the design and facilitate the process of assessing different design alternatives also considering the maintenance solutions. In this work, this integration was implemented throughout a BIM-based LCA approach, which streamlines the replacement and comparison of different structural solutions and the prediction of their impacts. Thus, this work aims to evaluate the potential environmental impacts of three structural alternatives according to the most common materials used in the construction of a building in Aveiro University (Portugal) and compare the results obtained by tow software. For this purpose, the LCA methodology was carried out to analyse the three structural solutions, considering maintenance interventions for 50 and 100-years life spans. Considering the construction and the maintenance actions forecasted during the life cycle of the building, both approaches conclude that the concrete alternative is environmentally more sustainable than the other two. It was also concluded that the results obtained through the BIM-based LCA software can be considered reliable.

Keywords

Construction, Sustainability, Life cycle assessment (LCA), Building Information Modelling (BIM), Maintenance

Energy assessment resourcing a BIM model

Fernanda Rodrigues, Anastasiya Isayeva, Hugo Rodrigues

Abstract

The high-energy consumption and GHG emissions of the construction sector leads to the development of research that shows easier methodologies to achieve low carbon buildings. Currently, the use of Building Information Modeling is growing in the Architecture, Engineering & Construction sector and it assumes relevance in buildings energy simulation. Therefore, this work aims to explore the potential and limitations of applying (BIM) to energy management and simulation in the operation lifecycle phase of a service building.

A Building Information Model developed in Autodesk Revit demonstrates to consist on an asset for storing and organizing energy-related data. The add-in Energy Analysis for Autodesk Revit allowed automatically generating the Building Energy Model from the BIM model and performing a cloud-based simulation in Autodesk Green Building Studio (GBS). The energy consumption results obtained in GBS were compared with the results obtained with the energy simulation tool ECO.AP. It was possible to infer that the input limitations of GBS, mainly in HVAC systems customization, compromise the representation and energy performance evaluation of the building under actual operating conditions, thus making GBS more adequate for early buildings lifecycle stages where energy simulation results may support decisions that aim to improve the buildings energy performance during the operation phase.

Keywords

Building Information Modeling (BIM), Energy efficiency, Building Energy Management, Green Building Studio (GBS)



ICEUBI2019 SESSION - 7

*Novel Advances In Technologies
and Processes in Stone Fruit
Production*

ICEUBI2019





Automated Weed Detection Systems: A Review

Saraswathi Shanmugam, Eduardo Assunção, Ricardo Mesquita, André Veiros, Pedro D. Gaspar

Abstract

A weed plant can be described as a plant that is unwanted at a specific location at a given time. Farmers have fought against the weed populations for as long as land has been used for food production. In conventional agriculture this weed control contributes a considerable amount to the overall cost of the produce. Automatic weed detection is one of the viable solutions for efficient reduction or exclusion of chemicals in crop production. Research studies have been focusing and combining modern approaches and proposed techniques which automatically analyze and evaluate segmented weed images. This study discusses and compares the weed control methods and gives special attention in describing the current research in automating the weed detection and control.

Keywords

Detection, Weed, Agriculture 4.0, Computational vision, Robotics



Preliminary Results of Peach Detection in Images Applying Convolutional Neuronal Network

Eduardo Assunção, Hugo Proença, André Veiros, Ricardo Mesquita, Pedro D. Gaspar

Abstract

The fruit detection part is very important for a good performance in a yield estimation system. This paper presents the preliminary results using the object detection Faster R-CNN method in the peaches images. The aim is evaluate the method performance in the detection of peach RGB images. Images acquired in an orchard were used. Although this method of object detection has been applied in other studies to detect fruits, according to the literature, it has not been used to detect peaches. The results, although preliminary, show a great potential of using the method to detect peach.

Keywords

Peach, Image Detection, Convolutional Neuronal Network



Deficit irrigation in peach orchards under water scarcity conditions

António Canatário Duarte, Abel Veloso, António Ramos, Dora Ferreira

Abstract

The irrigation patterns in two peach orchards, located in the central eastern region of Portugal, called “Beira Interior”, and the effect of different amounts of irrigation on the total production and fruit quality were evaluated. The experiment was conducted in 2016, in two different orchards, and included three treatments correspondent to three different flow rates per tree: 8, 12 and 16 l/hour. The water balance, which included the water supplied by rain and irrigation and the crop evapotranspiration, was developed. At harvest, crop production, pulp firmness and percentage of the total soluble solids were evaluated. There were no significant differences between treatments in the average production per tree. However, in one of the orchards production increased with the volume of irrigation. In the same orchard, fruit firmness decreased with the increasing water supply. Total soluble solids had decreased with the increasing water supply in both orchards, probably as a consequence of the dilution effect due, directly, to the water incorporated in the fruits, or, indirectly, to the larger fruits produced by the trees that were irrigated more. In general, the treatments used in this study as well as in the farmers’ practices, the supplied water was in deficit, but the farmers tend empirically to follow closely the evolution of evapotranspiration.

Keywords

deficit irrigation, peach tree, production, total soluble solids, fruit firmness



Climatic conditions during peach tree blossom (cv. Royal Time): main findings of monitorisation between 2015-2019

Dora Isabel Rodrigues Ferreira, André Amaral, Ana Paula Silva, Cristina Ramos

Abstract

Monitoring plant phenology has become a widespread methodology to monitor plant behaviour due to the increase, frequency and intensity of extreme climatic events. These extreme climatic events emphasise both plant susceptibility and farmers' vulnerability, as the latter constantly face the need to change or adjust cultural operations on commercial orchards, since these events have important economic repercussions.

This study aims to present the main results of the meteorological conditions that influenced peach tree blossom period (cv. Royal Time) during the last five years. Temperature and precipitation data were collected in an orchard in 2015, 2016, 2018 and 2019. This showed the phenological behaviour of peach trees, especially the environmental conditions that influenced full blossom.

The main results show that in 2015 the blossom period was very short, about 17 days, and full blossom occurred on March 12th while in 2016 the blossom period lasted 51 days due low temperatures. In 2018 high precipitation was the main variable that influenced the delay of full blossom, whereas in 2019 the average of the highest temperatures, resulted in an anticipation of full blossom, which occurred on March 15th, similar to what had been observed in 2015.

Keywords

Prunus persica, Beira Interior, full blossom, climatic conditions



Bird Monitoring and Dispersion System

Ricardo Mesquita, André Veiros, Pedro D. Gaspar

Abstract

Birds continue to be one of the main factors of loss by producers in the region of Beira Interior. Fruits such as peaches and cherries continue to be damaged and their trees destroyed due to bird crop attacks. There are several methods to disperse birds, but all have low effects in the long-term as they demonstrate low variability and high maintenance. Drones are systems that are capable of dispersing birds due to their high mobility. Together with the use of audiovisual technologies, increase the effectiveness of the bird dispersion. However, to get the most out of each flight it is required to understand birds' movements. Thus, a monitoring system is required. In this article, a technological solution is proposed that uses drones and aggregates the monitoring and dispersion systems so maximum effectiveness in bird dispersal is achieved.

Keywords

Agriculture 4.0, Monitoring system, Dispersion system, Birds, Drones



Airflow and thermal behavior within Peaches packaging box using Computational Fluid Dynamics - A preliminary study

Adhiyaman Ilangovan, Pedro D. Silva, Pedro D. Gaspar

Abstract

Post-harvest cold storage of peaches is an essential element to maintain the quality of the fruits without any loss. This work aims to present a CFD model, to predict airflow patterns and temperature profiles in ventilated packaging systems, during the forced-air cooling of Peaches stored in a cold chamber. Transient CFD simulations are performed for the chamber containing four ventilated boxes and the evaluation of the results show that the temperature removal near the vent holes and the hand holes is relatively high when compared to other regions of the packaging box. This preliminary study reveals the airflow behavior develop an uneven temperature distribution within the box. To overcome the flaws, future work is focussed on modifying the vent hole design to improve the airflow phenomenon to maintain the temperature homogeneity throughout the box.

Keywords

Peach, Computational Fluid Dynamics, Airflow, Heat transfer, Packaging



ICEUBI2019 SESSION - 8

*Technologies in Agriculture and
Agroindustry - Trends and
Innovations*





Postharvest Quality Parameters Evolution in ‘Golden Delicious’, ‘Gala’ and ‘Starking’ Apple

Daniela de Vasconcelos Teixeira Aguiar da Costa, Vanessa Alexandra Andrade Pina

Abstract

Portugal has ideal conditions for the production of apple fruit. The climate of the national fruit regions is highly favorable to the development of biochemical processes of maturation. The broad luminosity, ensures the full efficiency of photosynthetic activity and a better color of the fruits, warm enough for the ripening process to proceed under ideal conditions and to provide the maximum organoleptic qualities [1].

The main activity developed focuses on the evolution of postharvest quality parameters in "Golden Delicious", "Gala" and "Starking" apple, over a period of 12 weeks, in order to verify the evolution of these parameters along the storage in normal atmosphere.

In this work, the Golden Delicious, Gala and Starking varieties, cultivated in the region of Viseu, by different producers, were harvested during commercial maturation and analyzed in the postharvest phase. In the second phase of the work, the varieties were kept in normal atmosphere (NA) and analyzed weekly. The evolution parameters related to quality were based on the determination of firmness; the determination of °Brix; and the determination of the presence of starch.

The study allowed to verify that the Gala variety, is the only variety that at the pulp firmness level, is not significantly influenced throughout the storage. The same does not happen with respect to the sugar content, with Golden Delicious being the only variety that is not influenced during storage. For the presence of starch the apple Starking is the variety that shows higher values, followed by Golden Delicious and Gala.

Keywords

Apples, Postharvest, Varieties, Storage, Normal Atmosphere



Development of a monitoring device of fruit products along the cold chain

Diogo Morais, Pedro D. Silva, Pedro D. Gaspar

Abstract

During food transportation, products are often subject to conditions which in no way promote the conservation of their biological properties. As a result of this loss of quality, there is a decrease in appreciation under the product. But more important than the loss of economic value is food waste.

Remote monitoring systems, whose fundamental requirements relate to range and autonomy, make use of communications technologies to map characteristic crop parameters to reduce unnecessary application of resources or materials.

This article proposes a monitoring system to record the conservation conditions inside refrigeration plants and vehicles, transmitting them via the internet of Things (IoT). This device is composed of an ARDUINO UNO Rev3 microcontroller that acquires the temperature and relative humidity every 5 minutes by means of a DHT 11 sensor, and uses the SIM800L module that provides real time communication data via GSM. It also incorporates a 3.7 V - 2600mAh battery which gives you an approximate 60 hour power range.

Keywords

Monitoring system, Traceability, Cold chain, Internet of Things (IoT), GSM



Livestock real-time vital signs monitoring system

Rita Reigones, Pedro Dinis Gaspar, Nuno Garcia

Abstract

The focus on the application of information and communication technologies and electronic (ICTE) in agriculture has proven to be very efficient and revolutionary. With the adoption of increasingly efficient and modern technologies, agriculture generally improves its competitiveness and production sustainability. The intensive use of ICTE in this sector aims to create integrated solutions that generate effective gains in productivity, sustainability and economic, social and environmental quality.

In this paper is proposed an ICTE-based cattle or horse monitoring system, developed as a belt containing a microcontroller device used to assess the animal's heart rate and detect abnormal mobility. Correct assessment of these two parameters is very useful for detecting many of the pathologies and anomalies that constitute economic losses for producers. With precise monitoring, it is possible to minimize these events detrimental to animal production.

Keywords

Livestock, Agriculture 4.0, Vital signs, Accelerometry, Heart Rate



Current status and future trends in agricultural robotics

André Veiros, Ricardo Mesquita, Pedro D. Gaspar

Abstract

This paper analyzes some of the innovations in agricultural robotics, specifically for weed control, harvesting and monitoring, taking into account the challenges of introducing robotics in this sector, such as fruit detection, orchard navigation, task planning algorithms, or sensors optimization. One of the trends in agriculture 4.0 is the introduction of swarm robotics, allowing collaboration between robots. Another trend is in aerial imagery acquisition for ground analysis as well as environmental reconstruction, complemented by field-mounted sensors. Although robots are becoming quite important in the evolution of agriculture, it is still unlikely that all tasks will be automated in the near future due to the complexity arised by the overall variability of cultures.

Keywords

Agricultural robotics, Agriculture 4.0, Innovations, Fruit detection, Weed control



Active and Intelligent Packaging - Principles of Operation, Characteristics and Applications

Nuno Rato, Pedro D. Gaspar

Abstract

Food preservation is a topic increasingly being discussed due to market needs, where food from all over the world is required under the best chemical and physical conditions, with minimal waste. Active packaging is defined as the deliberate addition of some components to enhance the properties of the packaging. The various types of active packaging are oxygen scavengers, carbon dioxide emitters and absorbers, ethylene absorbers, ethanol emitters, moisture absorbers, and antimicrobial agents.

Smart packaging includes indicators that provide information on product quality and safety over time, such as packaging history, inside and outside atmosphere, oxygen levels, among others. Given the demands on food safety and quality as well as product traceability, there is an exponential increase in the development, production and use of active and intelligent packaging.

Keywords

Active packaging, Intelligent packaging, Compound Absorbers, Compound Emitters



Active and intelligent packaging with phase change materials to promote the shelf life extension of food products

Sasi Madhan, Christophe Espírito Santo, Luis P. Andrade, Pedro D. Silva, Pedro D. Gaspar

Abstract

Active packaging aims to extend the shelf life of fruits and vegetables using active agents such as Oxygen, Carbon-di-oxide, ethylene scavengers and moisture absorber. Intelligent packaging provides information about the fruits quality inside the package to the customer and this packaging technology detects the internal changes of fruits and vegetables using sensors and indicators. Further to improve the post-harvest storage PCM such as Rubitherm can be used depending on the package box dimension to remove the field heat from the products and maintain its temperature with low variation during transport and display. Gel packs having less weight with PET and PS can also be an alternate method in the packaging. The application of these technologies may lead to a revolution in post-harvest storage, transportation, and further retail sale. This paper reviews the theoretical principles of food packaging and recent developments in packaging technologies using PCMs.

Keywords

Active packaging, Intelligent packaging, Phase change materials, Shelf life extension, Fruits



ICEUBI2019 SESSION - 9

*Aircraft and Spacecraft
Engineering - 1*

ICEUBI2019





Aerial Forest Fire Detection and Monitoring using a Small UAV

Joaquim Vasconcelos Reynolds de Sousa, Pedro Vieira Gamboa

Abstract

In recent years, large patches of forest have been destroyed by fires, bringing tragic consequences for the environment and small settlements established around these regions. In this context, it is essential that fire fighting teams possess an increased situational awareness about the fire propagation, in order to promptly act in the extinguishing process.

Recent advances in UAV technology allied with remote sensing and computer vision techniques show very promising UAVs applicability in forest fires detection and monitoring. Besides presenting lower operational costs, these vehicles are able to reach regions that are inaccessible or considered too dangerous for fire fighting crews operations.

This paper describes the application of a real-time forest fire detection algorithm using aerial images captured by a video camera onboard an Unmanned Aerial Vehicle (UAV). The forest fire detection algorithm consists of a rule-based colour model that uses both RGB and YCbCr colour spaces to identify fire pixels. An intuitive targeting system was also developed, allowing the detection of multiple fires at the same time. Additionally, a fire geolocation algorithm was developed in order to estimate the fire location in terms of latitude (φ), longitude (λ) and altitude (h). The geolocation algorithm consists of applying two coordinates systems transformations between the body-fixed frame, North-East-Down frame (NED) and Earth-Centered, Earth Fixed (ECEF) frame.

Flight tests were performed during a controlled burn in order to assess the fire detection algorithm performance. The algorithm was able to detect the fire with few false positive detections.

Keywords

Aerial fire detection algorithm, Aerial fire monitoring, Forest fire, UAV, Remote Sensing



Analytical Model for the Performance Curves of a Family of Propellers based on Wind Tunnel Tests

Miguel Cabeleira dos Santos, Pedro Vieira Gamboa

Abstract

Propeller aircraft performance is greatly influenced by the performance of the propeller it uses. Thus, proper selection of a propeller for a given aircraft design at the early stages of the design process is fundamental. During the design of a new aircraft, simple yet accurate performance models are required to properly optimize the design. Significant experimental performance data of low speed, small propellers is available. The main objective of this work is to create and validate an analytical model for the performance curves of a family of propellers tested at low Reynolds numbers, which can be used in selecting a propeller for a given existing aircraft design or during its design optimization process. This kind of propellers is more commonly used in Unmanned Aerial Vehicles (UAVs).

The model is designed in MATLAB® using a variety of regression techniques, such as the Least Squares Method (LSQ), applied to experimental data acquired at University of Illinois at Urbana-Champaign (UIUC), for seventeen APC Thin Electric propellers, and at the Department of Aerospace Sciences (DCA) of University of Beira Interior (UBI), for ten more APC Thin Electric propellers.

The analytical model predicts propeller power coefficient and propulsive efficiency accurately for the family of propellers tested and can also be used for the propellers with dimensions close to those used for its development. The propeller performance data obtained during the experimental tests are made available the community to further increase the documentation on propellers tested at low Reynolds numbers.

Keywords

Propeller, Low Reynolds propeller performance, Propeller tests, Wind tunnel



Substitution of a Conventional Gas Turbine by a HT-PEMFC APU: Feasibility Study

Bruna Carolina Castro Pereira Araújo, Francisco Miguel Ribeiro Proença Brojo

Abstract

The aviation industry is increasing leading to a harmful environmental impact. APU is liable for 20% of airport ground-based emissions, 50% of aircraft maintenance costs and more than 5% of the daily fuel consumption [1]. Aware of this growing problem and its consequences, research should be conducted targeting new, non-polluting energy sources capable of meeting or even exceeding the aircraft's electrical needs. With this in mind, the main goal of this article was to analyze the feasibility of implementing a HT-PEMFC system as a more sustainable alternative for the gas turbine APU in an Airbus A320. The fuel used was methane which requires a fuel processor to convert it into hydrogen before entering the fuel cell. The maximum output work of this methane-supplied system is estimated at 250 kW. Therefore, a fuel processor and a fuel cell mathematical models were required. The two models along with the thermodynamic analysis were performed in MATLAB. The aims of this project were to evaluate fuel processing of methane and its conversion into electric energy through a fuel cell; to perform the thermodynamic analysis of HT-PEMFC APU based on the first and second laws of thermodynamics; and estimate the total weight, emissions and fuel consumption of the HT-PEMFC APU. The results of this research were very encouraging, as it shows that the breakeven weight of the HT-PEMFC, for a mass increment of 854 kg, was compensated by a fuel efficiency of ~2.7 times the conventional APU.

Keywords

APU, HT-PEMFC, Fuel Cell



Manufacturing and characterization of epoxy resin with Fe₃O₄ and SiO₂ particles

Jose Molina, Bożena Szczucka-Lasota, Tomasz Węgrzyn, Abílio P. Silva, Alberto Maceiras

Abstract

Thermosetting polymers are very popular in the automotive and aeronautic industry, in particular epoxy resin is widely used as matrix thermoset in carbon and glass fibre reinforced composites. The properties of these epoxy-based polymers can be improved with the addition of particulate or small fibre materials in order to construct a lightweight material with enhanced mechanical and structural response.

This work aimed to manufacture and characterize epoxy resin reinforced composites with iron (II, III) oxide (magnetite, Fe₃O₄) in amounts of 0.25, 0.5 and 1 wt%, and 2 and 4 wt% of fumed silicon dioxide (silica, SiO₂). Mechanical properties were investigated by three-point bending flexural test, fracture toughness, flexural stress relaxation. In addition, apparent porosity, apparent density and Differential Scanning Calorimetry tests were performed. The results showed that the addition of Fe₃O₄ does not contribute significantly to the improvement of mechanical properties. However, fumed SiO₂ promotes a considerable improvement in the mechanical properties.

Keywords

Composite, Epoxy resin, Fe₃O₄, SiO₂, Mechanical Properties



Composite Liquid Propellant Tanks for Space Launch Vehicles - Historical Challenges and Current Developments

Miguel Ângelo dos Santos Fernandes, Francisco Brojo

Abstract

Weight reduction remains an ever ending objective in space launcher vehicle design. Composite materials, particularly carbon fibre reinforced polymers (CFRP), are still considered, after several decades, as the next key step in cryotank weight reduction. Their use in this application, however, is still hampered by technical issues present in propellant containment environments, particularly cryogenic.

The aim of this work is to provide a brief explanation of the technical difficulties found in CFRP application to space launch vehicle propellant tank design and an overview of the research work and technical solutions that have been devised up to this day to face this challenge. CFRP based propellant tanks could make possible cheaper and reusable access to space transportation. Either through the design of more structurally efficient disposable launch vehicles, or as one of the enabling technologies of single stage to orbit (SSTO) recoverable launch vehicles (RLV) through mass fraction increase.

Keywords

Cryogenic Tanks, Propellant Tanks, Composite Materials, CFRP, Launch Vehicles



Comparison of pollutants formulation prediction using several turbulence models for a CFM56-3 combustor

Harsh Hansraj, Francisco Brójo

Abstract

Nowadays the CFM56 engine is one of the most widely used engine models in the aviation industry. With this work it is intended to analyse several turbulence models during the combustion, allowing a better understanding of some problems and their possible resolution. It was used a STL file of the combustion chamber digitization, from the work of Oliveira. In the numerical case only a quarter of the combustion chamber is used due to its symmetry allowing a less computational effort during the simulations and the fuel used in combustion is Jet-A. The mesh used was designed in Helyx OS software and numerical simulations were performed in ANSYS Fluent 16.2. The models $k-\epsilon$, $k-\omega$, RSM and LES are analysed and in the latter, the initial conditions resulting from the $k-\epsilon$ model are used. The results obtained show reasonable agreement with some experimental reference data present in the ICAO Emissions Data Base. Among the analysed models it was observed that in general, despite its high computational cost, the LES model is the one that best identifies the various zones of the combustion chamber. However, the RSM and $k-\epsilon$ models proved to be very useful in observing the emission distribution of some gases during combustion. It is concluded that the LES model gives the best results, but the choice of the most suitable model may vary depending on the boundary conditions and flow type of the case study to be analysed.

Keywords

CFM, Combustion Chamber, Turbulence Models



Aircraft Propellers, an outdated innovation?

Pedro Alves, Miguel Silvestre, Pedro Gamboa

Abstract

The race for speed ruled the early Jet Age on aviation. Aircraft manufacturers chased faster and faster planes in a fight for pride and capability. In the early 1970s, dreamed that the future would be supersonic, but fuel economy and not acceptable noise levels made that era never came. After the 1973 first oil crisis, the paradigm changed. The average cruise speed on newly developed aircraft started to decrease in exchange for improvements in many other performance parameters. At the same pace, the airliner's powerplants are evolving to look more like a ducted turboprop, and less like a pure jet engine as the pursuit for the higher bypass ratios continues. However, since the birth of jet aircraft, the propeller-driven plane lost its dominant place in the market. Associated with the idea of going back to propeller-driven airplanes, and what it represented in terms of modernity and security, it started a propeller avoidance phenomenon on the travelers and thus on the airlines. Today, even with the modest research effort since the 1980s, the advanced propellers are getting closer efficiencies to the jet-powered engines at their contemporary typical cruise speeds. This paper gives a brief overview of the performance trends in aviation since the last century. Comparison examples between aircraft designed on different paradigms are presented. The use of propellers as a reborn propulsive device is discussed.

Keywords

Propeller, Aircraft, Turboprop, Flight Efficiency, Flight Speed



ICEUBI2019 SESSION - 10

Electric Machines and Materials

ICEUBI2019





Optimization and Influence of GMAW Parameters for Weld Geometrical and Mechanical Properties using the Taguchi Method and Variance Analysis

Arthur Casarini, João P. Coelho, Émillyn T. Olívio, Manuel Braz-César, João Ribeiro

Abstract

Gas metal arc welding is one of the arc fusion processes that is widely used in industry due to its high efficiency. The correct selection of the input parameters has direct influence on the weld quality and, with the control of those parameters, it is possible to reduce the amount of weld material, improve its properties and then increase the productivity of the process. This study intends to take a group of weld parameters and submit them to the optimization by the Taguchi Method and check the influence of those through a Variance Analysis (ANOVA). An L9 orthogonal array gathered three parameters (weld voltage, weld speed and weld torch angle) into three levels, then, with all combinations set and performed, the macrography and the transversal tensile strength test provided, respectively, the geometrical and the mechanical properties. The signal-to-noise ratios enable the optimization and the ANOVA provided the influence of the input parameters on the response parameters. The weld speed appeared as the most influent parameter for the weld geometry, contributing 63.54% to reinforcement, 66.36% to width and 66.94% to penetration, and the weld torch angle the most influent to the ultimate transversal tensile strength (41.39%). The optimum levels to the reinforcement are 22.4 [V], 400 [mm/min] and 30 [°], to the width 22.4 [V], 300 [mm/min], 0 [°], to the penetration 23.3 [V], 400 [mm/min], 0 [°] and, lastly, to the ultimate transversal tensile strength 24.1 [V], 200 [mm/min], 15 [°]. The Taguchi method showed to be suitable for this kind of problem and giving an efficient experiment design and good results.

Keywords

Taguchi Method, Optimization, GMAW



Controller Design and Experimental Validation of a Solar Powered e-bike Charging Station

Carlos Jose Oliveira Inacio, Ivan Joel Ponciano Silva, Joao Pedro Domingues Faria, Jose Alvaro Nunes Pombo, Maria do Rosário Alves Calado, Silvio Jose Pinto Simoes Mariano

Abstract

Electric Vehicles (EV) have gained interest over the past decade. Because of this, to support EV technology installation of charging stations are required. Charging EVs from renewable energy provides a sustainable means of transport. E-bikes can help mitigate some mobility problems, particularly in large cities and metropolitan areas. This paper shows the development and implementation of a solar e-bike charging station with photovoltaic production, with energy storage system. The implemented system has a centralized control and allow an efficient management of the various resources and contemplates the possibility of four simultaneous e-bikes where user identification is performed by RFID. Finally, it is provided a user interface through an HMI panel and a web page where it will be possible to access the DataLog to consult the user activity and all charging parameters.

Keywords

Renewable Energy, Solar Charging Station, Programmable Logic Controller



Induction Motor Thermal Analysis based on Lumped Parameter Thermal Network

Pedro Cabral, Amel Adouni

Abstract

Many industry applications required the use of the induction motors. In such environment the electrical machines are facing of many stressed operating conditions. One of the critical criteria which decide the choice of the induction motor is the thermal behaviour under different mode operation. In this paper a study of the thermal behavior of an induction motor is presented. In order to predict the temperature in the different machine components, a model based on the lumped parameter thermal network has been developed. The geometry of the machine and the thermal properties of its various components are used to express the developed model. The joule and the iron losses are considering as the inputs. The proposed model is implemented and tested using MATLAB software. It is a simple model which could predict rapidly the different temperatures.

Keywords

Induction motor, Thermal analysis, Lumped Parameters Thermal Network, Modeling, Heat sources



ICEUBI2019 SESSION - 11

*Industrial Engineering and
Management - 1*

ICEUBI2019





Organizational and Methodological Influence of Risk Management in Projects

Diogo Francisco Gomes, Ana Sofia Martins da Eira Dias, Helena Victorovna Guitiss Navas,
António João Feliciano Pina da Costa Abreu

Abstract

Project risk management is essential to managers' decision making and business success, because it allows the manager to identify, analyse and decide on the most appropriate way to respond to different adversities that may arise during the development of new products, services, processes, projects, continuous improvement, etc. This requires a mind-set that risks have a major influence on the bottom line and use analytical methods or risk management software. It is essential to integrate the entire organizational structure into risk mitigation intervention. The purpose of this paper is to address some of the important topics to consider for well implemented and successful risk management. An approach is taken at both organizational and methodological levels.

Keywords

Risk Management, PMBOK, Stakeholders, Methods, New Product Development



Integrated Infrastructure Management in Urban Context: Implementation of a Renewable Energy Pilot Project in the Water Distribution Network

Ana Rita Silva, Ronald Faleiro Bastos, Fernando Manuel Bigares Charrua Santos, António Eduardo Vitória do Espírito Santo

Abstract

Over the past decade, smart energy and water grids have received special interest from the scientific community, especially when it comes to the efficient use of renewable sources. The concept of water-energy nexus has been discussed. This physical interconnection between both sectors (water and energy), complemented by numerous cyber layers such as optimization, forecasting, control and monitoring, data analysis, etc., allows significant technological advances towards energy and water efficiency improvement rather than their separate co-optimization. Smart grid enabling technologies can be connected to such systems, such as alternative energy storage systems, wind turbines, photovoltaic panels and mini hydro plants. This work aims to present the development and implementation of an integrated management system of renewable energy resources and water supply infrastructures in urban environment and real scale, analyzing the applicability and the viability of the most common and most potential measures that allow to implement such a solution as a result of the study developed. To this end, the existing water supply system in the city of Covilhã, a city with orographic mountain characteristics, is analyzed and a collaborative implementation and analysis of an integrated hydro, solar and wind energy production system is carried out in a previously chosen location and under specific conditions and restrictions duly described and assessment of its applicability and viability, with the possible premise of expanding the process to the entire supply system of the Municipality. The work also presupposes the adoption of the Living Lab concept, which represents a community-oriented open innovation environment based on a government-academy-citizen partnership, allowing users to actively participate in the city's scientific-technological development as well as greater awareness of the intelligent and efficient use of the available but scarce resources.

Keywords

Integrated management of renewable energy sources, water-energy nexus, cyberphysical systems

Decision support system for the use of energy sources and pollutant emissions

João Druczkoski, Marco Dias, Pedro Barandier, Tânia M. Lima, Pedro D. Gaspar, Fernando Charrua-Santos

Abstract

Nowadays, the energy demand presents a progressive and incessant growth, therefore it is crucial to design a program that balances the population' energy need and the independence of non-renewable sources, which present increasingly scarce projections. Moreover, to assure a more sustainable energy production in search of attenuation of the concentration of pollutants emitted. To this end, a proposal is presented for Portugal, through a quantitative data analysis that can both safeguard the Portuguese population from energy shortages in the coming years, as well as the entire ecosystem, both locally and globally.

Keywords

Wind Energy, Linear Programming, Decision Support System



Decision support system to assign food price rebates on the basis of quality decline

Vinicius Maciel, Cláudia Matos, Tânia M. Lima, Pedro D. Gaspar, Fernando Charrua-Santos

Abstract

In order to reduce food waste, fruits and vegetables in special, in small and medium markets sizes, caused by loss of quality at the end of shelf life, an appropriate pricing method was created to maximize profit of seller. The method it was based on an acquisition of primary data, through questionnaires appropriate to the theme, and, subsequently, these primary data was used for mathematical modeling using a pricing dynamic method. As a last step this work, was development a spreadsheet application, where the seller can found a ideal point of order, size of stock and best price to sell. This way, using the application, the goal of reduction of food waste in fruit products is expected.

Keywords

Food Waste, SME, Pricing, Mathematical Modeling, Decision Support System



ICEUBI2019 SESSION - 12

Energy and Thermal Machines

ICEUBI2019





An experimental analysis of the electrical parameter variation of a photovoltaic module

Hugo Nunes, Maria do Rosario Calado, Silvio Mariano, Jose Pombo

Abstract

Photovoltaic (PV) energy has been asserting itself in recent years as a true alternative for the electricity production in the future. It is well known that the accuracy of PV parameters is crucial to achieve optimal control of PV systems under any operating conditions. Although many attempts have been made to study the operating ranges of PV parameters, this remains a current research topic given the diversity of PV technologies. In this paper, the PV parameters variation with irradiance and temperature levels is experimentally analysed for a polycrystalline (poly-Si) silicon PV module. The experiment considers experimental data from 130 I-V characteristic curves measured over a typical day, considering several irradiance and temperature levels in the range 29-1023 W/m² and 19-68 °C, respectively. The results show that PV parameters vary considerably with irradiance and temperature levels for poly-Si technology.

Keywords

Photovoltaic module, Photovoltaic parameters, Single-diode model, Irradiance and temperature influence



Comparative study on Coolbox/Waterloop and natural refrigerants solutions for commercial refrigeration

Mario Rui Ribeiro de Almeida, Cláudia S.S.L. Casaca

Abstract

This paper presents some natural and artificial solutions for reducing the use of HFCs in commercial refrigeration systems to limit greenhouse gas (GHG) emissions to the atmosphere. Additionally, the case study of a medium size supermarket is addressed. For this, a series of cooling systems have been sized which are divided into Coolbox/Waterloop systems and centralized systems. Three centralized systems with R410a, R717 and R744/R717 were dimensioned as well as a Coolbox/Waterloop system with R410a. This way is possible to ensure a comparison not only between fluids but also between the Coolbox/Waterloop technology and the centralized solution. After sizing the systems, the comparative energy, economic and carbon emission studies of the systems, in which their application has been found to be possible, are presented. After analysing the systems covered and the studies performed, it is concluded not only about the best applicable system, but also about the limitations found in each of the others.

Keywords

Natural Refrigerants, Commercial Refrigeration, Coolbox, Waterloop



Development and construction of a photovoltaic didactic bench

Marco Rocha, Luís C. Pires, Pedro D. Silva, Pedro D. Almeida

Abstract

The significant growth in world energy demand has introduced significant pressure on energy consumption via fossil energy sources with recognized environmental consequences. In this context, renewable energies, such as solar, thermal and photovoltaic, wind and water, emerge as inevitable energy alternatives. This paper describes the process of developing a didactic photovoltaic unit to be used in laboratory practical classes in engineering courses at the University of Beira Interior. This unit consists on a photovoltaic module that converts solar energy into electrical energy, a charge regulator that protects the battery from overcharging and deep discharges, a battery that stores the energy produced during periods of higher solar radiation, and an inverter, which converts the energy produced in direct current to alternating current. The unit uses a set of lamps and a variable resistance, so that various system loads can be simulated. The developed didactic bench will allow the student to understand the characteristics of an autonomous photovoltaic installation, with practical examples about energy generation and storage. The basic storage system will allow to understand the charge storage concepts and its reuse without wasting energy. Additionally, a laboratory guide will be designed to support the experimental work to be developed.

Keywords

Didactic unit, Photovoltaic bench, Energy conversion



Greenhouse heating and cooling by means of an earth-to-air heat exchanger

Nuno C. Godinho, Luís C. Pires, Pedro D. Silva, Pedro D. Almeida

Abstract

The greenhouses aim to promote the ideal conditions for the growth of plants and crops, so it is important to air-conditioning the indoor environment of the greenhouse. There are several types of heating and cooling systems, however, they consume energy excessively and they consequently release of polluting gases into the atmosphere. A heat exchanger buried in the ground can be used to heat/cool agricultural greenhouses, thus taking advantage of the superficial surface layer of ground, capable of maintaining an approximately constant temperature throughout the year. The work presented seeks to study the possibility of using an earth to air heat exchanger in the heating and cooling of an agricultural greenhouse. With this objective, a set of tests to analyze the greenhouse heating and cooling from an earth to air heat exchanger were performed. This study had the purpose of perceiving the capacity that the air-to-ground heat exchanger has to heat and cool an agricultural greenhouse. From the tests carried out it is noted that the heat exchanger always allowed the increase or decrease the temperature of the test, in the case of heating or cooling. In the best test result the heat exchanger ensured an average temperature of $+1.5\text{ }^{\circ}\text{C}$ under heating and $-3.2\text{ }^{\circ}\text{C}$ under cooling. With the results obtained it is concluded that the earth to air heat exchanger can be seen as a valid alternative for the air-conditioning of an agricultural greenhouse.

Keywords

Heating and cooling of greenhouses, Earth-to-air heat exchanger, Passive heating and cooling

Energy Assessment of a Plug-in Hybrid Vehicle Propulsion Management System

Miguel Campino, Nuno Henriques, Gonçalo Duarte

Abstract

Plug-In hybrid vehicles have a complex propulsion system management, trying to manage the conventional and electric motorization in the most energy efficient way according to the driving dynamics, topography and battery charge state. In this sense, the aim of this work is to analyze the energy performance of plug-in hybrid vehicles, based on road tests, under real conditions of use, focusing on the management system of the two energy sources present, varying the level of battery charge at the start of the test to visualize the impact of this change. To complement the analysis and in order to better understand the operation of the management system, a methodology for applying the VSP parameter is used, which allows the load state to be approximated according to the vehicle's operating mode, alternating between the three modes according to the conditions at the time in question, prioritizing the electric motor when the state of charge of the battery is maximum. These results confirm the fact that plug-in hybrid vehicles allow better electricity management due to the diversity of external or internal charging sources, which makes this type of vehicle more efficient and versatile than conventional hybrids, allowing a reduction in fossil fuel consumption and consequently a reduction in the emission of pollutant gases, making this type of vehicle a very competitive alternative in the transport sector in view of the current challenges due to the goals present in the current European regulations.

Keywords

Plug-in Hybrid Vehicles, Energy Assessment, Climatization Systems, Load Support, State of Charge



ICEUBI2019 SESSION - 13

*Geotechnical Solutions for
Environmental Problems*

ICEUBI2019





APPLICABILITY STUDY OF THE OEDOMETER TEST TO A SILTY SAND

António Miguel Paula, José Alexandre Gonçalves, José dos Santos Batista, Manuel Teixeira Braz César, Bruno Afonso Freitas

Abstract

This paper exposes the applicability study of the oedometer test to an existing silty sand soil, from the city of Braganza, with the purpose to verify the applicability of this test to soils with fines in his composition, in a region with predominance of granite residual soils, considering that the granulometric curve of these soils are substantially different from the granulometric curves of the soils that are usually tested. For this, two types of soils were collected, namely intact samples of a silty sand, and a disturbed soil sample whose grains size distribution curve built into laboratory corresponds to a high plasticity silt. Due to the greater predominance of fines in the high plasticity silt, the mechanical behaviour of this soil, more conditioned by forces of an electrochemical nature, serves as a comparative term to the mechanical behaviour of the undisturbed samples of the silty sand, with a behaviour less dependent on these forces, thus allowing to show applicability of the test to soils with lower percentage of fines, with a more pronounced gravitational behaviour and, therefore, more atypical to the oedometer test. From the results obtained for silty sand, a high value of the immediate settlement was verified after each applied load cycle. Thus this observation, the beginning of the consolidation process demands high accurate recording of the settlement that clearly identify the time that primary consolidation begins. In this way, the implementation of the data acquisition system, allowing the correct reading of the consolidation beginning, minimizing human errors, expands the spectrum of soils existing in the region that can be study by the consolidation problematics point of view.

Keywords

Geotechnical characterization, Oedometer test, Mechanical behavior of soils, Laboratory tests



Experimental study on soils stabilized with two types of plastic waste

Dinis Gardete, Rosa Luzia

Abstract

The reuse and recycling rates for plastics are still below desirable values. The valorisation of plastic wastes that presently end in landfills or is incinerated can help to mitigate this environmental problem. There have been studies in soil improvement using plastic waste. Two types of plastic waste were used to assess their ability to improve soil properties for embankment construction and pavement layers. The selected plastic wastes are made from shredded package labels and ground bottles. The main properties of the soils were characterized. Three percentages of plastic waste were used, and the bearing capacity of the soil determined using CBR test (California Bearing Ratio). The results from the tests show that plastic waste stabilization leads to an increase in bearing capacity, expressed in CBR values, for low contents of plastic waste. This increase was more effective for high penetration values. Reduction in the bearing capacity was observed for higher plastic waste contents. Maximum dry unit weight decreased with increasing plastic waste content, whereas expansion increased with increasing plastic waste content.

Keywords

Soil stabilization, Plastic waste, CBR test, Compaction, Earthworks



Estimation of the soil hydraulic properties in the vadose zone by monitoring and numerical method

Hachimi Mustapha, Hamid Qanza, Karim Tamoh

Abstract

Vadose zone of the soil generally plays an important role in the transfer of water and pollutants in the subsoil and groundwater recharge. Estimation of soil hydraulic properties available in the unsaturated zone is very much essential for efficient use of the available water for irrigation supply. As the water resources available for mankind are very much limited, utilization of this resource should be properly managed. The estimation of soil hydraulic properties in the unsaturated zone helps us to simulate the water flow in this area. In this context, the determination of the hydrodynamic parameters constitutes an essential step for any study of transfers of water and solutes in the unsaturated zone. In the present study, efforts have been put to estimate the soil hydraulic properties by inverse modeling from the infiltration data the disc infiltrometer. The measurement field is the experimental station Rmel, located in the Loukkos Basin, in northern Morocco. The analytical and numerical results illustrate that the models used in this study reproduce effectively the experimental measurements. Sensitivity analysis showed that the most sensitive parameter was K_s , followed by the θ_s , n et α . Therefore, the number of parameters estimated by inverse modeling will be reduced to three parameters K_s , θ_s and n .

Keywords

Soil hydraulic properties, Infiltrometer, Vadose zone, infiltration, Inverse modeling



Global evaluation of two inverse models for simulating soil water flow in a laboratory experiment

Qanza Hamid

Abstract

Accurate estimation of soil hydraulic properties is essential for efficient soil water management. Experimentally, determination of these properties in the laboratory or in-situ conditions is tedious, time consuming and may involve considerable uncertainty for most practice use. Frequently, inverse modeling has been established to estimate effective parameters based on measured soil water content and hydraulic conductivity over time and depth. In this work, we compared a new modified levenberg-Marquardt algorithm based on complex variable differentiation methods (CVDM) and the HYDRUS-1D models to simulate water flow for two laboratory soil columns. These uses were made of the measured time series of soil water content at depths 10, 20, 40, 60 and 80 cm. The results indicated that the CVDM provided better performance to optimize soil-hydraulic parameters to predict soil water contents. Standard errors for HYDRUS-1D ranged from 0.79 to 0.90; whereas these values for CVDM varied between 0.89 and 0.95. Application of HYDRUS-1D increased the risk of overestimation of hydraulic parameters with depths. Although the CVDM model required much more computational time than HYDRUS-1D, using this model is recommended for deeper soils because of its more reliable and accurate simulation results.

Keywords

Hydraulic properties, inverse modelling, HYDRUS-1D, complex variable differentiation methods, Soil



Electrochemical remediation of textile dye with anodes produced from siderurgical wastes

Eric de Souza Gil, Mayk T. Oliveira, Luane F. Garcia, Ana Claudia Siqueira, Ieda Maria Sapateiro Torres

Abstract

Indigo carmine (IC) is a dye that is widely used in textile industries. Since the dyes lixiviation reach about 30%, these compounds are largely discharged in effluents, thus contaminating rivers and lakes. The IC presents high toxicity, causing topic irritation and carcinogenic effects. Electrocoagulation (EC) is based on the electrical dissolution of iron and aluminum ions used to promote the formation of metal hydroxide coagulants capable of destabilizing and aggregating pollutant compounds. In this context, this work aimed to investigate the use of electrodes obtained from the direct compression of metallurgical filing wastes on the EC remediation of IC. Electrodes of bronze, aluminum, steel and metal waste were produced and their performances were evaluated in NaCl 0.05 mol L⁻¹ and tap water solutions at 2.5 and 5 V. The IC dye discoloration reached 84% for the aluminum commercial electrode, 90% for the steel commercial electrode and 96% for the bronze commercial electrode respectively, in 80 minutes of treatment. For electrodes produced from chips (Swarf), there was a discoloration of 72% for the aluminum electrode, 92% for the steel electrode and 90% for the bronze electrode, respectively in the same time of treatment. These results showed that electrodes obtained from chips and commercial electrodes had similar electrochemical efficiency in the removal of IC dye from wastewater. In addition, the use of metallic debris as electrodes makes its application an economically viable option on a large scale, since they have high effectiveness, lower cost and their replacement can solve the electrode passivation.

Keywords

Electro coagulation, textile dyes, Metal Swarf, Wastewater, Discoloration



ICEUBI2019 SESSION - 14

Textil

ICEUBI2019





OBJECTIVE ASSESSMENT OF SLEEP MOVEMENTS IN NEURODEGENERATIVE PATIENTS THROUGH AN ELECTROTEXTILE TOOL

Nuno José Ramos Belino, Michella Melo Tavares, Maria Assunção Morais e Cunha Vaz Pato

Abstract

The present research work aims at the integration of textile materials and electronic components for the development of a new electrotexile structure to be used in human medicine and healthcare, specifically, in monitoring sleep movements of patients with neurodegenerative disease such as Alzheimer and Parkinson's. In this context, we sought the development of a new technological solution that allows not only to assess sleep quality, but also to establish a link between the nocturnal movements (body area, number of movements, direction, intensity) of demented patients and their polysomnographic recorded data. For this purpose, the authors developed an electroactive textile system, in order to acquire biomechanic information during the patients' night rest. The collected data will be statistically processed to verify any relation between night movements and the stage of the disease.

Keywords

Smart Textiles, Sleep Assessment, Polysomnography, Electrotexiles, Neurodegenerative diseases



State of the Art - Ergonomics and modeling of functional clothing products with biosignals sensor integration

António Julio Padez, Nuno Gonçalo Coelho Costa Pombo, Nuno Manuel Garcia dos Santos, Maria Madalena Rocha Pereira

Abstract

This literature review aims to introduce and investigate the topics addressed in the development of this project, where we try, the development of functional clothing with integration of bio-signals sensors, Textile materials, Ergonomics, Andrometry, Usability Wearability

Keywords

Ergonomics / Andrometry, Biosignals sensors, Usability / Wearability, Conforto, Textile materials



THERMAL ANALYSIS OF HEALTHY AND ECOLOGICAL FRIENDLY FLAME RETARDANTS FOR TEXTILES

Albert M Manich, Cristina Alonso, Luisa Coderch, Meritxell Martí, Sonia Perez-Rentero

Abstract

Flame Retardants (FR) are a group of anthropogenic environmental contaminants used at a relatively high concentration in many applications. Currently, the largest marked group of FRs is halogenated FR, and many of them are considered toxic, persistent and bio accumulative. Non-halogenated alternatives are a possible solution for the problem, but there is a lack of knowledge concerning environmental impact, health risks during the production process and final use. The main objective of the LIFE-FLAREX project that supports this work, is the mitigation of the environmental and human health impact of flame retardants used in textiles, looking for new efficient more ecological and healthy alternatives, able to replace the most common FR's that include toxic compounds like halogens, formaldehyde and antimony. The aim of this work is the determination of the effect of conventional and ecological flame retardants on cotton and polyester fabrics by the application of differential scanning calorimetry DSC and thermogravimetric analysis TGA. Results have been compared with those given by the best FR applied to cotton/polyester blended fabric. The application of DSC up to 550°C and TGA up to 600°C in N₂ and O₂ atmospheres give results that are in accordance with those yielded by the micro-scale combustion calorimeter. Onset temperatures of decomposition, steps of loss of mass by temperature and final residues, enable to evaluate the thermal efficiency of the different flame retardants. Results have been compared with those given by the application of ammonium polyphosphate and guanidine phosphate on cotton/polyester 50/50 blend.

Keywords

Thermal Analysis, Flame retardant, Cotton, Polyester



CONTROLLED DEPOSITION OF POLYAMIDE NANOFIBERS THROUGH AN INNOVATIVE ELECTROSPINNING DEVICE

Nuno José Ramos Belino, Teresa Raquel Aurélio da Silva Nunes Barata

Abstract

Electrospinning is a straightforward, cheap and unique method to produce novel fibers with diameter in the range of 100 nm and even less. Those nanofibers have a wide variety of applications such as: filters, membranes, composite reinforcement, drug delivery, protective barriers, sensors, wound dressings and tissue-engineered scaffolds where their unique properties contribute to product functionality. However, this process is characterized by a chaotic oscillation of the electrospinning jet which leads to the formation of beads an uneven nanofiber. This research work envisages the development of an apparatus to control the deposition of electrospun nanofibers through the use of a series of charged metal rings and the addition of a secondary power source, which enables a greater control over the polymer jet stream.

Keywords

Nanotechnology, Electrospinning, Nanofibres, Controlled deposition, Polyamides



ICEUBI2019 SESSION - 15

Information Systems Engineering - 1



Proposal of an IoT Solution to Fire Risk Assessment Problem

Ana Bernardo, Pedro Silva, Paulo Fazendeiro

Abstract

Several of the fighting weaknesses evidenced by the forest fires tragedies of the last years are rooted in the disconnection between the current technical/scientific resources and the availability of the resulting information to operational agents on the ground. In order to be effective, a pre-emptive response to similar disasters must include the articulation between local authorities at municipal level - in prevention, preparedness and initial response - and the common citizen who is on the field, resides there, and has a deeper knowledge about the field of operation.

This work intends to take a first step in the development of a tool that can serve to improve the civic awareness of all and to support the decision-making of the competent authorities.

Keywords

Internet of Things, Citizen Science, Fire Weather Index



Mobile monitoring of physiological parameters - Impact on population health

Pedro José Guerra de Araújo, Miguel Castelo Branco Craveiro de Sousa, Rui Francisco Miranda Robalo

Abstract

This paper presents an ongoing project in the municipality of Covilhã, concerning the use of an instrument to monitor physiological parameters collected at the homes of users, especially the elderly. It aims to improve health care among them, as the data collected is immediately processed by the computer system which will alert the physician about potentially increased risk individuals who need closer monitoring. On the other hand, it facilitates the faster establishment of a diagnosis by the doctor, resulting, when necessary, in the referral to a specialist consultation. The instrument used consists of hardware and software modules developed specifically for the project, being able to perform measurements such as blood pressure and glucose, among others. Besides describing the main characteristics of the instrument, some results obtained so far and future perspectives are presented.

Keywords

Telemedicine, Telemonitoring, Prevention, Proximity Care, Early Screening



A Multi-Agent Based Architecture for Internet of Things Environments

Diego M. Jiménez-Bravo, Valderi Reis Quietinho Leithardt, Daniel H. de la Iglesia, André Sales Mendes, Álvaro Lozano

Abstract

Nowadays we live surrounded by technology that makes our daily life easier. This technology is usually connected to the Internet forming what is known as the Internet of Things. The Internet of Things is present in many environments and generates large amounts of data. This data contains valuable information that has to be extracted in order to generate knowledge or decisions from that data. To do this it is necessary to have an architecture capable of managing the different components of this type of systems. Therefore, this article presents an architecture based on multi-agent systems to manage the Internet of Things environments. The results obtained in the case study demonstrate the correct application of the proposed architecture in this type of intelligent environments.

Keywords

Multi-Agent, Internet of Things, Distributed system, Smart environments



Study of a Context Quality Model for UbiPri Middleware

Diandre de Paula, Daniel Saraiva, Nuno Garcia, Valderi Leithardt

Abstract

With the growth of ubiquitous computing, context-aware computing-based applications are increasingly emerging, and these applications demonstrate the impact that context has on the adaptation process. From the context, it will be possible to adapt the application according to the requirements and needs of its users. Therefore, the quality of the context information must be guaranteed so that the application does not have an incorrect or unexpected adaptation process. But like any given data, there is the possibility of inaccuracy and/or uncertainty and so Quality of Context (QoC) plays a key role in ensuring the quality of context information and optimizing the adaptation process. To guarantee the Quality of Context it is necessary to study a quality model to be created, which will have the important function of evaluating the context information. Thus, it is necessary to ensure that the parameters and quality indicators to be used and evaluated are the most appropriate for a given type of application. This paper aims to study a context quality model for the UbiPri middleware, defining its quality indicators to ensure its proper functioning in the process of adaptation in granting access to ubiquitous environments.

Keywords

QoC, Model, Context-Aware, Data, Privacy



ICEUBI2019 SESSION - 16

Construction Sustainability - 3

ICEUBI2019





Analysis of heat balance in a Light Steel Frame residence with different insulating thickness

Isabel Oberderfer Consoli, Carlos Alberto Rodrigues Andrade, Ney Lyzandro Tabalipa

Abstract

Sustainability and efficiency in buildings are concepts that have been recently growing and developing. Its application in several buildings has become mandatory in many countries around the world. One of the major challenges faced by sustainable buildings is the achievement of satisfactory levels in efficiency terms, without negatively impacting the economics. The residential construction sector has great potential for energy savings and is also where building strategies need to be carefully planned, as they seek to meet the needs of residents not only in the present, but also over time. Residential design must be done thoroughly and must include the analysis of all climate variables involved. In order to verify a residential building envelope behaviour regarding energy and thermal efficiency, this paper intended to evaluate through software Design Builder®, walls and roofs with a rock wool layer, placed in a Light Steel Frame (LSF) house.

Keywords

Insulating materials, Light Steel Frame, Heat gains, Heat losses

MODULAR - Building dreams

Fernanda Maria Pinto Freitas Ramos Ferreira, Lucas da Silva Atanásio, Mario Tadeu Cleto da Costamagna

Abstract

“MODULAR - Building Dreams” was a project developed in 2018 at São Paulo Faculty of Technology’s ICenter, in partnership with the Telefonica Vivo Foundation and the Paula Souza Center. The project “MODULAR - Building Dreams” presents a solution to remove people from risky areas, offering the choice of container housing, combining the social cause with the latest sustainable technology in construction.

Keywords

Social startup, Container, Sustainability, Constructive technology



Sustainability and Acoustic Isolation in Construction

Elaine Garrido Vazquez, Eduardo Qualharini

Abstract

Society is very aware of two changes that must be made to help improve the environment. To do this, we heard about many factors such as or use of ecological materials, or use of renewed energies, etc. This unique um factor that directly affects society. Uma das matérias that will directly affect the user or the interior comfort of the building. Or when you fear indoor comfort, the rooms that appear in the first place are “thermal” and “acoustic”. At present, research was carried out as the main objective to deepen the subject matter in order to raise awareness and raise awareness about the importance of the issue of the daily life of individual individuals. A factor that has been mutely abandoned to diferença, for example, gives thermal insulation that is part of any current architectural construction. In addition, Brazil will also be useful, such as the weight at the time of the election, or that it is interesting in a subject that can be found not future and development for or future construction. Because it is important to invest or tempo em um know systems that help um this comfort and that comply with regulations. For the theoretical section, it is used to architecture, to contrast with the norms of civil and Spanish construction and a brief comparison between you.

Keywords

sustainability, acoustic isolation, construction



The contribution of Lean Construction methodology to the sustainability of the current civil construction in the state of São Paulo - Brazil

Leonardo Ferrari de Carvalho, Fernanda Maria Pinto Freitas Ramos Ferreira

Abstract

Civil construction is an important economic segment for human development, however its execution process, through the construction site, cause huge environmental impacts and generate pollution in its surroundings. In addition, the excessive use of materials and natural energy resources cause waste and make the enterprise more expensive, reducing the production processes' efficiency.

The objective of this work was to learn the solutions used in works that are based on the methodology known as Lean Construction. Solutions that aim to improve the management of natural resources, the use of materials and the improvement of construction processes. The research methodology consisted of making a survey on companies that adopt or not the methodology, in which it was made an analysis of how their construction sites are in relation to the rational use of these resources. The research brought data that will serve as recommendations and warnings to improve our relationship with the environment.

Keywords

Sustainability, Lean construction, Rationalization of materials, Production processes, Natural resources



ICEUBI2019 SESSION - 17

*Inspection, Diagnosis,
Maintenance, And Rehabilitation of
Buildings For The Future - 2*

ICEUBI2019





The influence of scope management on the optimization of school buildings

Lucas Nascimento de Lima, Fernanda Maria Pinto Freitas Ramos Ferreira

Abstract

This research aimed to understand how Scope Management tools and techniques are applied by Brazilian construction professionals, and how their use can influence the optimization of the construction of a school building. Several methodologies for studying and implementing knowledge are available in this area, including those described by PMBOK, which features 23 tools and techniques that are considered useful in describing the requirements for a project success.

To achieve this goal, we elaborated a questionnaire, answered by 36 construction professionals, and interviewed 3 professionals who were or are involved with the design of school buildings.

Keywords

Scope, Construction Management, School building, Project



Hausmannian Buildings Rehabilitation and Strengthening

Rui Cardoso, Anabela Paiva, Jorge Pinto, João Carlos Gonçalves Lanzinha

Abstract

Hausmannian buildings architecture spreads throughout the city of Paris. These buildings were constructed in the 19th century, being presently centenarians. However, they present several pathologies which prevent their adequate use, moreover, an update regarding users security, sound, thermal and fire requirements is, among others, urgently needed. Additionally, there is presently, in Paris, an increasing demand for hotel rooms. For those previous reasons, Hausmannian buildings are presently submitted to heavy operations related to rehabilitation, strengthening, use change and conservation. In this paper, rehabilitation and strengthening works presently carried out in those buildings are described. This description is the result of a technical survey on several Hausmannian building construction sites which occurred between 2015 and 2018. The knowledge from this study should be very useful for the development of sustainable rehabilitation and strengthening techniques and guidelines, aiming to preserve this important building heritage or similar ones existing in other countries.

Keywords

Hausmannian buildings, Rehabilitation, Strengthening, Sustainability

Information technology applied to construction management in the state of São Paulo - Brazil

Fernanda Maria Pinto Freitas Ramos Ferreira

Abstract

Esta pesquisa estudou a aplicação da tecnologia da informação aplicada ao gerenciamento de obras. Foram analisadas a evolução e o desenvolvimento do setor, o que nos instigou sobre quais seriam os impactos positivos quando da implantação de tecnologias da informação aplicadas ao gerenciamento de obras, principalmente em obras de edificações. A metodologia inicial desta pesquisa foi a pesquisa bibliográfica em livros, normas brasileiras, artigos acadêmicos e outros manuais já existentes, posteriormente realizamos múltiplos estudos de caso em empresas fornecedoras de softwares e aplicativos para a indústria da construção civil paulista. Um questionário foi preparado e enviado para empresas fornecedoras de softwares e aplicativos e neste artigo foram apresentadas 19 soluções, consideradas as mais relevantes na construção civil paulista. Concluimos que, os impactos de soluções tecnológicas em TI colaboram no planejamento de canteiro de obras, colaborando para o gerenciamento da obra. Existem várias soluções em TI que podem alertar antecipadamente problemas que irão acontecer na obra, assim o gestor consegue identificar esses problemas com antecedência, gerando economia.

Keywords

Construction Management, Information Technology, Software, Buildings



Recommendations on adoption of Life Cycle Analysis in Urban Rehabilitation in Brazil

Luiz Henrique Costa Oscar, Maiane Ramos da Silva, Ana Claudia Cruz Henriques da Silva, Eduardo Linhares Qualharini

Abstract

The preservation of the physical heritage, taking into account the economic and functional conditions inherent to the urban fabric, starts from the identification of the natural parties, analysis of the viable reconfiguration of the urban fabric and the recognition of the built cultural and historical heritage. With this analysis there is a need to document the choice of the optimal urban envelope performance. Through the adoption of studies that reward the analysis of the “Urban Rehabilitation Life Cycle”, the recycling of waste to use them as raw material can be an important tool in the preservation of natural resources, reducing energy consumption, generating landfill and occupation of productive areas, allied to this, with the evolution of studies on durability, performance and knowledge of the life cycle of construction components, we can use techniques and practices that bring more assertiveness in the solutions and reward the continuity. appropriate consequence of urban requalification. This paper presents recommendations to increase the assertiveness of solutions in the requalification of urban areas.

Keywords

Rehabilitation of Buildings, Life Cycle Assessment, Constructive Processes



ICEUBI2019 SESSION - 18

*Aeronautics & Space: Improving
Safety and Environmental
Protection*

ICEUBI2019





Parametric Study of a Plunging NACA0012 Airfoil

Emanuel António Rodrigues Camacho, Fernando Manuel da Silva Pereira das Neves, André Resende Rodrigues Silva, Jorge Manuel Martins Barata

Abstract

Natural flight has always been the source of imagination for the Human being, but reproducing the propulsive systems used by animals is indeed complex. New challenges in today's society have made biomimetics gain a lot of momentum because of the high performance and versatility these systems possess when subjected to the low Reynolds numbers effects. The main objective of the present work is the computational study of the influence of the Reynolds number, frequency and amplitude of the oscillatory movement of a NACA0012 airfoil in the aerodynamic performance for a constant angle of attack over time. The thrust and power coefficients are obtained which together are used to calculate the propulsive efficiency. The simulations were performed using ANSYS Fluent with a RANS approach for Reynolds numbers between 8,500 and 34,000, reduced frequencies between 1 and 5, and Strouhal numbers from 0.1 to 0.4. The aerodynamic parameters were widely explored as well as their interaction, obtaining optimal operational condition zones for the different Reynolds numbers studied.

Keywords

Plunging, Airfoil, CFD, Aerodynamic Coefficients, Biomimicry



Effect of Reynolds Number on a Plunging Airfoil

Diana Carvalho Rodrigues, Emanuel António Rodrigues Camacho, Fernando Manuel da Silva Pereira Neves, André Resende Rodrigues Silva, Jorge Manuel Martins Barata

Abstract

Biomimetics is an area of science that studies the development of new technologies, whose source of inspiration is Nature. Unlike traditional aircraft, animals only have one structure to create both lift and thrust, and for Humans, although in the recent years the studies in this area increased, a long way must be made to achieve their capability. The present paper focuses on the effect of the Reynolds number on the wake configuration produced by a plunging airfoil. The experimental work was performed using an airstream, that was marked with smoke, with an oscillating airfoil NACA0012, whose dimensions are 44cm and 10cm of span and aerodynamic chord, respectively. The motion prescribed for the wing is harmonic, since it very well represents the type of motion seen in Nature. Frequency and amplitude were maintained, respectively, at 1.2Hz and 2.8cm, and the wind speed range from 0.25m/s to 1.00m/s, which represents a nondimensional amplitude of 0.28, a reduced frequencies of 3.02, 1.51 and 0.75, and a Strouhal number and a Reynolds number range of, 0.07 - 0.27 and 1,500 - 6,300, respectively. Results indicate that, with the increase of the Reynolds number, the convection effects become more predominant than diffusion effects, the curvature of the wakes and the maximum effective angle of attack decrease, and time and configuration of vortex shedding change. For $Re = 1,500$, $St = 0.27$, another relevant conclusion appears; the interaction of the leading-edge vortex with the trailing-edge vortex indicates an improvement of the aerodynamic performance of this system.

Keywords

Biomimetics, Plunging, Airfoil, Vortices, Wakes



Turbulence quantification in supercritical nitrogen injection: an analysis of turbulence models

Leandro Magalhães, Francisco Carvalho, André Silva, Jorge Barata

Abstract

In Liquid Rocket Engines, higher combustion efficiencies come at the cost of the propellants exceeding their critical point conditions and entering the supercritical domain. The term fluid is used because, under these conditions, there is no longer a clear distinction between a liquid and a gas phase. The non-conventional behavior of thermophysical properties makes the modeling of supercritical fluid flows a most challenging task. In the present work, a RANS computational method following an incompressible but variable density approach is devised on which the performance of several turbulence models is compared in conjunction with a high accuracy multi-parameter equation of state. Also, a suitable methodology to describe transport properties accounting for dense fluid corrections is applied. The results are validated against experimental data, becoming clear that there is no trend between turbulence model complexity and the quality of the produced results. For several instances, one- and two-equation turbulence models produce similar and better results than those of Large Eddy Simulation (LES). Finally, considerations about the applicability of the tested turbulence models in supercritical simulations are given based on the results and the structural nature of each model.

Keywords

supercritical fluids, RANS turbulence modeling, Liquid Rocket Engines



Optimal Fuel Saving in 4D Waypoint Networks

Kawser Ahmed, Milca de Freitas Coelho, Kouamana Bousson

Abstract

The purpose of this work is to develop a trajectory optimization method that generates a fuel optimal trajectory from a predefined 4D waypoint networks, where the arrival time is specified for each waypoint in the network. A single source shortest path algorithm is presented to generate the optimal flight trajectory that minimizes fuel burn. Generating such trajectories enables the airlines to cope with increasing fuel costs and to reduce aviation induced climate change, as emission is directly related to the amount of fuel burn. Two case studies were considered and the simulation results showed that flying a fuel optimal trajectory based on the proposed algorithm leads to a reduction of average fuel consumption on international flights by 2-4% compared with the conventional trip fuel.

Keywords

Fuel Saving, Cost Index, 4D trajectory optimization, Waypoint network, Dijkstra's algorithm



ICEUBI2019 SESSION - 19

*Hidraulic Machines and
Bioengineering*

ICEUBI2019





3D Unsteady RANS computation of the mixing on a T-junction

Sílvio Cândido, José Páscoa

Abstract

Turbulent mixing is a very common phenomenon in industrial processes. It is well known that the turbulence model has a massive impact on the accuracy of a turbulent flow, principally when it is used in processes of turbulent mixing. For this reason, this paper aims to investigate the impact of two specific turbulence models on calculating a mixture of gas-gas, using a 3D T-junction geometry. The differences between the calculation with two RANS based models, the kw-SST and SAS are investigated here. A mixture of Air and N₂ is performed. The sensibility of the refinement of the mesh of calculation is assessed to calculate the discretization error. A comparison of results obtained with the distinct models of turbulence is made with available experimental data. In this comparison it is shown that the SAS model, due to its capability of capturing some vortices that SST couldn't, offers a better accuracy, with an error maximum below the 7%, in comparison to the experimental data.

Keywords

T-junction, Turbulent mixing, RANS, CFD



Current control optimization for grid-tied inverters using Cuckoo Search algorithm

João Faria, José Pombo, Maria do Rosário Calado, Sílvio Mariano

Abstract

One of the most decisive factors for a smooth and stable operation of an DC / AC converter connected to the power grid are the gains used in the current controllers. This paper proposes the use of the Cuckoo Search optimization algorithm via Lévy Flights to facilitate the determination of the optimal gains of the grid connected DC / AC converters. With the proposed algorithm, it becomes possible to determine the optimal gains of the current controllers of the DC / AC converters connected with the grid thus improving their stability, accuracy and response time.

Keywords

DC / AC converters, Cuckoo Search, Optimization, Current Controllers



Multifunctional prosthesis control with simulation of myoelectric signals

João Fermeiro, Filipa Moreira, José Pombo, Rosário Calado, Sílvio Mariano

Abstract

The skeletal muscle activation generates electric signals called myoelectric signals. In recent years a strong scientific activity has been developed in the recognition of limb movements from electromyography (EMG) signals recorded from non-invasive (surface) electrodes, in order to design systems for prosthetic control. Surface EMG acquire the activation of surrounding muscles and for that reason the obtained signal needs to be conditioned and processed, with pattern recognition techniques for extraction and classification.

In this work EMG signals were acquired for two hand movements, “hand close” and “hand open”. The EMG electrodes were placed on the forearm and positioned over the extensor digitorum muscle, for the “hand open” and flexor digitorum muscle, for the “hand close”.

Using MATLAB software the signal conditioning, feature extraction and classification were performed. The feature extraction process was carried with the Wavelet Packet Transform (WPT) technique and the classification process was done with two different techniques for comparison purposes, Neural Networks (NN) and Support Vector Machines (SVM).

The results show that the SVM classifier used presented better classification performance compared to NN classifier used.

Keywords

EMG, Signal conditioning, Wavelet Packet Transform (WPT), Neural Networks (NN), Support Vector Machines (SVM)



Experimental study of dielectric barrier discharge plasma actuators for active flow control

Miguel André Barbosa Moreira, Frederico Miguel Freire Rodrigues, José Carlos Páscoa Marques

Abstract

The objective of this study is to compare the effect of varying the material used as dielectric layer on the properties of the plasma actuators themselves.

The experiments have shown that actuators with a PIB dielectric have a lower power consumption, can achieve higher velocities and have a better mechanical efficiency, but are more prone to failure due to breakdown of the dielectric.

We verified that PIB rubber is a suitable material for DBD plasma actuators fabrication presenting several interesting features.

Keywords

Active Flow Control, Plasma Actuators, Dielectric Barrier Discharge, Dielectric Materials



Test and Preliminary Analysis of BioBall Device for Wrist Rehabilitation

Ana Rita Amorim, Bárbara Silva, Ana Cristina Braga, Luís Ferreira da Silva, Eurico Seabra, Rui Viana

Abstract

The wrist forms an extremely important complex joint mechanism and is associated with a wide range of movements. The pathologies or fractures that affect it are frequent and very varied. In order to restore wrist function, physical therapy modalities are essentially based on traditional procedures. Thus, the Bioball device has been developed, where it is intended to perform movements with a greater level of control, either in passive or active mode, and which allows the performance of relaxation and proprioception exercises. It is also possible to read the range of motion of the patients wrist.

Thus, this project came up with the objective of testing the performance of BioBall through a technical evaluation, in order to verify its repeatability and accuracy. The tests consisted of range of motion readings taken by the device, either in automatic or manual mode, “Passive Exercise” and “Physical Exercise” respectively. These tests served to calibrate the system prior to conducting patient tests.

The data collected from the technical tests performed allowed to determine the accuracy and repeatability of the device. The standard deviations obtained were low, lower than 2° and not significant for the application in question. It was concluded that BioBall, besides functioning correctly, is able to collect angular data consistently and is suitable to follow the evolution of a patient's rehabilitation.

Keywords

Rehabilitation, Medical device, Wrist, Passive Exercise, Active Exercise



ICEUBI2019 SESSION - 20

Transportation

ICEUBI2019





Validation of an indirect data collection method to assess airport pavements condition

Bertha Santos, Ianca Feitosa, Pedro G. Almeida

Abstract

This study presents two methods for airport asphalt pavements distresses data collection tested on the main runway of Amílcar Cabral International Airport, located at Sal Island in Cape Verde. The two methods tested were traditional visual inspection (by foot) and an indirect method using a vehicle equipped with image capture and recording, lasers and geopositioning devices (in-vehicle inspection).

The aim of this research is to contribute to the validation of the proposed low-cost in-vehicle pavement distress inspection system in order to be considered in the implementation of the pavement condition assessment component of an Airport Pavement Management System (APMS). This is a particularly important component as from the collected distress data it is possible to assess the condition of the pavements and define intervention strategies.

Validation of the indirect data collection method is evaluated by statistical comparison of the collected distress data and Pavement Condition Index (PCI) obtained with the two methods. Statistically non-significant differences between the result sets validate the proposed indirect method, resulting in significant advantages in respect to the amount of pavement area inspected (larger), inspection time (shorter), data collection cost, processing and results visualization (on a GIS), revaluation of the dataset (possible on indirect method) and quality control (simpler and faster).

Keywords

Airport Pavement Management Systems (APMS), Pavement Data Collection, Image Processing, Statistical Comparison



Geographic Information System in the management and monitoring of traffic signs in low density areas. Case Study: Belmonte village

Olga Gonçalves, Jorge Humberto Gaspar Gonçalves

Abstract

The current national and regional conjuncture requires the correct management and monitoring of traffic signs, essential in any local authority, not only for the purpose of reducing urban/rural road accidents, but also for the optimization of costs and resources throughout the inherent process. The role of vertical signs is the transmission of information, be it warning, guidance, obligation, or merely informative to road users, through different shapes, colors and graphics. Sometimes, however, they are imperceptible for several reasons: material wear, difficulty understanding pictograms, or improper location, are some of these reasons. In the search for solutions to improve the management, analysis and representation of existing information, Geographic Information Systems (GIS) appear as an essential tool for the functional competences of local administration, with emphasis on municipalities, municipal road network management entities. These tools help to manage capacity and directly monitor quantitative and qualitative parameters, in order to make management decision-making more effective. Thus, the present study presents the use of GIS for urban vertical signs management in low density areas. The case study area was Belmonte Village, in the Portuguese district of Castelo Branco, whose applicability specifications are based on the regulatory and normative models. For obvious reasons, the management of public infrastructures in these low density areas must be even more rigorous and careful, considering the economic and financial sustainability of local authorities, their populations weaknesses/needs and the development difficulties faced in their territories

Keywords

Traffic signs, Urban management, Low density areas, Open source software, Geographic Information Systems



Proposal for improvements in the road system of Pato Branco - PR, Brazil, based on traffic conflict analysis

Gabriela Legramanti, Danilo Rinaldi Bisconsini, Isabel Dalanhol, Thais Elenize de Siqueira, Ney Lyzandro

Abstract

Traffic accidents are a constant concern of society due to the high economic and social costs involved. The search for the reduction of accident rates involves the identification and prioritization of critical intersections and street segments in the intervention network. This paper proposed alternatives for the reduction of accidents in critical points of the urban perimeter of Pato Branco city, Brazil. The study was done through database consultations, identification of factors that contribute to the occurrence of accidents and field analysis and applying the Swedish Traffic Conflict Technique. In the municipality, information related to traffic accidents is collected. However, data analysis is not yet performed efficiently. Better data analysis with the assessment of the place of occurrence makes it possible to suggest improvements in the road system. It was also noted the need for investments in a Geographic Information System (GIS) platform, which would provide efficiency in data processing and the correct direction of municipal investments.

Keywords

Traffic Accidents, Conflict Analysis, Geographic Information Systems (GIS)



Hexagonal zones in transport demand models

Jacek Chmielewski, Jan Kempa

Abstract

Planning the development of transport systems, as well as assessing the effects of investment activities in the field of spatial development requires the use of appropriate IT tools enabling an objective assessment of investment intentions. In the field of transport analyzes, one of such tools is a transport demand model. Reproduction of transport-related processes is the main role of such transport demand model. This applies to both the transport of people and goods, as well as the travel of residents but also visitors to the study area. The description of the process of creation and implementation of transport demands is usually based on the assumptions in the field of places of generation and absorption of travel - i.e. sources and destinations of travel. The generalization of the mathematical description of this phenomenon introduced the concept of transport zones, which are separated homogeneous areas of the study area, as sources and destinations of trips. Practice in the construction and use of transport models indicates that the problem of defining transport zones requires a number of further work. With increasingly richer transport infrastructure databases collected in open databases (such as OpenStreets), they force a change in the approach to the problems of constructing transport zones. The current used solutions are characterized by a high level of generalization of sources and destinations. Thus, they prevent a series of detailed transport analyzes. The article presents the author's method of dividing the study areas into transport zones based on a uniform hexagonal system. The basic assumptions of the method as well as the pros and cons of the presented method are presented in the paper.

Keywords

transport, demand models, algorithms



ICEUBI2019 SESSION - 21

Construction Sustainability - 4

ICEUBI2019



Comparative Analysis of Quality Assessment Methods of Rehabilitated Buildings

Alana Sena de Mendonça, Marina Almeida Batista, Sandra Pereira Cunha

Abstract

The performance and durability of a rehabilitated building is directly related to the quality of the projects and their execution. In this theme, the methods of evaluating the quality of building rehabilitation have become an essential element nowadays, as they seek to guarantee and certify the quality of the buildings and, consequently, the comfort of users, which has become increasingly relevant.

If quality is not guaranteed even at the design stage, it is likely that this building will present anomalies, either due to inadequate materials specified or ineffective proposed solutions. It is also important that the execution and control of the work is done by specialized professionals, seeking the efficiency of the final result. During these steps, technical managers face a number of difficulties, and the various quality assessment methods can serve as a guide to good practice.

Considering the importance of the quality factor for the rehabilitated buildings, the present work aims to analyze quality evaluation methods, applied in different countries, that are directed to the rehabilitation of buildings, through the survey of the main evaluated characteristics, as well as the methodology of verification for each of the methods studied.

Through the synthesis of each method and after their comparative analysis, the effectiveness of each one will be analyzed, as well as its scope and the ease of application, considering the reality of Portugal. Once this analysis is done it can be concluded that the evaluation methodology for new buildings and rehabilitated buildings are similar, as they evaluate the same quality criteria, but none of these methods assess the state of conservation of the building, nor the possibility of them. existing building elements can be preserved during rehabilitation.

Keywords

Quality, Rehabilitation of Buildings, Preservation of building elements



Evolution of the structural system of the haystacks of the center coast

Jorge Morarji dos Remédios Dias Mascarenhas, Maria de Lurdes Belgas da Costa Reis

Abstract

The Portuguese coast is characterized by being extensive and quite diversified. Between Leiria and Porto presents a typology of low coast, consisting of extensive stretches of sand and dunes, with pine forests behind that prevent the sea advancement. In the past some locations of these sand strips, without any use, were being occupied by fishermen who devoted themselves to the arte xávega. The fishermen of these areas were poor and, they built rudimentary wooden buildings on wooden stakes, so as to allow the circulation of sand. Over time they also devoted themselves to some agricultural activity, practiced in the areas immediately behind the dunes. Larger housing buildings began to emerge with storage areas of fishing tackle and agricultural implements, warehouse and shelter for livestock that also pulled the nets. Given their use, these constructions were being designated by palheiros. This paper intends to present the structural system of the first palheiros, which only served as housing.

Keywords

wooden structures, palheiros, heritage



Geographic Information System as a Fire Risk Analysis and Management Tool in Historic Sites: Case Study in Ouro Preto

Paulo Gustavo von Krüger, Fernando José da Silva, Erika Esteves Lasmar, Luana Oliveira, Ana Carolina Castanheira Anderson de Souza Quintella Chagas Crisley Nyanne Oliveira

Abstract

This paper presents the comparison of two urban fire risk assessment methodologies, EBRAFire and Chichorro, in the block between Tiradentes Square, Senador Rocha Lagoa Street, Camego Veloso Travessa Cônego and Bobadela Street, located in the Center Ouro Preto History. The first methodology, developed at the University of Beira Interior, consists in giving the analyzed buildings a classification, based on fundamental parameters, observed in empirical events, technical and regulatory standards. The second methodology, developed at the University of Porto, is based on four global fire risk factors: probability of fire occurrence; total consequences of the fire; fire development and spread; and effectiveness of relief and fire fighting. The comparative assessment between the two methodologies showed discrepancies of fire risk degrees, however, conclusive considerations cannot yet be gauged due to the initial character of the research presented here. However, this incipient approach will provide insights to increase resilience in historic sites, as the most vulnerable areas will be identified and mitigation actions can be used before a fire occurs.

Keywords

Risk assessment methodology, risk management, fire, historic sites



Application Of Passive Architecture Concepts To The Proposed Community And Interpretative Center Of Marvila

Laura Sofia Mateus Conde, João Lanzinha

Abstract

Portugal, like the rest of Europe and North America, was affected by the great Industrial Revolution (1820-1840), thus becoming an industrial country.

This revolution has triggered over the years a huge population growth in big cities. It is thus estimated that by 2050 the percentage of city population exceeds 68% of the world's population. As a result of this growth, cities are becoming places with a higher concentration of water (liquid release), materials (solid waste) and energy transmission (CO₂ emissions), thus creating a significant increase in environmental pressures. These environmental pressures come mostly from the built environment, which is mainly responsible for CO₂ emissions on our planet.

This article intends to approach an efficient bioclimatic solution in architecture in a community and interpretative center, inserted in a city environment. The place to intervene is abandoned in the center of the parish of Marvila, one of the most typical neighbourhoods of the eastern part of Lisbon.

The application of efficient bioclimatic solutions in architecture in the proposed building aims to introduce concepts that achieve the goals of achieving low energy consumption, CO₂ emission reduction, passive architecture, harmony with the environment and a good connection with nature.

This article will possibly be relevant to those interested in a sustainable architecture.

Keywords

Energy efficiency, Environment, Passive Architecture



New index for sustainability in climate control - TWI (Total Water Impact)

Alexandre F. Santos, Pedro Dinis Gaspar

Abstract

Sales for air conditioning are growing rapidly in buildings, more than tripling between 1990 and 2016. This energy use for air conditioning comes from a combination of rising temperatures, rising population and economic growth. Energy demand for climate control will triple by 2050, consuming more energy than the United States, the European Union and Japan today. This increase in energy will directly impact water consumption, either to cool a condenser of equipment directly or to serve indirectly as a basis for energy sources such as hydroelectric power that feed into these HVAC systems. Knowing the unique and growing importance of water, a new index, Total Water Impact (TWI) is presented, which allows a holistic comparison of the impact of water use on water, air and evaporative condensation climate systems.

Keywords

Water cooled condenser, Air cooled condenser, HAVAC, Evaporative, TWI



Determination Of The Drag Coefficient Of A Autonomous Solar Lighting Column Using Wind Tunnel Simulation And Computational Analysis.

Vitor Hugo da Silva Dias, João Carlos Almendra Roque, Sérgio Manuel de Sousa Rosa, Francisco Augusto Aparecido Gomes, Carlos Alberto Rodrigues Andrade

Abstract

The Sun is the largest source of energy available and many studies for the development of technologies capable of harnessing this energy are constantly being conducted. Among the technologies developed are photovoltaic solar panels that have many applications and among them are the autonomous solar lighting columns that have been growing in popularity especially in urban and industrial environments. These columns are installed in open regions and have their structure exposed to the mechanical actions imposed by the wind, so they need to be correctly designed to support them. There are aerodynamic variables that must be determined for the design of these columns, especially the drag coefficient, a property linked to the geometry of a body, which represents its interaction with a flowing fluid. Due to the complexity of determining these variables, experimental methods are constantly used to obtain these values. Classically, wind tunnel simulations are used for this purpose, but they can be expensive and difficult to perform. Fluid dynamic computational analysis has been widely applied to replace physical analysis. In this work, the drag coefficient of an autonomous solar lighting column is determined by wind tunnel simulations and computational analysis. With the obtained results, a comparison is made to verify the fidelity of the data obtained by computational means when compared to those obtained through the wind tunnel simulations.

Keywords

Drag coefficient, Wind tunnel simulations, Computational Fluid Dynamic analysis, Autonomous solar lighting columns



ICEUBI2019 SESSION - 22

*Re-Architectures - The Industrial
Heritage*

ICEUBI2019





Art and industry. Reflections on the configuration of Donald Judd's specific objects

Pablo Llamazares Blanco, Jorge Ramos Jular, Fernando Zaparaín Hernández

Abstract

In the course of history, the resource to the industrial appears as a constant in the works of a whole series of artists, who seem to take it as a point of reference and inspiration in the configuration and development of their proposals. The movements of abstract expressionism and pop art in the United States, which positioned New York as the international capital of art after the end of World War II, laid the foundations for a new current, which would look again at the industry at a very early stage of its own manifestation. Donald Judd, as one of the most prominent artists of that new trend, which would be called minimal art, approached in the beginning of his artistic activity to that field of the industrial, determining some of the most important characteristics of his sculptural production and of the whole movement. With all this, the research tries to analyze the resource to the industry in the artistic creation carried out by Donald Judd, fundamental in the configuration of some of the most important ideas of his works, his specific objects.

Keywords

Donald Judd, industry, shape, material, space



Residential districts of the socialist realism period in Poland (1949-1956)

Zuzanna Napieralska, Elzbieta Przesmycka

Abstract

Architectural and urban projects in the countries of Eastern Europe after WWII were subordinated to political ideology, but also to the means of its implementation. The ideology of the communist party was realized through new forms of architecture and urban planning implemented in many war-ravaged and newly-built cities. This new, ideological architecture style was called socialist realism. The buildings of that period was to show the superiority of the new communist architecture over the modernist realizations of the interwar period. In many buildings, architectural solutions implemented were based on palace patterns, also numerous decorative elements, typical of Classicist architecture, were applied, enriched with themes of national architecture style. The urban systems created monumental spatial arrangements, often connected with industrial plants - steelworks, factories. The article will present chosen examples of housing estates complexes realized in socialist realism period in Poland (1949 - 1956).

Keywords

Housing Estates, Urban Planning, Socialist Realism, Postwar architecture, Polish Architecture

Time and Project

Eusebio Alonso

Abstract

This text considers the need to understand the present as part of a temporal current, which becomes more apparent, than not exclusive, when we have to work architecturally in consolidated places and our actions must enter into dialogue with the forms and landscapes inherited from the past. The ruins are a case of special intensity in relation to this. The act of projecting contains by definition a temporal dimension, projecting is thinking and designing the future but, in turn, involves knowing the starting point and its past. Each project establishes its implementation of time and articulates the relevant formal strategies to design the processual and contingent condition that alludes to the idea of time as a shaping action. They are architectural strategies that use the time as a project tool. Time leaves footprints that predispose the memory; they are links between before and after that allow articulating certain continuity, physical and conceptual, formal and temporal, between different structures and thus finding a sense of order in the place.

Keywords

time, project, fragment, simultaneity, tool



VALLADOLID STATION LOCOMOTIVES DEPOTS

Eduardo Miguel González Fraile

Abstract

The Valladolid Locomotive Depot is the most important building in the entire station from the point of view of the architectural avant-garde. It is horseshoe-shaped (fer de cheval), with two 12 m diameter rotating platforms (which economize maneuvers and costs, as well as preventing breakdowns) configuring itself as a new type that will be imposed immediately on those of semi-circular or circular geometry. In 1865 Perdonnet commented in his Treaty of Railways the new type as a recent and avant-garde discovery, when in Valladolid it was already built two years earlier. The building is also structurally innovative, as it is the first building with steel structure (19 m Polaneau truss) built in Valladolid station, to prevent such frequent fires in locomotive tanks if the structure was made of wood. On the other hand, Ricour manages to impose the most recognized and essentialist figuration of railway architectural language. Since it does not need to make any emblematic formal element, the designer adheres to the constructive and tectonic logic. Half-point arches for massive walls, pilasters supporting trusses, fine-tuned section steel parts, clear and continuous gap references, constructive coronation of the faces, transparency of the carpentry based on profuse very thin partitions and, finally, face walls of powerful expressionist character (the arches are deformed according to the general profile) are the most outstanding and invariant characteristics of this building and from which they subsequently resume such language.

Keywords

Machine Depot, railway, industrial architecture, locomotives, architectural project



Intervention On Industrial Heritage in Canal de Castilla: The Alar Del Rey Peak Warehouse as a Visitor Reception Center

Miriam Ruiz Íñigo

Abstract

The Canal de Castilla was an ambitious hydraulic project that emerged in the mid-eighteenth century in response to the problem of isolation of the villages located on the Castilian plateau and its inability to trade with cereal surpluses. The construction process was convulsive and developed over almost a hundred years and its period of splendor was short since almost at the time of finishing its route it became obsolete compared to the advantages offered by the newly released railway, much faster and efficient. However, with the perspective of time, the Canal showed an ability to adapt to changing reality, becoming essential infrastructure when understanding the life of the inhabitants of Tierra de Campos. In this context, the processes of recovery and rehabilitation of industrial heritage linked to the banks of the Canal, whose buildings are in various stages of deterioration, arise. These actions are a sample of the sensitivity that both the administration and private developers are showing towards this type of heritage. In 2009 the Consortium for Tourism Management of the Canal de Castilla summons seven architectural studies to a restricted competition to condition the Nave de Picos de Alar del Rey as a Visitor Reception Center. The winning proposal, from the study of Juan Carlos Arnuncio, resolves the program by establishing a clear contrast between the elements that generate the support spaces and those that define the main functions requested in the bases. The reflections on which the project is articulated form part of a broader line of thinking that will crystallize in the Plays exhibition held at the Patio Herreriano Museum of Contemporary Art of Valladolid in 2013 that is based on formal speculations about projects - built or not built- developed in the study until that date.

Keywords

Industrial heritage, warehouse, Canal de Castilla, Tierra de campos, restoration



Reuse of post-industrial architecture. The value of modern heritage

Jessica Pino Espinosa

Abstract

Industrial landscape involves the interaction of various complementary integrating elements of a manufacturing landscape that are perceived as a coherent and powerful scenario in a context of synthesis. This landscape typology very common today, is ignored and sometimes despised, despite having an undoubted architectural, urban, environmental, cultural and visual interest. A progressive collective sensitization is necessary to appreciate its intrinsic qualities. In this way it can not only be accepted but even admired. Transformation of industrial landscapes is currently booming due to the accelerated growth of recent years and the current crisis that forces abandoning the recovery plans of the old industries. Turning the industrial space into real garbage dumps for imminent disappearance due to lack of resources for its conservation, reuse or conversion. Most of the actions require strong investments, especially when the facilities present a high degree of abandonment and deterioration that currently cannot be allowed. A frequent problem is how to treat large industrial sites due to their large size and at the same time they lack the interest aroused by other architectures. In addition, not all strategies start from returning to a natural landscape, this time transformed by the hand of man, to solve the problem. They are exhausted mechanisms that in many occasions do not solve the problem. It is necessary to look for a new form of landscape integrating the old factories with natural elements and elements that are necessary for the city.

Keywords

reuse, industrial, architecture, heritage, landscape



ICEUBI2019 SESSION - 23

*Aircraft and Spacecraft
Engineering - 2*

ICEUBI2019





A study of the magnetic field inside the discharge chamber of an ion thruster

Diogo Abranches, Francisco Brojo

Abstract

One of the characteristics that ion thrusters are known for is its high efficiency. In the process of designing an ion thruster the study of the magnetic field alongside the discharge chamber is crucial to achieve optimal efficiency. This work shows the importance of taking into consideration the materials in the vicinities of the magnets as well as the expected intensity of the magnetitic field inside the thrusters in study. The procedures used to study the magnetic field in the open software used are described in this work. The thruster in study is an oversizing done of a previous one, so the desired results are to obtain the ones obtained for the original engine.

Keywords

Ion thruster, High efficiency, Magnetic field



Designing an Eddy Current Brake for Engine Testing

Alexandre José Rosa Nunes, Francisco Miguel Ribeiro Proença Brojo

Abstract

An Eddy Current Brake (ECB) has several advantages making it suitable for using in a dynamometer for testing engines. In this paper, a model is presented which considers the electromagnet's core saturation to predict the performance of an ECB. A design is then proposed for a dual coil, single rotor ECB that meets the design requirement to dissipate a power of 30 kW at 3000 rpm. A comparison between the results obtained for a few different materials considered to be used in the rotating disc are also presented.

Keywords

Antimagnetic Force, Dynamometer, Eddy Current Brake, MATLAB Model



Development of a Modular Controller to Minimize Current Ripple in Low Inductance Coreless Permanent Magnet Motor

Jorge Miguel Guedes Rebelo, Miguel Ângelo Rodrigues Silvestre

Abstract

In this paper, a development of a modular controller to minimize current ripple in a low inductance coreless permanent magnet synchronous motor (CPMSM) is described. Based on individual modules, the controller uses a 60 degree commutation scheme instead of the conventional 120 degree. The neutral point of the motor's windings is connected to an intermediate voltage level provided by a capacitor bank relative to the DC power bus. This feature allows the utilization of a single current sensing point that is used to regulate the motor's torque by hysteretic current level control. With this simplification of the control strategy it was possible to use a single Programmable Logic Device (PLD) to implement all the processing in the controller. The controller was built and tested, and the results showed efficient and smooth operation of the motor.

Keywords

current ripple, permanent magnet motor, low inductance



Prediction of pollutants emissions in a CFM56-3 combustor, using large eddy simulation

Inês Isabel Ascensão Costa Morão, Francisco Miguel Ribeiro Proença Brójo

Abstract

In the present work a CFD simulation was performed using a CFM56-3 combustor. It was intended to simulate the combustion and emission of pollutants (CO_2 , CO, UHC and NO_x) from the different jet fuels (Jet A, Jet B and TS-1), when burning these through ICAO's LTO cycle. Being this a continuity study, the CAD model of CFM56-3 made by Oliveira [5] was used. The mesh was constructed with HELYX-OS software and the numerical study was made using the commercial software ANSYS Fluent 16.2. It can be concluded, amongst all the fuels simulated that increasing the power produces higher NO_x . There was also an erratic behaviour in the emissions of UHC and CO results, because an empiric model was used and not a detailed chemical model.

Keywords

Jet Fuels, ANSYS Fluent, Pollutants emissions, ICAO's LTO cycle, CFM56-3



Theoretical Analysis of Ammonium-Perchlorate Based Composite Propellants with RDX Containing Small Size Particles of Beryllium

Paulo Alexandre Rodrigues de Vasconcelos Figueiredo, Francisco Miguel Ribeiro Proença Brojo

Abstract

Rocket engines have been developed for at least the last six decades. There is a need to improve the actual solid propellant grain for rocket engines through the addition of metallic fuels in the mixture as well as the addition of energetic binders to stabilize the combustion.

The rocket industry expects the launchers to be reliable, to be faster, stable and to have longer times of operation for the most possible payload weight (operational envelope). New propellants should have optimized ignition and combustion time rates reducing the possibility of negative oxygen balance thus reducing detonation process. Deflagration process should be optimized for best performance of the rocket.

In this evolution, small quantities of explosives have been used in the propellant in order to increase the operational burning time, hence, the specific impulse. Adding metallic fuels such as aluminum, boron or beryllium on double based composite propellants and ammonium perchlorate are expected to increase the propellant density over chemical stability and aging resistance. The study of heterogeneous propellants containing large amounts of fine beryllium and ammonium perchlorate, it is necessary to understand the combustion products so to a proper evaluation of specific impulse, Mach number and mass flow of the mixture. In this study a mixture with nitramides (RDX - Cyclotrimethylene trinitramide) and ammonium perchlorate was analyzed with and without the addition of small size particles of beryllium using a numerical algorithm. Therefore, this study relates the influence of beryllium in the performance parameters of ammonium perchlorate based composite propellants.

Keywords

Propellant, Rocket engine, RDX, Ammonium perchlorate



Thermal Experiments for validation of 3-AMADEUS CubeSat

Daniel Carvalhais, Paulo Figueiredo, Miguel Machado, André Guerra, Francisco Brójo

Abstract

There has been an increasing interest in CubeSats missions due to its small size, low cost and flexibility to accommodate different payloads. It enables CubeSats to perform a range of various missions. One of the causes of failure in a satellite in space are the temperature peaks suffered during a full orbital cycle. Therefore, proper thermal control system design and test should be performed to guarantee the reliability of a spacecraft prior to launch. The present work aims to analyze the main heat transfer processes within a satellite to validate the 3-AMADEUS CubeSat and current methodologies used by CEiiA for nano and micro satellites. Hence, with the purpose of developing thermal models with higher reliability, an experiment was devised to be performed in a controlled environment. The experimental test consists in a study of the heat exchange between two aluminum plates through radiation, using infrared lamps as heat source. Three distance configuration and two lamp types are tested. This would emulate the heat transmission between different components within the satellite. The view factors are changed. In parallel, a finite element software (MSC Nastran) is used to carry out a numerical study of the same experiments. The temperature distribution results of both numerical and experimental solutions are then compared, and the results are discussed.

Keywords

Radiation, View Factors, Experimental



ICEUBI2019 SESSION - 24

*Information Systems Engineering -
2*

ICEUBI2019





Mobile Cloud Computing - Building High Availability Applications

Paula Prata, Euclides Catumbela

Abstract

Mobile Computing seems to spread to all aspects of our life, from light entertainment to health or finance apps. Cloud services appear as the common solution to be used as backend of mobile applications. In complex applications the cloud can even be used as an additional computational resource. Mobile cloud computing applications raise new reliability and availability challenges that result namely from the device mobility and from the limited battery charge. In this work, fault tolerant mechanisms for connection problems and for low battery charge are proposed and studied. The execution time overhead of those mechanisms is evaluated and compared with the offline support existent in two common cloud platforms: Firebase and Azure.

Keywords

Mobile computing, Cloud computing, BaaS, Fault tolerance, Availability



Placement of Controllers in Software Defined Networking Under Multiple Controller Mapping

Mohammad Ashrafi, Faroq AL-Tam, Noelia Correia

Abstract

This work focuses on the placement of controllers in software-defined networking architectures. A mathematical model is developed to place controllers under multi-controller switch-controller mapping, where a switch can be assigned to multiple controllers. Resiliency, scalability, and inter-plane latency are all modeled in the proposed model. A scalability factor is introduced to increase the load to capacity gap at controllers, preventing controllers to work near their capacity limit. The proposed model is shown to be effective and resilient under different failure scenarios while, at the same time, taking latency and scalability into consideration.

Keywords

Controller Placement, Software-defined Networking, Reliability, Scalability, Multiple Mapping



Usability heuristic evaluation in AAL ecosystems

Carlos Romeiro, Pedro Araújo

Abstract

In the past few years there has been a significant growth of the elderly population in both developing and developed countries. This event provided new economic, technical and demographic challenges to current societies in several areas and services. Among them the healthcare services can be highlighted, due to its impact in people daily lives. As a natural response an effort has been made by both the scientific and industrial community to develop alternatives, which could mitigate the current healthcare services bottlenecks and provide means in aiding and improve the end-user life quality. Through a combination of information and communication technologies specialized ecosystems have been developed, however multiple challenges arose, which compromise their adoption and acceptance among the main stakeholders, such as their autonomy, robustness, security, integration, human-computer interactions and usability. As consequence an effort has been made to deal with the technical related bottlenecks, which shifted the development process focus from the end-user to the ecosystems technological impairments. Despite there being user related issues, such as usability, which still remains to be addressed. Therefore this article focuses over the ecosystem's usability through the analysis of the process used to check the ecosystem's compliance level with the usability guidelines from Jakob Nielsen and Shneiderman; and the identification of the quantifiable parameters for each principle that could aid in the heuristics evaluation process by maximizing its objectivity improve its overall accuracy.

Keywords

Usability, Ambient Assisted Living, User interaction, Older people, Heuristics analysis

Performance Investigations of IEEE 802.11 a 54 Mbps WPA2 Laboratory Links

José A. R. Pacheco de Carvalho, Claudia F. F. P. Ribeiro Pacheco, Antonio D. Reis, Hugo Veiga

Abstract

The increasing importance of wireless communications, involving electronic devices, has been widely recognized. Performance is a fundamental issue, resulting in more reliable and efficient communications. Security is also crucially important. Laboratory measurements are presented about several performance aspects of Wi-Fi IEEE 802.11a 54 Mbps WPA2 point-to-point and four-node point-to-multipoint links. Our study contributes to performance evaluation of this technology under WPA2 encryption, using available equipments (HP V-M200 access points and Linksys WPC600N adapters). New results are given from TCP and UDP experiments concerning TCP throughput versus TCP packet length, jitter and percentage datagram loss versus UDP datagram size. Comparisons are made to corresponding results for Open links. Conclusions are drawn about the comparative performance of the links.

Keywords

Wi-Fi, WLAN, IEEE 802.11a, Wireless Network Laboratory Performance, Multi-Node WPA2 Links



ICEUBI2019 SESSION - 25

*Modeling and Validation
Engineering*

ICEUBI2019





Matlab® algorithm to simulate the dynamic behavior of an NiTi alloy through Ansys® APDL™ models

Jean César Hilário, Manuel Braz-Cesar, Carlos Andrade, Adailton Silva Borges

Abstract

In recent years, technological advances related with the so-called intelligent materials have been exploited for problem solving in many engineering fields. In this regard, shape memory alloys (SMA) seem suitable for medical and engineering applications and many others. These alloys have the ability to return the original form after an apparently plastic deformation by applying heat and the also ability to perform phase changes with voltage variations under a specific temperature. These properties allow the development of a hysteretic loop with energy dissipation, which can be used as a damping element in a vibratory system. In this paper, a MATLAB algorithm was developed to create an interface with the Ansys® APDL™ software that simulate the dynamic behavior of a SMA. The software is capable to obtain the cyclical behavior of a vibratory mechanical system based on the energy dissipation properties of the SMA. The results shown that the free vibration of a mass-damper (alloy) system presents the energy dissipation related in magnitude with the area of the hysteresis loop until the deformation caused by the motion which does not correspond to a voltage required to initiate the (direct) phase transformation of the material, thus reducing the displacement to a constant level.

Keywords

SMA, ANSYS APDL™, Matlab



NUMERICAL ANALYSIS OF LOAD DISTRIBUTION IN JOINT LINES WITH PUNCHED METAL PLATE FASTENERS

Lucas Paiva, Manuel Braz-Cesar, Miguel Paula

Abstract

Wood trusses with traditional bolted or nailed connections are generally modeled as pinned joints, and the forces on the wood members are directly transmitted to the connections by shear plane contact. Other methodologies recommend that the analysis should be done more rigorously, taking into account the wood behavior and the evaluation of stress distribution within the connection area. There's a wide range of related data to pin-type connections, but the mechanical analysis of punched metal plate fasteners (nail plates) is still under development. Nail plate connections are capable of transfer moments, therefore, appropriated modeling should be applied. The present paper compares two methodologies for the stress distribution in the rupture lines of nail plates, using an analytical approach and a numerical method with the commercial software Midas/Gen. The results shows a quantitative parity for the proposed analytical model in the case of a single joint line, but the stresses diverge in both methods for zones that presents more than one joint line.

Keywords

Timber, Nail plate, Structural analysis



Parametric Study of Lateral Loaded Piles by Computational Modeling

Giovani Augusto Noquelli Lombardi, António Miguel Verdelho Paula, Manuel Teixeira Braz César

Abstract

Since soils are heterogeneous materials and the survey methods are based on insufficiently representative soil samples, there are several variables involved and less reliability in estimating the load capacity of the structures. So that, it is necessary to keep verifying the validity of stress and displacement method analysis in order to achieve results with more precision. In this sense, the objective of this study was to develop a two-dimensional computational analysis of the axial and transverse (simultaneous) loading effects on isolated, bored and reinforced concrete piles. In addition, different types of soil, piles dimensions, soil stratigraphy, drainage conditions and soil mechanical parameters were considered as variables of this study. Thereby, the axial load capacity of piles was verified by the method of NAVFAC DM 7.2, the settlement by the methods of Poulos & Davis (1980) and Masopust (1994), and the distribution of horizontal forces and displacements by the p-y method, based on the horizontal reaction modulus obtained from the theoretical approaches by Bowles (1997), Vesic (1977), CSN 73 1004, Pochman & Simek (1989) and Matlock & Reese (1956). Regarding to the distribution of lateral stresses and displacements by the p-y method, no interference on results was observed due to change of friction angle, cohesion, coefficient of lateral earth pressure and soil drainage conditions. In addition, it was concluded that the horizontal forces and displacements are more dependent on the diameter than the length of piles.

Keywords

Computational analysis of piles, Lateral loading, Distribution of horizontal stresses, Distribution of lateral displacements



Performance evaluation of active and non-active electrodes for doxorubicin electro-oxidation.

Eric de Souza Gil, Emily Kussmaul Gonçalves Moreno, Luane Ferreira Garcia, José Joaquin Linares León

Abstract

Introduction: Electrochemical remediation is an innovative technique that utilizes electro-oxidation reactions to degrade micropollutants such as doxorubicin (DOX) that is a drug widely used to treat many types of cancer, and it is present in hospital effluents.

Objetives: The aim of this work is to evaluate the efficiency of active and non-active electrodes in DOX degradation during electrochemical treatments.

Methods: AuO-TiO₂@graphite, a nanostructured electrode and BDD, a commercial electrode were used as active and non-active electrodes, respectively. DOX treatments were realized at concentration of 1.25 mmol L⁻¹ in medium with 10 mmol L⁻¹ NaCl as support electrolyte. Studies were realized in 5 V of voltage source.

Results: The treatment of DOX with BDD promoted 100% of DOX degradation in 20 min, while the same result was obtained for the AuO-TiO₂@graphite in 40 min of treatment. Also, the modified electrode presented an energy expenditure of 1.12 kWh m⁻³ and the BDD achieved 0.462 kWh m⁻³.

Conclusion: Thus, the active and non-active electrodes were efficient to promote DOX degradation, and the BDD, the non-active electrode demonstrated a better performance.

Keywords

electro-oxidation, modified graphite anodes, BDD, doxorubicin, micropollutants



A mixed experimental-numerical energy-based approach for fatigue life assessment in notched samples under multiaxial loading

R. Branco, F. Nogueira, D. Costa, P. Prates, V. Antunes

Abstract

This paper presents a methodology to predict the fatigue lifetime in notched geometries subjected to multiaxial loading on the basis of the cumulated strain energy density. The modus operandi consists of defining an energy-based fatigue master curve that relates the cumulated strain energy density with the number of cycles to failure using standard cylindrical specimens tested under low-cycle fatigue conditions. After that, an elastic-plastic finite-element model representative of the material behaviour, notched geometry and multiaxial loading scenario is developed and used to account for the strain energy density at the crack initiation site. This energy is then averaged using the Theory of Critical Distances and inserted into the energy-based fatigue master curve to estimate the lifetime expectancy. Overall, the comparison between the experimental and predicted fatigue lives has shown a very good agreement.

Keywords

multiaxial fatigue, fatigue life prediction, strain energy density



Qualitative approach for assessing runoff temporal dependence through geometrical symmetry

Santiago Zazo Del Dedo, Hector Macian-Sorribes, Cristina María Sena Fael, Ana-María Martins, Jose-Luis Molina, Manuel Pulido-Velazquez

Abstract

Currently, noticeable changes in traditional hydrological patterns are being observed on the short and medium-term. These modifications are adding a growing variability on water resources behaviour, especially evident in its availability. Consequently, for a better understanding/knowledge of temporal alterations, it is crucial to develop new analytical strategies which are capable of capturing these modifications on its temporal behaviour. This challenge is here addressed via a purely stochastic methodology on annual runoff time series. This is performed through the propagation of temporal dependence strength over the time, by means of Causality, supported by Causal Reasoning (Bayes' theorem), via the relative percentage of runoff change that a time-step produces on the following ones. The result is a dependence mitigation graph, whose analysis of its symmetry provides an innovative qualitative approach to assess time-dependency from a dynamic and continuous perspective against the classical, static and punctual result that a correlogram offers. This was evaluated/applied to four Spanish unregulated river sub-basins; firstly on two Douro/Duero River Basin exemplary case studies (the largest river basin at Iberian Peninsula) with a clearly opposite temporal behaviour, and subsequently applied to two watersheds belonging to Jucar River Basin (Iberian Peninsula Mediterranean side), characterised by suffering regular drought conditions.

Keywords

Causal Reasoning, Theorem of Bayes, Temporal dependence propagation, Runoff time series, Water resources management



ICEUBI2019 SESSION - 26

Urban Planning

ICEUBI2019





A typology of facade in the churches of S. Miguel (1728-1882)

Maria Antonia Rocha Vieira, Mafalda Teixeira de Sampayo, Paulo Miranda

Abstract

The religious spaces are carriers of great symbolic importance, standing out in the urban fabric not only for their location, but also for their scale in relation to the surrounding buildings. We show the relevance of the religious space in the S. Miguel island (Azores) urban fabric, where the church presents itself as an element of great importance. It is the generator of urban fabric, and it is usually strategically located as a landmark of the civic center of the localities. This study presents an analysis of the main facades of the parish churches of the island of S. Miguel built during the eighteenth and nineteenth centuries. It highlights the existence of a typology of facade, which is a consequence of the materials and building systems existing there at the time. This demonstration continues the studies carried out by Sousa (1986) with the concept of facade Micaelense baroque ornamentation and Caldas (2012) with the concept of Micaelense baroque facade and Micaelense type facade. Methodologically, the investigation was carried out through the analysis of the elements that make up the facades of the parish churches, the study of old and current photography, and drawings made in CAD; and the systematization of facades by grouping them into categories and establishing a typology between the various churches of the eighteenth and nineteenth centuries.

Keywords

Religious architecture, Facades, S. Miguel



SHARED SPACES IN CITIES OF POLAND

Andrzej Zalewski

Abstract

The aim of paper is a presentation an idea of shared space in the cities and results of implementation of this solution in the cities of Poland. The methodology of elaboration consisted of carrying out a review of the literature, comparing existing solutions and formulating conclusions regarding implementation. This trend, which has appeared over the past 50 years as a counterbalance to the pedestrianization of public spaces, is at the beginning of the 21st century experiencing its second youth and is being implemented in many areas in intensive urban development, especially in urban centers and areas of historic character. Shared space solutions are an integral way of shaping functions and forms of revitalized public spaces. These solutions contributes to improving the quality of public space and traffic safety, revitalizing social life, improving and reducing the environmental nuisance caused by traffic and finally created liveable city. Analyzes effectuated indicate, that in central areas of cities in Poland whose spatial arrangement is legally protected, the forms of shared spaces solutions are strongly influenced by strong conservation restrictions in these areas. This means the need to respect existing historical conditions in shaping public spaces, as well as limited transformation possibilities. The Polish solutions of shared spaces presented in this paper of in their forms and quality do not differ from the standard functional solutions abroad. Solutions implemented in the Polish conditions, however, are more modest in terms of materials and implemented in a smaller number than is the case in Western European countries.

Keywords

shared spaces, traffic calming, cities of Poland, creation of public space



The evolution of the urban form of the Plateau in Praia, Cape Verde

Felisberto Cortês, Soraya Genin, Mafalda Teixeira de Sampayo

Abstract

An analysis of urban morphology of the historical nucleus (the Plateau) of Praia (Cape Verde) highlights the process of thinking and making a city expressed in António de Lencastre's plan and its further development. For this, the processes of urban transformation occurring over time in the Plateau are shown.

The methodology used for this urban analysis allowed an understanding of the intervention process on the Plateau through an interpretative analysis of morphological evolution obtained from: i) a detailed identification of cartography; ii) a comparative morphological analysis of urban development based on old and current cartography; iii) a vectorization of the maps through scale normalization (the letters were overlapped with the 2018 chart); iv) an identification of public buildings and public spaces; and v) a quantification of the elements of urban form. In the quantification of the elements of the urban form, the reading and interpretation of the different maps is synthesized through analytical drawings and tables.

Keywords

Praia, Cabo Verde, Plateau, Urban Form



AUTOMATIC SYSTEM TO CONTROL THE ANISOTROPY OF LYOCELL FELTED WEBS

Nuno José Ramos Belino, Mário Figueiredo Nunes, Paulo Torrão Fiadeiro

Abstract

The webs produced using a card as former system generally keep the fiber orientation. This effect is not very important for a great number of applications. But if an even pore distribution is necessary or the mechanical properties are to be uniform in all directions, then this system doesn't work very well. Taking into account these considerations, a new technological solution has been specifically devised to control the fibre orientation during the drafting operation in pre-needed felts. A prototype is used as drafting unit with the rolls driven by stepper motors and controlled by computer. Two video cameras collect images of the surface of the web, before and after the drafting operation, and process them in a computer. The values of the images textural descriptors, are calculated and compared. It is intended an increase in entropy which means that the web become less ordered and this is the situation we are aiming for. A computer program will adjust automatically the speed and pressure of the drafting cylinders so as to achieve the best possible situation in terms of the isotropy of the final product and, consequently, MD:CD ratio close to 1.

Keywords

Anisotropy, Nonwoven felts, Image analysis, Textural descriptors., Estiragem



ICEUBI2019 SESSION - 27

Water and Safety

ICEUBI2019





SAFETY EVALUATION IN THE STORAGE OF CHEMICALS FROM A WATER TREATMENT PLANT

Andreia Cristina Fonseca Alves, Samara Silva Soares, Paulo Sérgio Scalize

Abstract

Most water treatment technologies for human consumption use chemicals to provide potable water to the population and to prevent the occurrence of occupational accidents, it is essential to comply with relevant legislation that addresses both design issues and the operation of storage environments and handling of hazardous products. The objective of this work was to evaluate the safety in the storage of chemicals used in a Water Treatment Plant (ETA). A technical visit to ETA was carried out to evaluate the current state of storage of the same through the application of checklists based on the current legislation. The chemicals identified in ETA were aluminum sulfate, chlorine gas, sodium hypochlorite, calcium hydroxide, fluorsilicic acid etotopolyphosphate. In relation to Technical Standard 32/2014 of the CBMGO, ETA served 94.1% of the items applied and 72% in relation to ABT NBR 12216/1992. In general, the ETA under study presents safety conditions in the storage of chemicals, however with deficiencies and failures in some points in what is an optimized layout, where you can separate inventory activities, prepare solutions and dosages allowing a better productivity, and better mobility in emergencies

Keywords

Water Treatment, safety, Chemicals



THE INFLUENCE OF THE NATURE OF DIFFERENT SANDS ON THE RHEOLOGICAL AND MECHANICAL BEHAVIOR OF SELF-COMPACTING CONCRETES

Baali Laid, Larbi Belagraa, Zeghichi Leila, Benhamouda Abdelhakim

Abstract

Self-compacting concretes represent a new advance for concrete construction because they offer many advantages from the economic, technical and social point of view. They are very fluid concretes, which are put in place without vibration. When pouring into a formwork, tightening a BAP is ensured by the simple effect of gravity. Thanks to their formulation, they offer exceptional flow characteristics and filling formwork while resisting perfectly segregation. Homogeneous and stable, they have resistances and durability similar to those of traditional concretes of which they are differentiated by their properties in the fresh state. The use of self-compacting concrete reduces the noise nuisance, as well as the hardness of the work.

This research work is part of a policy of contributing to the improvement of the properties of self-compacting concretes prepared from local materials in the M'sila region. In this study, we are interested in obtaining the most suitable concrete formulation for the different local materials of the M'sila region.

Our study is directed towards the effect of the following parameters on the physico-mechanical properties of the composite such as: dynamic segregation, spreading diameter as well as mechanical strengths (compression, traction). It is therefore a question of determining the criteria to be imposed on these parameters, in order to lead to the construction of a self-compacting concrete characterized by an acceptable resistance.

Keywords

SCC,, Rheological Behavior, Mechanical Resistance, Binder, Binder



Future land-use and land-cover scenarios for mapping flood-prone areas in Pato Branco city, Brazil

Isabel Dalanhol, Ney Lyzandro Tabalipa, Flora Cristina Meireles Silva

Abstract

Urban flooding is the most common type of disaster and the one that hit people most. Unplanned urbanization processes increase the recurrence of these events due to soil impermeabilization. Thus, land-use and land-cover is an important factor for urban flood research. Besides, mapping flood-prone areas has been an alternative for disaster prevention and urban planning. However, the use of future land-use and land-cover scenarios for flood mapping is a factor that still requires investigation. The study that is being developed by the authors of this paper aims to identify flood-prone areas in the upper third of the Ligeiro River basin in the city of Pato Branco, Parana, Brazil. For this purpose, this research makes use of the GIS-AHP integration, considering a current scenario and future land-use and land-cover scenarios. Therefore, the objective of the present study is to construct possible land-use and land-cover scenarios, according to municipal legislation, that could serve as a basis for mapping flood-prone areas. Two scenarios were built using Geographic Information Systems software. This tool proved to be efficient in the elaboration of maps and land representation. Pato Branco already has a history of flooding with the current scenario of land-use and land-cover. With future land-use and land-cover scenarios, it is possible to verify the influence of urban sprawl on urban flooding.

Keywords

Land-use and land-cover (LULC), Floods, Geographic Information Systems (GIS), Analytic Hierarchy Process (AHP)



Impact of reservoir level control on energy production in a water distribution system

Ronald Faleiro Bastos, Fernando Manuel Bigares Charrua Santos, Antônio Eduardo Vitória do Espírito Santo, Ana Rita Carriço Silva

Abstract

The effects of greenhouse gas emissions and increased energy consumption have led humanity to develop renewable energy technologies and to re-evaluate clean energy sources, leading to a more sustainable future. A simple and less expensive alternative is the use of commercial reverse mode water pumps used as hydraulic turbines. Pump-as-Turbine (PaT) technology has been analyzed in different applications in the context of mini-hydro plants or energy recovery systems. Such machines can be installed in water distribution networks, taking advantage of the gap between the distribution reservoirs to produce electricity.

One of the main benefits of PaT is meeting the electricity demand in farms or isolated regions, as can be seen in some situations of water collection and distribution, which are not met by the public power grid.

Due to its design, the efficiency of a PaT is known to be lower than a conventional hydraulic turbine installation, but the relative costs associated with purchasing a commercial pump are considerably lower than those of a hydraulic turbine.

This case study will evaluate the specific installation of a PaT to predict the technical results between two water distribution reservoirs in the city of Covilhã - Portugal. The importance of this study is to show the technical details involved in this type of installation, as well as its potential for positive impact on society, adopting the concept of living laboratory.

This case study is prepared as part of the international collaborative research project EdGeWiSe - Energy and Water Systems Integration and Management, whose main line of research is the contribution to the integration of water and energy systems into a single highly efficient system.

Keywords

Water-energy nexus, Renewable energy, Pump as Turbine



ICEUBI2019 SESSION - 28

Telecommunications

ICEUBI2019





Coder and Decoder of Block 3B4B with Auxiliary Channel

Antonio D. Reis, Jose F. Rocha, Atilio S. Gameiro, Jose P. Carvalho

Abstract

This work presents the coder and decoder of block 3B4B with auxiliary channel. The coder 3B4B converts an input 3 bits word in an output 4 bits word. It transmits an equal number of 1's and 0's to provide a DC constant component. It increases the transitions number, improves the system quality and security. The objective is also to improve the system potentialities with an auxiliary channel to monitor the communication (alarm). The main channel is real, but the auxiliary channel is fictitious.

Keywords

Block codes, digital systems, transmission lines



Coder and Decoder of Block 7B8B Simplified with Auxiliary Channel

Antonio D. Reis, Jose F. Rocha, Atilio S. Gameiro, Jose P. Carvalho

Abstract

This work presents the coder and decoder of block 7B8B simplified with auxiliary channel. The coder 7B8B converts an input 7 bits word in an output 8 bits word. It transmits approximately an equal number of 1's and 0's to provide a DC constant component. It increases the transitions number, improves the system quality and security. The objective is also to improve the system potentialities with an auxiliary channel to monitor the communication (alarm.) The main channel is real, but the auxiliary channel is fictitious.

Keywords

Block Codes, advanced digital systems, transmission lines



Performance Evaluation of IEEE 802.11 ac WPA2 Laboratory Links

José Pacheco de Carvalho, Hugo Veiga, Cláudia F. F. P. Ribeiro Pacheco, António D. Reis

Abstract

The increasing importance of wireless communications, involving electronic devices, has been widely recognized. Performance is a fundamental issue, resulting in more reliable and efficient communications. Security is also crucially important. Laboratory measurements are presented about several performance aspects of Wi-Fi IEEE 802.11ac WPA2 point-to-point links. Our study contributes to performance evaluation of this technology under WPA2 encryption, using available equipments (Cisco 2702i access points and TP-Link AC1900 USB 3.0 adapters). New results are given from TCP and UDP experiments concerning TCP throughput versus TCP packet length, jitter and percentage datagram loss versus UDP datagram size. Comparisons are made to corresponding results for WPA2 802.11n. Conclusions are drawn about the comparative performance of the links.

Keywords

Wi-Fi, WLAN, IEEE 802.11ac, Wireless Network Laboratory Performance, Point-to-Point WPA2 Links



ICEUBI2019 SESSION - 29

*Industrial Engineering and
Management - 2*

ICEUBI2019





Lean Banking application to identify wastes in the credit process: Case Study Banco de Poupança e Crédito (Angola)

Agostinho Alberto, Tânia M. Lima, Fernando Charrua-Santos

Abstract

In general, all companies aim to reduce costs, maximize the use of their resources and optimize production. Angolan companies are no exception, and these goals have gained greater urgency in the context of the economic crisis, which the country is facing. The Lean philosophy principles aim to reduce wastes within an organization, thus contributing to the optimization of production processes. The flexibility of Lean tools allows them to be applied in any business sector and in companies of any size. They are therefore a good tool to achieve these business goals in an efficient and systematic manner. There are cases of successful application of Lean principles in the banking sector, in this case called Lean Banking, which may be replicated in other companies in the sector. This case study consisted of an analysis of the bank credit management process in a branch of the Bank of Savings and Credit (BPC) in Angola, with the objective of proposing measures to optimize this process, supported by the application of Lean Banking.

Keywords

Lean Banking, Lean Principles, Angolan Banking, Services Optimization



Model to estimate the project outcome´s likelihood based on social networks analysis.

António Abreu, Marco Nunes

Abstract

One of the Key Challenges in the area of Project Management, is definitely, how to set up the best Project Team, regarding several key areas, such as; team experience, flexibility, engagement, know-how, and intra and cross-collaboration, so that Project Success Outcome can be achieved. Such best Project Team is definitely very difficult, if not extremely hard to define, especially when it comes to intra and cross-collaboration matters, where in projects environment, implies an extreme dynamic interaction between project people, throughout all the phases of a project lifecycle. Forecasting, to the possible extent, how that people dynamic´s interaction is a critical factor that can contribute to dictate how a project outcome will look like, is becoming a major concern for Risk Management, in Project Management. In this line of thought, the present work aims to further contribute to this particular area of Risk Management, in Project Management, by exploring a new analysis approach, where it points out its focus towards project People, and how the dynamic interaction of project people, that delivers a project, across its lifecycle, influences or not, a certain project outcome type (failure or success). To provide answer to this question, a heuristic model based on three scientific field pillars (Project Management, Risk Management, and Social Network Analysis Theory), is proposed in this work, which aims to identify a set of critical factors, regarding hoe people dynamically interact across the different phases of a project lifecycle, that are to be associated with project success, and project failure outcome.

Keywords

Project Management, Risk Management, Social Networks Analysis



Passengers comfort perception and demands on railway vehicles: a review

Patrícia Filipa Pinheiro da Silva, Joaquim Mendes

Abstract

Trains are becoming a popular way of transportation driven by comfort and ecology reasons. Latest statistics showed an increasing of 40% on the number of passengers in the last decade. The development of new high-speed trains promoted an evolution on the coaches interiors, as to make railway transportation more attractive. To cope this objective, new requirements were set, namely high levels of comfort and safety. In complement, multiple long-term ride comfort evaluation methods have been developed. The aim of this work is to present a review on the passengers' comfort perception in railway vehicles. The standards ISO 2631, EN 12299 and the Sperling's method are the most used ones. They refer several factors, as the vibration (level, frequency and duration), temperature, noise and area of the train per capita. Additionally, the perception of reduced accidents delayed the studies of passive security. Therefore, recent works focus on reducing the consequences of the second impact in case of accident and minimize the biomechanics injury criterion, through new interiors design layouts.

Keywords

railway vehicles, passengers comfort, posture, ride evaluation, passive safety



Modeling system based on machine learning approaches for predictive maintenance applications

Joao Pedro Serrasqueiro Martins, Filipe Martins rodrigues, Nuno Paulo Ferreira Henriques

Abstract

A Indústria 4.0 tem de responder a alguns desafios como a flexibilidade e robustez de condições inesperadas, assim como o grau de autonomia dos sistemas, algo que ainda está em falta. A evolução da Indústria 4.0 visa a conversão de máquinas puramente mecânicas, em máquinas com capacidade de autoaprendizagem de forma a melhorar o desempenho geral e contribuir na otimização da manutenção. Um importante contributo da Indústria 4.0 no setor industrial é a manutenção preditiva e a manutenção prescritiva. Este artigo deve ser analisado como uma proposta de metodologia para implementar um modelo de previsão automática numa bancada de ensaios para o reconhecimento da falha de uma máquina e contribuir para o desenvolvimento de algoritmos para a manutenção preventiva e descritiva.

Keywords

Industry 4.0, Artificial Intelligence, Machine Learning, Predictive Maintenance, Prescriptive maintenance



ICEUBI2019 SESSION - 30

Engineering and Management

ICEUBI2019





A Fuzzy Logic model to enhance Quality Management on R&D Units

António Abreu, Ricardo Santos, João M.F. Calado, José Requeijo

Abstract

Nowadays, Higher Education Institutions (HEIs), are becoming even more competitive, with the public ones, facing at the same time a greater restriction on public funding. Therefore, HEIs, have to be more effective and more efficient as well, on pursuing their own goals, which includes Research and Development (R&D) units as well.

Such demands can be achieved, by enhancing R&D's global performance. Therefore, the use of a framework such as European Foundation for Quality Management (EFQM), can bring value to an organization with the characteristics of a R&D unit.

This work presents a new integrated method based on EFQM model, by using Fuzzy Logic, to enhance the organizations' overall performance.

The applicability of the proposed approach is demonstrated by a case study in a R&D unit, where an initial performance evaluation takes place, by using RADAR's Logic approach. The proposed method, based on Fuzzy Logic, is then applied, followed by the identification of the strength points as well as the improvement areas, according to the EFQM framework. Then, the improvement actions with high priority are determined, followed by the correspondent action measures.

Keywords

Quality Management, Fuzzy Logic, EFQM

Design of a Continuous Improvement Model in a Portuguese Food Industry Company - A Case Study

Ana Sofia Dias, Helena Victorovna Guitiss Navas, António João Feliciano Pina da Costa Abreu

Abstract

The search for perfection forces organizations to adopt new techniques and approaches, focused on the systematic creation of innovative solutions that facilitate the processes of continuous improvement. In view of this context, there was an opportunity to study the implementation of the Lean philosophy in the production line, at a processed food organization. A continuous improvement model was designed for an organizational system, combining tools used in both TRIZ methodology and Lean philosophy. Several Lean tools are used in the model in order to support problem formulation, e.g. Brainstorming, 5 Whys, Pareto Diagram, Ishikawa Diagram, Plan-Do-Check-Act (PDCA) Cycle. And the Kano Model integrated in the proposed model allows assessing employee satisfaction at a later stage than the implementation of previously found solutions. In case the problems identified are not very complex, were resorted to the use of both TRIZ and Lean techniques, such as cause/effect databases, the 40 problem solving TRIZ principles, visual management, 5S's or line balancing. But if the problems identified are more complex, which means with an inventive issue to be solved, Matrix of Contradictions and S-Field Analysis TRIZ tools proved to be more appropriate to find the proper solution. With the case study carried out, it was noted that the proposed model proved to be very useful as a roadmap for the implementation of Lean and TRIZ tools in the continuous improvement of industrial products, services and processes should be the ways to continually minimize them in a company.

Keywords

Continuous Improvement, Lean, TRIZ, Management Tools, Model proposed



Growing evolution of the electrification rate on heavy vehicles

Ricardo Manuel Fernandes Lemos de Oliveira, Gonçalo Nuno de Oliveira Duarte, Nuno Paulo Ferreira Henriques

Abstract

In response to environmental impacts and all the limitations caused by fossil fuels, we have been witnessing in recent decades to the sharp development of hybrid electric and electric vehicles, particularly in heavy-duty passenger vehicles. Its proliferation is now widespread in virtually every major vehicle brand, reflecting operator confidence. In order to further mitigate the use of fossil fuels, the trend is to increase supply in 100% electric versions.

However, the evolution of recent years, both in manufacturers commercial strategy of major brands and bodybuilders and in sales volume, seems to indicate a new demand stage for this kind of vehicles, which are still making the first steps in Portugal. However, high acquisition costs and limited autonomy are still major obstacles to a faster proliferation of electrification in heavy vehicles. Its strengths such as lower air and noise pollution, in addition to lower operating and maintenance costs, led to a growing acquisition in the Portuguese vehicle market, where 16 new heavy-duty passenger BEV have been sold this year.

Real-world operational impacts of these vehicles indicate a energy use between 0.91 and 1.65 kWh/km depending on driving context. It has been also observed that operators are still adapting and not always using the full battery capacity.

Keywords

Electrified Heavy Vehicles, Energy Assessment, Driving Mode, Load Support, State of Charge



Scrambler and descrambler in Digital Systems

Antonio D. Reis, Jose F. Rocha, Atilio S. Gameiro, Jose P. Carvalho

Abstract

The scrambler and descrambler are important blocks in digital transmission systems. The scrambler function is to maintain an uniform spectrum independently of the input on or off. The other function is to improve the system security. The descrambler makes the inverse operation, recovering the original signal. The objective is to observe the pseudo-random sequence generators and adapt them to the scrambler and descrambler.

Keywords

Scrambler, descrambler, transmission channel



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