CONFERENCE PROCEEDINGS

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CONFERENCE VENUE

University of Washington – Rome Center (UWRC), Piazza del Biscione 95, 00186 Roma, Italy

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Preface:
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Our mission is to make continuous efforts in transforming the lives of people around the world through education, application of research & innovative ideas.
KEYNOTE SPEAKER

Elza M. M Fonseca

Professor, Dep. of Mechanical Eng. of the Polytechnic Institute of Porto, Portugal

Topic: Design of Wood Connections through Analytical and Computational Methodologies

Elza M.M Fonseca is Professor at the Dep. of Mechanical Eng. of the Polytechnic Institute of Porto, Portugal, where she has been since February 2018. From 1995 to January 2018 she served as Professor at the Dep. of Applied Mechanics of the Polytechnic Institute of Bragança. She has a degree in Mechanical Eng. (1990), MSc degree in Mechanical Eng. (1998) and a Ph.D. degree in Mechanical Eng. from the Faculty of Eng. – University of Porto (2003). She is a permanent researcher at IDMEC, INEGI, which belongs to the LAETA (Associate Laboratory for Energy, Transport and Aeronautics). She is also an associate researcher at the CIDEM (Centre for Research and Development in Mechanical Eng.). Main research interests include solid mechanics, thermal, computational mechanics and biomechanics.
KEYNOTE SPEAKER

Paulo Alexandre Gonçalves Piloto

Coordinator Professor, Department of Applied Mechanics, Polytechnic Institute of Bragança (IPB), Portugal

Topic: Fire Resistance of Composite Slabs with Steel Deck: Experimental and Numerical Investigation

Paulo Alexandre Gonçalves Piloto has a degree in Mechanical Engineering from the Faculty of Engineering – University of Porto (FEUP, 1991), Master Science degree in Mechanical Engineering from the Technical University of Lisbon (IST, 1994) and PhD degree in Mechanical Engineering (FEUP, 2001).

He is currently coordinator professor at the Department of Applied Mechanics – Polytechnic Institute of Bragança (IPB) – Portugal, having performed other professional activities in business and university environment.

Develops the research activity in the field of fire and structural engineering, participating as a permanent researcher at LAETA INEGI (Portugal). He is also an associate researcher at the research unit from the University of Salamanca (Spain) “Art, architecture, Urbanism and Engineering (Centuries XIX-XXI)”.

He is the author/co-author of several papers published in journals and congress proceedings. He made part of the organizing committee and scientific committee of several conferences. He participated in several international and national research projects.
Dr Yousuf Alkhezi  
ERCICSTR1906055

Properties of Homotopy and Pinched Homotopy

Dr Yousuf Alkhezi  
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Abstract

This paper is an investigation into the properties and applications of Geometric algebra and to examine new property called the pinched homotopy. That there is much new to say on the subject. It is the computational power brought to the manipulation of these objects that makes geometric algebra interesting and worthy of study.

Keywords: Geometric Algebra, Complex, Pinched, Null Homotopy

Abubakar S. Muhammad  
ERCICSTR1906061

Microcontroller Based Automatic Residential Weather Control to Create Thermal Comfort According to Nigerian Climate

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Abstract

Thermal comfort is the expression of satisfaction by human in relation to his thermal environment subject to some evaluations during various weather condition. It is influenced by some major parameters such a room’s humidity, temperature and air speed. In Nigeria the average relative humidity and temperature were respectively 16% to 85% and 14oC to 33oC while the thermal comfort range acceptable by human body according to ASHRAE recommendations are 68oF to 80oF in winter and 72oF to 80oF in summer with a relative humidity of 30% to 60%. The microcontroller16F877A was employed to design an air conditioning control of dehumidifier, air conditioner and fan speed respectively. Both dehumidifier and the conditioner were made to work within the acceptable range, the fan speed was made to be around 1.5m/s at highest Nigerian temperature and the reduced proportionally with drop in temperature until 0.2m/s is reached to maintain continuous distribution of air at thermal comfort range of the parameters under consideration. Dew point temperature obtained from psychometric chart was avoided, fan speed/regulation voltage relationship was simulated using Simulink, the flow chart was made, the program was developed using mikro C and the circuit for the control was drawn and tested using proteus software. From the simulation result, automatic optimal control of weather to suit thermal comfort can be easily achieved and power would be economized with intermittent operation of these devices.

Keywords: Thermal Comfort; ASHRAE; Weather; Psychometric Chart; Microcontroller; Simulink; Proteus; Mikro C.

Laura Marcela Gaviria Yepes  
ERCICSTR1906069

Evolution and Research Trends in the Field of Model-based Enterprise: A Bibliometric Analysis

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Abstract

The Model-based Enterprise refers to digital three-dimensional models that serve as a support and source of information for monitoring activities in the life cycle of a product, therefore, it is useful to improve efficiency, design better products quality and reduce costs. Given its importance, this work aims to examine the evolution and research trends in Model-based Enterprise in order to guide future research in the field of study. The methodology consists in the bibliometric analysis of 91 academic publications from a search equation applied in the Scopus database between 1991 and 2018. Subsequently, quantity and quality indicators were calculated to understand the evolution of this area of study in said period of time. Among the main results, it is observed that countries that generate more knowledge on the subject are China, US, Brazil and Spain, being a multidisciplinary topics addressed from computer science, decision sciences supported by research centers in engineering and mathematics, standing out in its positioning universities such as Federal University of Parana, National Institute of Standards and Technology, Northwestern Polytechnical University and Purdue University. Additionally, among the most researched topics include: Manufacturing, Model-based OPC, Life Cycle, Information Systems, Computer Aided Design, Product Design and Information Management.
### Multi-criteria Decision Modeling for Filter Design Tool Selection in Online-CAD-COM Platform

Mohammed I. A. Abuibaid  
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**Abstract**

We present the development of a multi-criteria decision model for decision support in the telecommunications engineering software solution Online-CADCOM. The solution is to aid user in selecting a filter design tool based on specific selection criteria. The multi-criteria decision model will serve as the basis for the development of an expert system to be implemented in code and integrated in Online-CADCOM. The multi-criteria decision model is implemented as a Decision Matrix and combines set theory based option filtering with the MAUT method for option ranking.

**Keywords:** Multi-Criteria Decision Analysis, Decision Matrix, Filter Design, Telecommunications

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### Evaluating the effect of height between ground surface and bottom side of a window (OKB) on air draft and natural ventilation (Case study: residential house of Rasht city)

Seyyedeh Sara Yazdi Bahri  
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**Abstract**

Due to the high investment costs and long payback period in energy efficiency projects of buildings, careful evaluation is essential before implementing strategies for reducing energy consumption. Saving fossil energy and using clean energy sources for reducing the operating costs of building, protect the environment and people's health. Natural ventilation is one of the factors that affect the thermal comfort. This feature by utilizing air drafts, decreasing relative humidity and increasing surface evaporation causes mild climate and comfort conditions in the humid and temperate climates. This paper is organized to discuss three models of openings with OKB = 70 cm, OKB = 90 cm and OKB = 110 cm in Rasht city, using CFD (Computational Fluid Dynamics) of Design Builder software and experimental studies in order to determine the validity of climate models, and to compare and examine the air draft rate between the models. These three heights were chosen because they are the most common dimensions applied in residential buildings. The results demonstrate that the air drafts in OKB = 90 and 110cm are increased to reach a constant rate and thermal comfort is increased by the same amount.

**Keyword:** Air Draft, Openings, Mild And Humid Climate, CFD, Design Builder, Rasht

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### Some Properties of Bombax Costatum Leaf Gum and its Application as Stabiliser in Emulsion

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**Abstract**

Bombax costatum-Pellegr Leaf (BCL) is a common African food thickener, rich in gum. However, limited information on its gum characteristics has hampered its commercial exploitation. This study was conducted to isolate gum from BCL, characterise it and investigate its suitability as emulsion stabiliser.

Fresh B. costatum Leaves (BCL) were obtained in Abeokuta North Local Government, Ogun State, Nigeria. They were cleaned, oven-dried (50°C) and milled into flour. Gum was isolated by hydro-extraction, purified, freeze-dried, pulverised and characterised using X-Ray Diffractometer (XRD) and Fourier Transform Infrared (FT-IR) spectrometer. Physico-chemical properties of Bombax costatum leaf gum (BCLG) and the instruments used in their determination were: Uronic Acid (UA) content, colorimeter; elemental composition, Elemental Analyser (EA); Specific Optical Rotation (SOR), polarimeter; monosaccharide composition, High Performance Liquid Chromatography (HPLC); rheological attributes, rheometer; Viscosity Average Molecular Weight (VAMW), viscometer. Emulsions were prepared using homogeniser, with BCLG as stabiliser and the stability evaluated by monitoring the creaming rate. Data were analysed by descriptive statistics and one way ANOVA (α0.05).

The gum contents of BCL was 45.6%. The XRD showed that BCLG was amorphous. The FT-IR absorption bands at 1700 cm⁻¹ (free C=O) and 1609 cm⁻¹ (COO⁻) indicated UA, which colorimeter
showed to be 32.0%. The EA revealed carbon (40.47%), hydrogen (5.44%), nitrogen (2.29%) and sulphur (0.02%) in the gum. Polarimeter revealed SOR of \(-19.33^\circ\). HPLC showed constituent monosaccharides of its hydrolysate as rhamnose, galactose and mannose (ratio 1:2:2). Intrinsic viscosity and VAMW of BCLG were \(5.8 \text{ dL/g} \) and \(5.35 \times 10^5 \text{ g/mol} \) respectively. The gum dispersions exhibited shear thinning behaviour at concentrations of 5 and 10%. BCLG at low concentration range of 0.025 – 0.5%, inhibited creaming of 10% olive oil-in-water emulsion with a third order polynomial fit (\(R^2 = 0.9923\)), indicating a good stability.

Bombax costatum leaf gum exhibited application properties which make it exploitable commercially. Keywords: Bombax costatum Leaf Gum; Oil-in-water emulsion; Inhibition of creaming; Rheology modifier.

Damilola Hazeez Aderomola

Estimating Groundwater Recharge from Infiltration in the Unsaturated Zone, A Data Integration and Modeling Approach: Mvudi Village Case Study

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Abstract

Groundwater recharge is generally defined as the downward flow of water to the saturated zone, forming an addition to the groundwater reservoir (De Vries and Simmers, 2002). Techniques used to estimate groundwater recharge have previously been based on data from surface water, unsaturated zones, and saturated zones. In semi-arid and arid regions where the unsaturated zone is generally thick, unsaturated zone techniques are usually applied to estimate recharge (Scanlon, 2000). Methods commonly used in South Africa include Chloride method (Cl), Isotope method (2H), Water table fluctuation (WTF), Saturated Volume Fluctuation (SVF), Cumulative Rainfall Departure (CRD), EARTH Model, Carbon-14, Groundwater Model, Qualified guesses, and Spring flow (van Tonder and Xu, 2000). Methods dealing with the unsaturated zone usually comprise physical, tracer and numerical methods.

Recently, numerical flow models have become a powerful tool for groundwater management. They permit prediction of the hydrodynamic aquifer responses due to various forcing functions (abstraction scenarios, precipitation or land use changes). In theory, an infinite range of recharge rates can be estimated using numerical modeling. However, these results need to be checked for reliability by comparing with field data such as that from lysimeters, tracers, water content or temperature. For numerical models to be reliable, an accurate representation of the physical system needs to be established with the appropriate boundary conditions.

Keywords: Groundwater, Modelling, Infiltration, Recharge, Unsaturated zone

Vivek Thakar

Comprehensive Study on Hybrid Geothermal- Solar Cooling System with Special Focus on India

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Abstract

Since last couple of decades India has focused on unconventional naturally available resources to utilize the available resources for solving the issue of energy security of the country. This is stimulated by the increasing awareness about Global Warming and hazards of pollution. For this more focus should be provided to the different type of renewable energies like geothermal energy, biomass, wind power, solar energy, nuclear energy and hydro energy. This paper discusses the integrated systems of solar and geothermal energies and proposes design for heating, ventilation and air-cooling system for use in India on commercial basis for domestic and commercial buildings. The average temperature in winter is around 24 oC while the average temperature in summer is around 44 oC in India. The
average ground temperature is higher than winter temperature and lower than summer temperature which is around 32 oC. Thus, ground can be utilized as a heat source or sink and power from the solar collector can be used to run the electrical components of the system like pumps and the rest of the power can directly be added to the power supply of the building. The cost-based analysis of this system is more economically feasible than conventional cooling systems working on electrical energy as it makes use of both the accumulation and loss of heat simultaneously at two different places for heating and cooling respectively.

Keywords: Renewable Energy, Geothermal Energy, Solar Energy, Cooling System

### Rajesh Tundiya
ERCICSTR1906082

**Modelling of Wait and Weight Well Control Method for Dual String Drilling: A Novel Approach for Safe and Sustainable Deep-Water Drilling**

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**Abstract**

Since oil & gas reserves in onshore fields are getting depleting fast, the oil and gas Industry is investing heavily on Offshore Exploration and Production (E&P) which apparently is costlier. As a result, new unconventional drilling technologies are implemented to bring down costs needed to effectively exploit such reservoirs. Dual String Drilling (DSD) is one such technology which suffices the deep waters drilling requirement at minimal costs with better operational safety. However, every drilling technology requires robust well control design to tackle the kicks from formation in well bore during drilling. Conventional riser drilling is full of predicaments and also the risks of having blowouts increases due to narrow operational window between fracture pressure and pore pressure which leads to the difficulties related to kick detection and lesser kick tolerance. Due to constant gradient of Equivalent Circulation Density (ECD) is suitable for narrow pressure windows. Apart from this it also has efficient cutting removal capacity, better annular clearance, elimination of differential sticking, better well stability, reduction of torque and drag and better extended reach drilling. The novelty of this model sees the application of wait & weight well control technique in DSD for sustainable deep-water drilling which includes the ability to resolve problems like long well killing time, large kill mud volume, early kick detection and formation fracture during well kick operations in soft formations.

Keywords: Dual String Drilling, well control, wait and weight method, Riserless, Equivalent circulation density

### Aysegul Ozgenc Aksoy
ERCICSTR1906072

**Experimental Investigation of the Effect of Different Reservoir Levels on the Flood Wave Propagation due to Triangular Shaped Dam Failure**

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**Abstract**

In this study, the effects of the different reservoir levels on the water depth and velocity values in the case of dam break were investigated experimentally by using the distorted physical model of Ürkmez Dam Lake and its downstream residential area. The horizontal and vertical scales of this distorted physical model are 1/150 and 1/30, respectively. The residential area and the Seferihisar-Kuşadası highway were reflected in the model. The vegetation configuration of the studied area was determined from the related maps and in situ inspections. The vegetation configuration, simulated by plastic sink brushes, was located by taking into consideration the model scales. The dam break was simulated by means of a gate with triangular shape. The clamp is lifted up by a motor and the gate is opened. The time dependent water depths in the lake and at downstream part were measured by using Ultrasonic Level Sensors (ULS). The velocities at specified location were recorded in terms of time by Acoustic Doppler Velocity meter (ADV). The so obtained water depth and velocity values were compared and interpreted. According to the experimental results, it is revealed that the increase in reservoir level induced an increase in water depths and velocity values at downstream of the dam.
Design of Wood Connections through Analytical and Computational Methodologies

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Abstract

The main objective of this work is to compare the performance between wood-steel-wood and wood-wood connections, joined by steel dowel fasteners, exposed to fire. The design methodologies follow simplified equations presented in Eurocode 5, part 1-1 and 1-2, for wood connections with dowels fasteners. A numerical methodology, based on finite element method, was also implemented to produce thermal computational simulations, which permits to verify the heating effect through the dowels fasteners or steel elements for the global connection in study. Different two-dimensional cross-sections will be identified, considered as the most relevant parts, to compare the temperature distribution through the connections in study. According the fire exposure, a thermal and transient effect will happen and a char-layer appearing in the fire exposure side of the connections. The measured quantity of the charred area permits to identify the lost structural material in cross-sections due the conjunction of the steel heating with fire action, or in only wood cross-sections. The charring rate will calculate for all connections in study and compared with the constant value proposed by the Eurocode 5, part 1-2. Charring rate decreases with increasing material density and increases linearly with the external heat flux. There are typical values for charring rate of wood between 0.5-1.0mm/min according Eurocode 5, part 1-2. This value permits to quantify the lost charring thickness layer and the fire resistance of the wood connection dependent of the chosen material density, as additional information to help designers and professionals.

Keywords: Wood Connections, Steel Dowel, Char Layer, Fire.
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Thankgod Osemudiamen Ifada
Upcoming Conferences

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- ICSTR Prague – International Conference on Science & Technology Research, 06-07 June 2019
- 2nd ICSTR Malaysia – International Conference on Science & Technology Research, 28-29 June 2019
- 3rd ICSTR Singapore – International Conference on Science & Technology Research, 28-29 June 2019
- 2nd ICSTR Bali – International Conference on Science & Technology Research, 11-12 July 2019
- 2nd ICSTR Budapest – International Conference on Science & Technology Research, 11-12 July 2019
- 2nd ICSTR Mauritius – International Conference on Science & Technology Research, 21-22 July 2019
- 3rd ICSTR Bangkok – International Conference on Science & Technology Research, 26-27 July 2019
- 2nd ICSTR Barcelona – International Conference on Science & Technology Research, 01-02 August 2019
- ICSTR Istanbul – International Conference on Science & Technology Research, 08-09 August 2019
- 2nd ICSTR Rome – International Conference on Science & Technology Research, 30-31 August 2019
- 2nd ICSTR Jakarta – International Conference on Science & Technology Research, 19-20 September 2019
- ICSTR Hong Kong – International Conference on Science & Technology Research, 26-27 September 2019
- 4th ICSTR Dubai – International Conference on Science & Technology Research, 09-10 October 2019
- 2nd ICSTR Prague – International Conference on Science & Technology Research, 17-18 October 2019
- 4th ICSTR Bangkok – International Conference on Science & Technology Research, 17-18 October 2019
- 4th ICSTR Singapore – International Conference on Science & Technology Research, 15-16 November 2019