CIVILMEET2023

May 18-19, 2023 | Brussels, Belgium

Location: *"Holiday Inn Brussels Airport, Holidaystraat 7, 1831 Brussel, Belgium*

Abstract Book

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FOREWORD

Dear Colleagues,

It is our pleasure to invite all scientists, academicians, young researchers, business delegates and students from all over the world to attend the 2nd International Meet on Civil, Structural and Environmental Engineering will be held in Brussels, Belgium during May 18-19, 2023.

CIVILMEET2023 provides a platform of international standards where you can discuss and share persuasive key advances in Civil, Structural and Environmental Engineering. In addition to Presentations, Workshops, and Discussions, the conference also offers a unique venue for renewing professional relationships, networking and remaining up-to-date variations in our challenging and expanding discipline.

CIVILMEET2023 we have not only increased the number of opportunities for you to network with colleagues from across the world but also introduced more focused sessions that will feature cutting-edge presentations, special panel discussions, and livelier interaction with industry leaders and experts.

We’re looking forward to an excellent meeting with scientists from different countries around the world and sharing new and exciting results in Civil, Structural and Environmental Engineering.

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Asphalt Pavement Test Sections with Reclaimed Asphalt Pavement to Reduce Climate Change

K. Wayne Lee, Katherine Wilson

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Abstract

Many roads in Rhode Island (RI) are coming to their intended design life and are now considered in poor condition. The full depth reclamation (FDR) technology has gained a lot of interests in the recent years in academia, state agencies and industries. Significant number of roads with severe deterioration are being rehabilitated through FDR with various additives. FDR can rejuvenate subbase and pavement structures. Route 165 in Exeter, RI, USA, was selected as a test road with four different treatments and a control. The road had severe pavement distresses such as alligator cracking, potholes, shoving and ravelling and was not a candidate for a resurfacing. The road had an FDR in 2013 which included a control section, three test sections with additives which consisted of calcium chloride, asphalt emulsion, and Portland cement, and a geo-grid section. Triaxial testing was performed on the subbase materials and subgrade soils before and after the FDR treatments to determine the resilient modulus. The results of the material testing were used to predict the performance of each of the test sections by using AASHTOWare Pavement ME Design (PMED) software.

The 200 mm (8.0 in.) rehabilitated base/subbase layer was covered with 62.5 mm (2.5 in.) Hot Mix Asphalt (HMA) with Warm Mix Asphalt (WMA) additive base and 50 mm (2 in.) surface. The maximum sizes of base and surface aggregate were 19 mm (3/4 in.) and 12.5 mm (1/2 in.), respectively. Properties of HMA mixtures with WMA additives including dynamic modulus were determined as input parameters and for further analysis

Of the five test sections, it was predicted that the pavement with the FDR layer stabilized with Portland cement would perform the best overall. Next is calcium chloride followed by the control (no additive), geo-grid and asphalt emulsion.

A condition survey was conducted in 2022, but there was no surface distresses on the all five test sections. A plan for long term performance evaluation has been developed, and an optimal strategy has been recommended, i.e., predicting performances before rehabilitating any broken roads.

Keywords
Full Depth Reclamation; Reclaimed Asphalt Pavement; Portland Cement; Hot Mix Asphalt; Warm Mix Asphalt; AASHTOWare Pavement ME Design; Climate Change

Biography
Kang-Won Wayne Lee is a faculty of Civil & Environmental Engineering (CVE) and RITRC Director at URI. He worked as CVE Director of Graduate Studies from 1996 to 1999 and served as Chairperson from 2005 to 2008. He also served as Chairman of the URI Research Council from 1990 to 1991, and a URI Faculty Senate Executive Committee member from 1992 to 1994. In 1992, Prof. Lee established the RITRC, the recipient of a $12 million research grant under the Transportation Equity Act for the 21st Century (TEA21) in 1998 and served as R&D Director for the URI Transportation Center (TC) Grant Program from 1999 to 2003. He also has been working with the consortium of University of Maine and received USDOT Region 1 UTC – Transpiration Infrastructure Durability Center grant ($14.7M) in 2018. Prof. Lee earned his B.S. degree in Civil Engineering from Seoul National University in 1974. During his college years, he served in the Korean Army for three years. Following two years of consulting work as a civil engineer for Lyon Associates and TAMS Inc., he returned to academia and earned his M.S. degree in Geotechnical Engineering from Rutgers Univ. in 1978. After briefly working as a highway construction inspector for the NJ Department of Transportation (DOT), he continued his post-graduate education and received his Ph.D. degree in Transportation Engineering from the University of Texas at Austin in 1982. He assisted Late Prof. Thomas W. Kennedy who developed Superpave asphalt mix-design during and after his doctoral program. He began his higher education teaching career at the King Saud University in 1982 and joined the URI faculty in 1985. Prof Lee's research interests are focused on Intelligent Transportation Infrastructure and Systems (ITIS), Sustainable Infrastructure and Energy. He is a founding member of the New England University Transportation Center (NEUTC) at MIT and the New England Transportation Consortium (NETC). He also initiated a joint research program between URI and RIDOT in 1986. He is a founder of the Bituminous Materials Committee (BMC) of the American Society of Civil Engineers (ASCE) and served as chair for 1999-01. He has been a member of Pavement Committee, an ETG for the LTPP Data Analysis Contest, and currently serves as a paper reviewer for Journal of Transportation Engineering and Journal of Civil Engineering Materials. He served as President of the RI Section for 2006-07 and has been elected as an ASCE Fellow in 2008. Prof. Lee was member of several committees of Transportation Research Board (TRB) including AFK40 and AHD25, and currently is a member of AKG90 - Stabilization of Geomaterials and Recycled Materials, AKM30 – Asphalt Materials Selection and Mix Design, and AKT30 – Pavement Maintenance. Other professional memberships include ASTM, AAPT, ITE, and ASEE. He serves as a paper reviewer for the TRR, Journal of AAPT, ASTM Journal of Geotechnical Engineering., ARR, and other technical publications and conferences.

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Microstructural Investigation of Thermo-Mechanically Processed Lithium Slag for Geopolymer Precursor Using Various Characterization Techniques

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Abstract

Lithium slag is an emerging industrial waste due to the increasing demand for lithium rechargeable batteries attributed to the recent boom in the automobile industry and space exploration. It is extracted as a powder residue in sedimentary tanks after the refining process of lithium extraction. In this study, the effect of thermo-mechanical processing on the chemical reactivity of lithium slag is assessed by TESCAN Integrated Mineral Analyzer (TIMA), X-ray Fluorescence (XRF), Rietveld quantitative refinement techniques. The chemical, mineral, and crystallographic phase composition of processed lithium slag specimens were assessed and compared by XRF, TIMA, and Rietveld quantitative refinement techniques, respectively. The results of thermo-mechanical processing indicated that the mineral and crystallographic transformation of Spodumene to feldspars (Anorthite, Muscovite, Albite) occurred by crystallite agglomeration. The chemical reactivity of lithium slag is gauged in terms of amorphous alumino-silicates present in feldspars and unidentified phases. Characterization of unidentified phase is evident that it majorly contains micro-nano sized alumino-silicate rich particles with similar spectral signatures to that of feldspar, some fraction of it is aggregated into other phases due to its reactivity. The concentration of the amorphous phase is proportionate with the thermo-mechanical processing energy. However, the thermo-mechanical processing energy is also optimized based on the generation of amorphous phase and reduction in particle size. Therefore, the G1C700 processed regime resulted in one of the maximum amounts of amorphous phase (52.60%). The mineral phase transformation of Spodumene to Anorthite (+10.46%) and unidentified phase (+8.24%) along with D50 value of 13.26 µm, consequently releasing 0.45 kg of carbon emissions upon thermo-mechanical processing. Hence, G1C700 lithium slag is recommended for its use as a geopolymer precursor.

Keywords

Lithium slag; Thermo-mechanical processing; Geopolymer precursor; Geopolymer precursor

Biography

Dr. Faiz Shaikh is Professor in School of Civil and Mechanical Engineering of Curtin University, Australia. His research focus on the development of sustainable binder by incorporating high volume fractions of industrial by-products as partial replacement of OPC and nano and ultrafine materials, use of recycled aggregates in sustainable concrete, mechanical characterisation of fibre reinforced cement and geopolymer concretes, behaviour of geopolymer composite in fire and natural fibre reinforced composites. He is a Chartered profession engineer (CPEng.) of Australia, fellow of Engineers Australia (FIEAust) and member of Concrete institute of Australia. He has supervised 8 PhD and 3 MPhil students and currently supervising 6 PhD students and one postdoc fellow. His has about 230 refereed publications including two books, six book chapters, 175 reviewed journal papers and 46 reviewed conference papers in his credit. He also holds an h-index of 55 and total citations of about 9750 according to Google scholar.

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Corrosion Activity of Carbon Steel and Low Chromium Ferritic Steel in Extract Solution of New Cement

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Abstract

Due to the high emissions of CO2, associated to the production of Portland cement clinker (PC), its substitution with supplementary cementitious materials have been proposed. The supersulfated cement, based on 52% pumice, 34% hemidrite and 7% of PC and CaO, is considered as a "green" alternative for partial replacement of the PC clinker [1-3]. Carbon steel B450C and low-chromium stainless steel SS430 were exposed for 30 days to water extract solution of this cement, to simulate the environment at the steel-concrete-pore interface. The change in time of the free corrosion potential (at OCP) and pH of the solution, surface characterization (SEM-EDS, XPS, XRD), as well as EIS diagrams, were performed. The initial pH of 12.38 dropped since the first day to 7.84, accompanied by a displacement to more negative values of the free corrosion potential (OCP) of the carbon steel up to 480.74 mV, giving the formation of □-FeOOH, α-FeOOH and Fe2O3, as suggested by XRD and XPS analysis. In the meantime, the OCP of the SS430 tended towards more positive values (+182.50 mV), although at lower pH, and XPS analysis revealed the presence of Cr(OH)3 and FeO as corrosion products, as well the crystals of CaCO3, NaCl and KCl. On both surfaces, a localized corrosion attack was observed in the vicinity of local cathodes (Cu, Mn-carbides, Cr-nitrides, among others), influenced by the presence of Cl-ions in the extract solution, originating from the pumice. Two equivalent circuits were proposed for the quantitative analysis of EIS Nyquist and Bode diagrams, whose data were correlated with the OCP values and pH change in time of the supersulfated cement extract solution. The thickness of the corrosion layer formed on the SS430 surface was 0.8 nm, while that on the B450C layer was 0.3 nm. The electrochemical activity of both steels was compared to that observed during their exposure to water extract of PC (cement extract).

Keywords
carbon steel; stainless steel; supersulfated cement; corrosion activity

References
K. Cabrera, E. E. Maldonado, D. Nieves, P. Castro, and J. I. Escalante, Cem. Concr. Compos., 124, 104236, (2021).
A. Bacelis, L. Veleva, S Feliu Jr., M. Cabrini, S. Lorenzi, Buildings, 11, 22, (2021).
K. Cabrera, E. E. Maldonado, D. Nieves, P. Castro, and J. I. Escalante, Contr. Build mater., 176, 145 (2018).

Biography
Prof. Dr. Lucien Veleva is majored in Electrochemistry (Eng.) in Sofia, Bulgaria, University of Chemical Technology and Metallurgy. Her PhD was done in Institute of Physical Chemistry (Bulgaria) and after that was working as a researcher in the "Institute for Protection of Metals from Corrosion" (Sofia, Bulgaria), as a head of the National Laboratory for Testing of Corrosion. Since 1994 is Associated Professor at Applied Physics Department (Center for Investigation and Advanced Study - CINVESTAV, Mexico), teaching in Master/ Doctor Degrees programs, and is adviser of thesis. In 2011 she received Doctor Honoris Causa; in 2012 - Francis La Que, Award ASTM G01, USA; in 2013 – NACE International Distinguished Career Award, in 2020 – National Award in Electrochemistry (Mexican Section of ECS). She has more than 200 articles in international journals, chapters in international books and 4 patents. Currently Dr. Lucien Veleva´ research focus on the corrosion activity of commercial carbon and stainless steels, exposed to simulated concrete-pore solution, extracted from Portland cement, which is mixed with binders. In this aspect, a variety of different techniques and methods help to establish the corrosion behavior of the steel proposed as reinforcement in new low weight concretes.

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Modeling Operational Resilience of Freeway Corridors

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Abstract

Developing a resilient freeway network, which can minimize congestion by absorbing various types of traffic disturbances and recover from them with maximum efficiency, is of the ultimate challenge facing traffic engineers. The key element in developing such a resilient freeway network is the capability to quantify the operational resilience of individual corridors, so that the structural issues inherent to each corridor can be assessed and applied for prioritizing corridor improvements under given resources.

While there have been multiple studies to determine the resilience of transportation systems, most of research efforts to date have tried to quantify network or community-wide resilience by integrating the individual metrics in multiple dimensions, i.e., organizational, and social aspects of resilience with financial and technical ones [1-7]. While these approaches tried to capture multi-dimensional aspects of resilience and their complex interactions, the major difficulties of such approaches include the accuracy and availability of the data required for estimating proposed resilience measures. Recently some researchers tried to quantify the operational resilience of roadways using traffic data, their efforts to date have been limited to individual roadway sections and the development of a corridor-wide resilience measure reflecting the interactions between time-variant bottlenecks and demand patterns has not been fully addressed in their work [8-10].

This paper presents a Corridor-wide Operational Resilience Index (CORI) designed to quantify the operational resilience of individual freeway corridors, i.e., the capability of a given freeway corridor in reducing the delay under given corridor-wide geometric and control structure. For this study, a set of the directional freeway corridors in the Twin Cities' metro network were selected and a set of the traffic data, including the delayed-vehicle-hours (DVH) and traffic volumes entering freeway per 5-minute interval, were collected during the peak periods in September-October 2019. Based on the analysis of the DVH- traffic-demand variation patterns at each corridor, the CORI was formulated as a function of the time- variant, through capacity, traffic demand and its variability for a given corridor [11]. The proposed CORI was applied to the six directional corridors, in the Twin Cities, Minnesota, metro freeway network, and the daily CORI values of each corridor were estimated for the peak periods in September –

October 2019. The resulting CORI estimates show relatively stable day-to-day variations for each route. Further, the average

CORI values of the sample routes are significantly different from each other at 95% confidence level. The analysis of the geometric features of the sample routes and their relationships with CORI indicates that those routes with low levels of geometric friction in handling through-traffic movements exhibit stronger operational resilience than those with high-friction levels. The relationships between the proposed CORI and the travel-time reliability measures for each corridor also indicate that those routes with strong resilience exhibit highly reliable travel times during peak periods [11].

Keywords
freeway corridor, operational resilience

References
1. Transportation Research Board, Transportation Resilience 2019, Transportation Research Circular, E- C265, 2020
2. Murray-Tuite, P., A comparison of transportation network resilience under simulated system optimum and user equilibrium conditions, Proceedings of the 2006 Winter Simulation Conference, Monterey, Canada, December 2006
3. Cimellro, G.P., Reinhorn, A.M., and Bruneau, M., Framework for analytical quantification of disaster resilience, Engineering Structure, 32(11), 3639-3649, 2010
4. Devannadham, H., and Ramirez-Marquez, J.E., Generic metrics and quantitative approaches for system resilience as a function of time, Reliability Engineering and System Safety, 99, 114-122, 2012
5. Leu, L., Abbass, H., and Curtis, N., Resilience of ground transportation networks: A case study on Melbourne, Proceedings of the 33rd Australasian Transport Research Forum Conference, Canberra, Australia, September 29-October 1, 2010
6. Berche, B., von Ferber, C., Holovatch, T., and Holovatch, Yu, Resilience of public transport networks against attacks, Europiean Physical Journal B., 7191), 125-137, 2009
7. Dorbritz, R., Assessing the resilience of transportation systems in case of large-scale disastrous events, Proceedings of the 8th International Conference on Environmental Engineering, Vilnius, Lithuania, May 2011, 1070-1076, 2011
8. Kim, Sunghon, and Yeo, Hwasoo, AFlow-based vulnerability measures for the resilience of urban road network, 11th Internaltional conference of the International Institue for Infrastructure Resilience and Reconstruction, Procedia-Social and Behavioral Sciences 218 (2016) 12-23
9. Simeon C. Calvert & Maaike Snelder, A methodology for road traffic resilience analysis

and review of related concepts, Transportmetrica A: Transport Science, 14:1-2, 130-154, DOI: 10.1080/ 23249935.2017.1363315, 2018
10. Khaghani, F., Resilience-based Operational Analytics of Transportation Infrastructure: A Data-driven Approach for Smart Cities, Doctoral Dissertation, Virginia Polytechnic Institute and State University, 2020
11. Kwon, E., Jurrens, C., Wright, C. and Mahmood, A., Estimation of Metro Freeway System Reliability and Resilience, Final Report, MN 2022-01, Minnesota Department of Transportation, St. Paul, Minnesota, 2022

Biography

Dr. Eil Kwon is currently a professor of Transportation Engineering at the Department of Civil Engineering, University of Minnesota Duluth (UMD), USA. He has received his MS and Ph.D. degrees in transportation engineering from the University of Minnesota, Twin Ciites. Prior to joining UMD, Dr. Kwon had worked as the Traffic Research Director for the Minnesota State Department of Transportation, USA. Dr. Kwon has over 35 years of research and development experience in the areas of intelligent transportation systems. His focus areas include adaptive ramp metering/signal control, variable speed limit control, bottleneck identification and prioritization, emergence evacuation strategies in a large network, and modeling operational resilience of freeway corridors. In particular, the ramp metering algorithm developed by his group at UMD is currently in operation at the metro freeway network in Minnesota.

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Sensorless Control of AC Drives – a Concept for Electrical Cars ?

Ralph M. Kennel

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Abstract

Field-oriented control is necessary for dynamic AC drives – it requires knowledge of the mechanical rotor position. Generally, this is detected by a position encoder, which has to be mounted on the shaft of the servo motor. In cost sensitive applications, however, when maximum performance is not required (for instance in traction drives), it is desirable to save this expensive sensor. Besides the cost advantage, encoderless control convinces with high mechanical robustness, as no sensitive electronic components are present in the machine.

There are two main methods for encoderless position detection, the first is based on using the basic equations of the electrical machine (model-based), whereas the second is based on additional signal injection.

High frequency injection methods are becoming more and more attractive. These methods generally interact with the saliencies (magnetic anisotropies) of an electrical machine obtaining the desired rotor position by demodulation methods.

Biography

Ralph M. Kennel was born in 1955 at Kaiserslautern (Germany). In 1979 he got his diploma degree and in 1984 his Dr.-Ing. (Ph.D.) degree from the University of Kaiserslautern. From 1983 to 1999 he worked on several positions with Robert BOSCH GmbH (Germany). Until 1997 he was responsible for the development of servo drives. Dr. Kennel was one of the main supporters of VECON and SERCOS interface, two multi-company development projects for a microcontroller and a digital interface especially dedicated to servo drives. Furthermore he took actively part in the definition and release of new standards with respect to CE marking for servo drives. Between 1997 and 1999 Dr. Kennel was responsible for "Advanced and Product Development of Fractional Horsepower Motors" in automotive applications. His main activity was preparing the introduction of brushless drive concepts to the automotive market. From 1994 to 1999 Dr. Kennel was appointed Visiting Professor at the University of Newcastle-upon-Tyne (England, UK). From 1999 - 2008 he was Professor for Electrical Machines and Drives at Wuppertal University (Germany). Since 2008 until his retirement in 2022 he was Professor

for Electrical Drive systems and Power Electronics at TechnischeUniversitaetMuenchen (Germany). His main interests are: Sensorless control of AC drives, predictive control of power electronics and contactless energy transmission. Dr. Kennel is a Senior Member of IEEE, a Fellow of IET (former IEE) and a Chartered Engineer in the UK. Within IEEE he was Treasurer of the Germany Section as well as Region 8 – furthermore he has been Distinguished Lecturer of the Power Electronics Society (IEEE-PELS) as well as Vice President Meetings of the same society. In 2018 Dr. Kennel received the Doctoral degree honoris causa from Universitatea Stefan cel Mare in Suceava (Romania). Dr. Kennel has received in 2013 the Harry Owen Distinguished Service Award from IEEE-PELS, the EPE Association Distinguished Service Award in 2015 as well as the EPE Outstanding Achievement Award in 2019. Dr. Kennel was appointed “Extraordinary Professor” by the University of Stellenbosch (South Africa) from 2016 to 2019 and as “Visiting Professor” at the Haixi Institute by the Chinese Academy of Sciences from 2016 to 2021. There he was appointed as "Jiaxi Lu Overseas Guest Professor" in 2017. In 2018 Dr. Kennel was appointed Guest Professor at Harbin Institute of Technology (HIT), Harbin, China. In 2019 Dr. Kennel was appointed „Honorary Chair Professor“ ("distinguished visiting professor") at Shandong University in Jinan, China.

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Sustainable Waste Management Moving Toward Circular Economy

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Abstract

Sustainable waste management developed in conjunction with resource conservation, increased efficiency as supported by zero discharge and zero emission are fundamental in building environmental full stability. Our future depends upon truly and deeply developing a symbolic relationship between environment and resources. A future where products are designed through the "12 green engineering principles" for multiple cycles of use, and manufacturing cycles are carefully aligned, so that the output of one process always feeds the input of another. What is currently regarded as simply emissions and discharges, manufacturing by-products as "waste", in "circular economy" they become raw material, nutrients in "supply chain" for new product cycles.Waste resource utilization is a powerful alternative to current "linear economy" (make, use and dispose).

A case study is presented on a state-of-the-art municipal solid waste-to-energy (WtE) plant located in Spokane in the State of Washington can process 800 tons daily. WtE or energy-from-waste (EfW) is the process of generating energy in the form of electricity.The WtE plant is designed to reduce the emissions of air pollutants using various pollution control technologies. The WtEfacility is utilizing wastes as an input to generate valuable outputs, including but not limited to growth of local economy, job creation, as well as protecting the local environment. Typically half of the energy content in MSW is from biogenic material, considerably less carbon and methane into the air than having waste decay away in landfills. Consequently, this energy is recognized as renewable energy according to the waste input, and as a result the energy yields and profit generated can be accounted for circular economy. And the WtE could play an important role in the transition to a circular economy, the waste hierarchy must be used as a guiding principle to ensure that waste minimization, prevention, reuse, and recycling are not averted.

Keywords

Waste-to-Energy, Sustainable Waste Management; Circular Economy

References

Anastas, P.T. and Zimmerman, J.B. (2003). Design through the 12 Principles of Green Engineering, Engineering Science and Technology, 37(5), 94A-101A.
Averyt, C. (2018). Personal Communication, The City of Spokane Waste-to-Energy Facility, Operation Superintendent, Spokane, Washington, USA.
Das, T.K.(2005).Toward Zero Discharge: Innovative Methodologyand Technologies for Process Pollution Prevention, Wiley, NJ.
Das, T.K. (2020). Industrial Environmental Management: Engineering, Science and Policy, 1stedition, Wiley, NJ.
Weetman, C. (2017). A Circular Economy Handbook for Business and Supply Chains: Repair, Remake, Redesign, Rethink, Publisher: Kogan Page, London, New York, New Delhi

Biography

Tapas K. Das, PhD, PE, BCEE,FAIChE, FICS,is a Chemical and Environmental Engineer, a Fellow member of the American Institute of Engineers (AIChE) and Indian Chemical Society; Past Chair of the AIChE's Environmental Division; Former Chair of the Air Pollution Control Committee of the American Academy of Environmental Engineers and Board Certified Environmental Engineer (BCEE) and Board of Trustee with the Academy; former senior environmental engineer at the Washington Department of Ecology; since 2005 Prof. Das has been teaching at Saint Martin's University, Washington; formerly Assistant Professor in Paper Science and Chemical Engineering Departmentat the University of Wisconsin at Stevens Point; supervised MS and PhD students; served as an external examiner for Chem. Eng. Program at the University of Surrey, UK, IIT Roorkee and Calcutta University. Dr. Das holds a BS in Chemical Engineeringfrom Jadavpur University in Kolkata, India, and PhD from Bradford University, UK. Dr. Das was a postdoctoral fellow at London's Imperial College of Science and Technology, and a visiting scientist at Princeton University. Dr. Das is a registered professional engineer (PE) in the states of Washington and Wisconsin.Prof. Das serves as an Associate Editor of the Journal of Solid Waste Technology and Management, published by International Society of Waste Management, Air and Water. Prof. Das is the author of twotextbooks,16 book chapters, and over 50publications.

Construction 3D Printing – The Next Frontier

Ming-Jen Tan

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Abstract

Construction 3D Printing has taken-off in the last 6 or 7 years, with an explosion of research interestevidenced by the number of research papers, followed up by conferencesand numerous projects featured in the media subsequently. It is an opportunity to change the status quo of construction technology, and bring about the digital age in thistraditional industry, which has been slow to change compared with other industries. Some of the areas that have been tackled has been its low productivity, issues with work-site safety, the emergence of robots, better and more sustainable designs and materials both of the construction process but also for the life-cycle of buildings. This talk discuss all these and the challenges and outlook going forward.

Keywords

3D Printing; Building & Construction; Sustainable Construction; Sustainability in Construction

Biography

Dr.Ming-Jen Tan received both his B.Sc. (Eng.) and Ph.D. from The Royal School of Mines, Imperial College, London. He was Japan Society for the Promotion of Science (JSPS) Fellow at Kyoto University in 1991, Science & Technology Agency (STA) Fellow at the Mechanical Engineering Laboratory (A.I.S.T., M.I.T.I.), Tsukuba, Japan 1992-93, Visiting Scientist at Columbia University (2003) and Fulbright Scholar (2004) at both UCLA and Northwestern University in the U.S. He is currently a Professor at Nanyang Technological University, Singapore.

He has been the Programme Director (Building & Construction) at the Singapore Centre of 3D Printing (SC3DP) up to recently, and currently Director of the HP-NTU Digital Manufacturing Corporate Lab. Since 2019, he has been on the World Economic Forum's (WEF) Global Future Council on Advanced Manufacturing and Value Chains.

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Harvesting of Waste Thermal Energy to Support Buildings' Essential Needs

Chua Kian Jon

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Abstract
This presentation focuses on the development of a unique smart thermal energy harvesting plant, whereby all four key resources are generated simultaneously using a single, integrated system in an energy efficient manner, through maximizing the recovery of its generated waste energy. Specifically tailored to support buildings' essential needs, the plant can contribute to greater energy and cost savings and is also more space efficient. It employs a smart temperature cascading method and thermal energy-equipment capacity matching to maximum the utilization of waste heat. More importantly, it can significantly reduce energy consumption by 30 per cent or more and potentially trim the amount of carbon dioxide emitted to the environment by 2 to 4 per cent for countries at business-as-usual levels while meeting varying needs of electricity, potable water, cooling, and heating. Such a novel system is particularly suited to buildings in countries whereby continuous cooling and water production are essential utilities.

Keywords
Thermal Energy; Heat Recovery; Energy Efficiency: Building Applications

Biography
Dr Chua Kian Jon is currently an Associate Professor with the Department of Mechanical Engineering, National University of Singapore. He has been conducting research on renewable energy systems and heat recovery systems since 1997. He has conducted both modelling and experimental works for specific thermal energy systems. He is highly skilled in designing; fabricating; commissioning and testing many sustainable energy systems to provide for heating, cooling, and humidity control for both small- and large-scale applications. He has been elected to several fellowships including Fellow of IMechE, Fellow of Institution of Engineering Technology, Fellow of Energy Institute, and Fellow of Royal Society of Biology. He has more than 200 international peer-reviewed journal publications, 6 book chapters and

recently written six monographs on air conditioning, dehumidification, and thermal energy storage and processes. He was highlighted among the top 1% of scientists in the world by the Universal Scientific Education and Research Network and top 2% in the Stanford list of energy researchers. His works has garnered more than 13,000 over citations with a current h-index of 61. Further, he owns more than 12 patents related to several innovative cooling and dehumidification systems. On a regular basis, he has been invited to deliver many plenary and keynote talks on his research findings. He is the Principal Investigator of several multi-million competitive research grants.

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Mitigating Environmental, Economic, and Social Impacts of Current ELV Recycling Practices in ASEAN Countries: Effective Strategies towards Sustainable Future

Zambri Harun and Altaf Hossain Molla

Department of Mechanical and Manufacturing Engineering, Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia (UKM), Bangi 43600, Malaysia

Abstract

The escalating worldwide demand for automobiles has resulted in a substantial proliferation of end-of-life vehicles (ELVs) that necessitate appropriate disposal. The recycling of ELVs has emerged as a pivotal concern for both governmental bodies and industries, owing to its potential to provide substantial environmental, economic, and social advantages. Nevertheless, the current practices of recycling ELVs in the Association of Southeast Asian Nations (ASEAN) countries are deemed unsustainable due to their consequential adverse impacts on the environment, society, and economy. Therefore, it is imperative to investigate the environmental, economic, and social implications of existing practices for ELV recycling, as well as possible solutions. This research paper aims to investigate the prevailing practices of ELV recycling in ASEAN countries, with an aim to discern the associated environmental, economic, and social impacts. In addition, this study endeavors to examine possible measures for alleviating the environmental, economic, and social repercussions associated with current practices of recycling ELVs. This study employs an exploratory approach that integrates a comprehensive review of the literature on the recycling practices of ELVs and their corresponding environmental, economic, and social repercussions. The literature review facilitates an understanding of the current ELV recycling practices and enables an evaluation of their associated environmental, economic, and social impacts, interviews with industry experts, government officials, and environmental organizations to gather insights into the current practices and potential solutions, and field investigations to investigate the prevailing practices of ELV recycling. The research results indicate that the ELV recycling system in ASEAN countries is in a state of limited but growing development. This study identifies significant environmental, economic, and social implications arising from the current ELV recycling practices. Notably, this study highlights the increased generation of waste, air pollution, higher recycling costs, fluctuating material market prices, health risks, and occupational hazards as prominent among these implications. The present

study provides numerous approaches for mitigating the adverse ecological, financial, and societal effects of contemporary ELV recycling practices. Prominent among these strategies are sustainable ELV design, adoption of a circular economy approach, implementation of green technologies, and a heightened sense of extended producer responsibility (EPR). This research may contribute to developing sustainable ELV recycling practices in ASEAN countries as the present study offers valuable insights into the current practices of ELV recycling in ASEAN countries, focusing on identifying the associated environmental, economic, and social impacts and exploring potential solutions to address these issues. Moreover, the findings of this investigation are of significant interest to a broad range of stakeholders, including policymakers, industry professionals, and environmental organizations.

Keywords
End-of-life vehicles (ELVs) recycling; Sustainable development; Circular economy; Environmental impact

Biography
Zambri Harun is the Chair of the Department of Mechanical and Manufacturing Engineering at the Faculty of Engineering and Built Environment, Universiti Kebangsaan Malaysia (UKM). He received a BSc. and an MEng. degree in mechanical engineering. His PhD is in turbulence and wall-bounded flows from the University of Melbourne. Prior to working at UKM, he worked as a process engineer at Motorola (Malaysia) and as a mechanical and electrical design manager for the Design and Construction of the Gerbang Selatan Bersepadu (GSB) project, in Malaysia. He actively researches in turbulence, fluid mechanics applications, renewable energy especially in wind-energy generation, emission and end of live vehicle (ELV). He has published over 100 articles in conference proceedings, journals as well as in books both in the fields of engineering and education.

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Seismic Metamaterials with Low Frequency Wide Bandgaps Using Steel Barriers

C.W. Lim

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Abstract

The feasibility of built-up steel section as barriers of seismic metamaterials is proposed in this study. We consider two types of built-up steel sections (as resonators) and the surface waves propagation in a singlelayer homogenous medium and a six-layered soil medium (substrate) is investigated by analytical and computational techniques. The presence of resonator on the surface of a semi-infinite substrate results in the generation of local resonance that induces low frequency wide bandgaps. The generation of local resonance bandgaps are mainly governed by the impedance mismatch between resonator and substrate and the coupling of surface waves propagating on the surface of a semi-infinite substrate with a longitudinal mode of resonator. We further consider the surface waves propagation in both types of media and compared the bandgap frequencies. For layered soil media, a bandgap with relative bandwidth greater than 1.5 is reported that indicates the surface wave bandgap is relatively wide and it is located at a low frequency. The result also shows the effect of impedance mismatch on the bandgap width. Furthermore, with a change in geometric parameter of the resonator and material properties of substrate, theposition and width of bandgap do vary. The infinite unit cell model study is further validated by a finite unit cell based frequency response and time transient analyses. An excellent agreement is observed. The time transient analysis results indicate more than 50% reduction in vibration amplitude of the surface waves. The study provides an insight for having steel piles to protect critical infrastructures from earthquake hazards.

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Sustainable Development and the Future of Construction: Trends in the Canadian Construction Industry

Dr. Faisal Arain

KLC College, Ontario, Canada

Abstract

Around the world the construction industry accounts for over $10 trillion a year of economic activity or about 13% of the world's GDP. Moreover, this amount was projected to grow to $15.5 trillion by 2030. Construction always has been a major player in Canada's economy. During this time period, Canada is expected to be top 5 in terms of the world's largest construction market. This emphasizes the need for aptly trained professional in all domains of sustainability. Sustainability in all aspects of our life is certainly an emerging trend. All industries including Construction Industry are taking active initiatives to support sustainability practices.

Sustainable development issues and environmental concerns are becoming popular with Canada's construction industry's ever increasing activities. Contemporary construction practices adhere to traditional methods of construction; negative environmental impact during and after construction phase is certainly an area of interest for construction professionals. Technological advancements in the engineering and construction industry is contributing to achieving sustainable construction practices, however industry has been complaining regarding lack of training/education to produce construction professionals with sustainability competencies. There is a growing need for construction professionals with sustainability skillsets, which are crucial for enhancing sustainability practices, especially given the growing complexity of construction projects and construction-related environmental law. Academic institutions have a responsibility to address this emerging need of the industry to support national economy.

The presentation will discuss the sustainability practices and identify the need for an enhanced program in sustainability. The study suggests that an enhanced program in sustainability will help training young professionals better to address the needs of sustainability professionals in the local and global built environment industries that await them. The presentation would be of interest to sustainability experts, construction professionals, and faculty involved with sustainable built environment education.

Keywords
Sustainability; Construction; Trends; Construction Education

Biography
Dr. Faisal Arain is an experienced academic leader and architect with an MS and PhD in Construction Project Management. He has extensive experience of working at management and leadership positions in industry and academia in Pakistan, Saudi Arabia, Singapore and Canada. Dr. Arain has consulted, researched and published widely in the discipline of Project Management and Design and Construction Management. He has authored over 120 research publications, 2 book chapters, and 13 books. Dr. Arain is the recipient of numerous awards including the Donald S. Barrie Award 2005 conferred by PMI USA, and the Idahlynn Karre Exemplary Leadership Award 2016, conferred by the Chair Academy, USA. He is the Editor-in-Chief of the International Journal of Construction Project Management published by Nova Science Publishers Inc., USA.

Dr. Arain worked as Chair, Construction Project Management with SAIT, Calgary. He served as the Associate Dean of the School of Sustainable Building and Environmental Management at NAIT, Edmonton. Dr. Arain also worked as the Senior Principal/Senior Dean, Niagara College Campuses in KSA. He recently served as the Vice President, Academic at the Northern Lakes College, Alberta.

Dr. Arain is currently the Vice President, Academic & Administration at the KLC College, Ontario and the CEO of AM Management Global Inc, Alberta, Canada.

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Quo VadisDomine 1: Developing a Model T for Universal Retrofitting of Residential Buildings

Mark Bomberg, Umberto Berardi, David Yarbrough, Paulo Santos and Malgorzata Fedorczak-Cisak

Mechanical Eng., Clarkson U.,Potsdam,NY, USA and DFI Enterprises, Inc, Port Orange, Fl, USA

Abstract

Protests during the 2021 Climate Conference in Glasgow exemplified the dilemma of our time. The establishment perpetuates the old thinking,but to mitigate the impact of climate change, one must replace the current fragmentary approach with a new holistic one. To reach zero energy and emission objectives, Laurence Berkeley National Laboratoryproposed in 2008: a 90% energy reduction for new buildings and 50% forexisting buildings. While the first objective appears to be on track, widespread achieving the second objective has yet to happen because of missing integration. For such integration to happen, we need to bridge the chasm (gap) between the frontiers of social thinking and construction technology. Builders follow the public demands, but the public needs to learn that there is an affordable technology to improvethe comfort of life while simultaneously slowing climate change. Our virtual network selected two 2023 conferences in Brussels(May) and Barcelona (October) to build bridges from both sides of the chasm, from technology to social values and vice versa. We use the title Que Vadis Domine to highlight that success depends on the broad audience we try to reach. Our role is to assist in the discussion on how to achievein 4 years as much as achieved in 4 decades from the 1980s until today.

Our objective for this conference is to recreate the thinking behind the Ford Model T by proposing a universal, affordable, climate-related technology for the next generation of construction. We offer monitoring field performance and use the building's automatic control systems to optimize HVAC operation under service conditions.

We analyzedthe heating, cooling, and ventilation aspects of housing and postulated the

Following:

1. Introduction of a two-stage construction process for new and retrofit cases that modifies financing patterns. In the first stage, the best possible performance within a prescribed investment limit is the objective; in the second stage, reducing the cost of the required energy efficiency level is the objective.

2. A building automatically controls thermal mass utilization, including geothermal storage linked with solar panels through a hydronic system and heat pump. One implements the concept of an adaptable indoor climate and a complete integration of HVAC with the building structure. This is accomplished with a monitoring and performance evaluation (MAPE) system. Introducing automatics to the design process offers improved building subsystem integration and teaches energy optimization in the post-construction stage.
3. We would also like to organize an industry-academic consortium with two parallel groups: warm climate led by Italy or Spain and cold climate led by Poland in collaboration with the USA.

Keywords
energy efficiency, residential retrofits, building automatics control, integrated HVAC

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The Restoration of a Concrete Bridge in Altitude: Mortar Application, Damage and Concern

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Abstract

The concrete restoration of roadway viaducts is a main concern. Concrete damage, chloride contamination, carbonation, the modulus of elasticity, the preparation of the support, the thickness of the new mortar application and the environmental conditions during and after the repairing works are some of the issues that need to be taken into account. The latter parameter is especially critical in altitude, where wind speed, abrupt changing of the temperature and the relative humidity may influence the adhesion of the new mortar on the old concrete substrate and the quality of the restoration woks. The new mortar applied as a partial structural reinforcement on the viaduct piles exhibited variable compressive strengths, which could be linked to the mortar application procedure. The variability and the low adhesion strength values lower than 1.5 N/mm2 and the compression strength < 45 N/mm2 were below the required limits. The rupture in the adhesion strength measurement occurred within the mortar. The mortar was well hydrated, but exhibited a clear lack of compaction, also visible in the high porosity. In this concern, to obtain thick structural sections up to 100 mm the application of a sprayed gunite is not to adequate. In fact, the spraying angle, distance, machine regulation and dexterity of the operator may all adverse the final compaction.A castable mortar is more independent on the application technique and may be more appropriate for such repairs, in particular if the works are done in several steps.

Keywords

bridge, concrete, restoration, mortar, application, damage

Biography

Ph. D in Material Science at the Swiss Federal Institute of Technology, in collaboration with Sika AG in Zurich. Post-doctoral Researcher in the Corrosion of Aerospace Aluminum Alloys Friction Stir Welds at the Material Science Department, Ohio State University, Columbus, USA,

in collaboration with the Wright Patterson Air Force Research Laboratories. Responsible of a branch office of the Helbling Consulting Engineering Group, Zurich. Director of the Institute of Materials and Constructions at the University of Applied Sciences of Southern Switzerland. Publications on concrete, metals, corrosion and building materials. Editorial board member of materials and corrosion scientific journals. Member of the SIA commission 215 on mineral binders. Technical committee member Rilem for the degradation of organic coating materials, for the carbonation of concrete with supplementary cementitious materials, chloride bonding in concrete, concrete fire spalling and performance-based asphalt recycling.

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Water Security: a Holistic Approachat the Global and Regional Scale

Roger A. Falconer

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Abstract

The presentation will introduce some of the general challenges of global water security (i.e. water availability and quality) and highlight the growing challenges of climate change, increasing population growth, floods, droughts and pollution. The concept of virtual water will be introduced and the necessity for society, industry and governments to address water security challenges in a global holistic framework. Examples will be given as to how western cultures can have a significant impact on water security for citizens living in many less well-developed parts of the world. Some small changes in our behaviour could have a significant impact on water security in so many developing countries and we could have a marked impact on improving the quality of life for so many fellow citizens world-wide.

The need for a systems-based approach to water management, will also be discussed at the local river and coastal basin scale, with an example being given of a major study of the Ribble River basin and bathing water quality along the Fylde Coast, including Blackpool, in the UK. An outline will be given of an extensive field data acquisition and integrated hydro-epidemiological modelling study, with the objective being to predict the distribution of faecal bacteria levels in the Ribble River Basin and along the Fylde Coast. The estuary includes shellfish harvesting sites and the coast includes the popular bathing waters around Blackpool, which is one of the most popular bathing resorts in the UK. The extensive measured and statistical data from the catchments, CSOs, WwTWs and river networks discharging into the estuary and along the coast have been collected, for both wet and dry weather conditions, to determine various model parameters for calibration and validation of the integrated modelling system. The results highlight the significance of a Source to Sea (S2S)approach in water management, with sediment transport being shown to be a key potential mechanism for affecting faecal bacteria levels and impacting bathing water quality.

Keywords

Virtual Water;Water Security; Hydro-environmental Modelling; Faecal Bacteria;

Biography

Roger Falconer is Emeritus Professor of Water and Environmental Engineering in the School of Engineering at Cardiff University; Chair Professor at Hohai University and the Yangtze Institute for Conservation and Development, China; and an Independent Water Engineering and Environmental Management Consultant. He graduated from Imperial College with a PhD in 1976, followed by posts at the universities of Birmingham (1977-86), Bradford (1987-97), and Cardiff (Professor 1997-18). He has managed a wide range of research projects on hydro-environmental modelling (both computational and laboratory) and has been involved in over 100 EIA studies worldwide. He has published extensively in the field of hydro-environmental impact assessment modelling studies, and advises governments, consulting engineering and water companies internationally on water security topics, and regularly gives lectures and participates in media and TV interviews on various topics, including water security. He is a Fellow of the Royal Academy of Engineering, a Foreign Member of the Chinese Academy of Engineering, a Fellow of the European Academy of Sciences and a Fellow of the Learned Society of Wales. He was President of the International Association for Hydro-Environment Engineering and Research (2011-15) and was made an Honorary Member in 2017.

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Impact of Nanosilica Inclusion in Portland-Based Cement

Paulo C. De Morais

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Institute of Physics, University of Brasília, Campus Darcy Ribeiro, Brasília DF, Brazil

Abstract

This Talk will focus on the present status of how nanosized supplementary cementitious material (NSCM) can be used to improve the mechanical properties and durability performance of cementitious composites (cement paste, mortar and concrete). The emphasis here will be on the use of nanosilica (NS), which has been taken cement composites to higher performance levels. Despite the performance improvements in many properties, NS has a great agglomeration tendency, which makes it a difficult material to handle beneficially in a broad perspective. In addition, there is the occurrence of autogenous shrinkage of cementitious materials caused by the accelerated development of mechanical strength in a short period of time. In view of these challenging aspects, recent achievements in monodisperse NS via surface functionalization methods have provided a significant development of silica-decorated nanomaterials (among the functional groups: amine, carboxyl, and glycol), leading to functionalized nanosilica (FNS). FNS can be developed with chemically grafted functional groups that can improve their properties as NSCM. Therefore, a comprehensive evaluation of functionalized NS using amino-terminated 3-aminopropyltriethoxysilane (APTES) and based on the silica gel process with different levels of functionalizing agent will be presented. Data extracted from representative samples and using different experimental techniques, such as zeta potential, dynamic light scattering (DLS), thermogravimetry (TG), infrared spectroscopy (FTIR) and 29Si nuclear magnetic resonance (NMR) will be presented and discussed. The performed analyses show that typical FNS samples reveal sophisticated surface changes involving chemical reactions, proton transferring and hydrogen bonding, leading to different end products and presenting different surface coating composition, hydrodynamic particle size profile and zeta potential. Finally, the performed analyses emphasize the signatures of the onset of the first dressed closed shell while using APTES.

Keywords
Nanosilica; Cementitious material; Surface functionalization; APTES

Biography
Paulo C. DE MORAIS, PhD, full Professor of Physics at University of Brasilia (UnB) – Brazil up to 2013, Appointed as UnB's Emeritus Professor (2014), Appointed as Guest Professor of Huazhong University of Science and Technology – China (2011), Visiting Professor at Huazhong University of Science and Technology (HUST) – China (2012-2015), Appointed as Distinguished Professor at Anhui University (AHU) – China (2016-2019), Appointed as Full Professor at Catholic University of Brasília (UCB) – Brazil (2018), Appointed as CNPq-1A Research Fellowship since 2010, 2007 Master Research Prize (UnB), 2008-member of the European ERA NET Nanoscience Committee, Member of the IEEE-Magnetic Society Technical Committee, Senior Member of the IEEE Society, 2012 China's 1000 Foreign Expert Recipient, and 2012 Academic Excellence Award from Brazilian Professor's Union. He held two-years (1987-1988) post-doc position with Bell Communications Research – New Jersey, USA and received his PhD in Solid State Physics (1986) from the Federal University of Minas Gerais – Brazil. He received his BSc in Chemistry (1976) and in Physics (1977) from the University of Brasília (UnB). With about 500 published papers in peer reviewed journals and 15 patents, he has appeared in recent World ranking of top 1% scientists, such as 2020-Stanford and 2022-Research.com.

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Consistent Planning with Changing Sustainability Targets

Robert Bordley

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Abstract

Sustainability goals have repeatedly shifted. For example, carbon dioxide targets have shifted from 550 ppm to 450 ppm. More aggressive goals reduce the potential damage from excessive levels. But they reduce the time available for maturation of untested but higher potential technologies. This reflects genuine uncertainty about the impacts of different levels of pollution as well as different prioritizations of different kinds of environmental damage. As a result of this volatility, plans with fixed targets must constantly be updated or discarded. This can lead to inefficient use of scarce scientific, engineering and political resources.

This same issue of volatility arises in product design where product requirements, especially software requirements, often change. This paper develops a new planning method which explicitly recognizes the possibility of targets changing. The objective function is consistent with standard principles of rationality (while recognizing Nobel-prizing winning findings on bounded rationality.) The objective function can be easily adjusted based on new information. As volatility increases and targets become unknown, the objective function reduces to standard economic utility models. As the uncertainty about a potential emissions metric increases, the objective function focuses resources on other more well understood metrics.

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Seismic Resilience of Shape Memory Alloy (SMA) Reinforced Bridge Infrastructures Considering Performance and Lifecycle Cost

M. Shahria Alam

The University of British Columbia, Kelowna, BC V1V 1V7, Canada

Abstract

Bridges with traditional structural systems experience large residual deformation after a large magnitude earthquake, and often lose serviceability and need to be demolished incurring huge economic losses. In order to resolve this issue, various smart structural systems have been developed that can overcome permanent deformation and keep the structures serviceable following a major earthquake. Such systems could be built with superelastic materials like shape memory alloys (SMAs), rocking systems with post-tensioning, etc. SMA's distinct flag-shaped hysteresis makes SMA an ideal contender for the structural components of bridges in seismic regions as it can help us avoid demolition and replacement of bridges following an earthquake. The performances of SMA reinforced structures are expected to supersede conventional structures against seismic hazards as they can potentially recover their deformation. This study presents applications of SMAs as reinforcement of structural elements, and the development of kernel components for seismic devices such as bracings, dampers, and isolators in both new bridge design and construction as well as in deficient bridges for seismic repair/retrofit. Although the high cost of SMAs is still limiting their wide use, life cycle cost (LCC) assessment can help us understand better the economic impacts of utilizing SMA in bridges during their service life. The outcomes of such assessment prove the SMA reinforced bridges to be more resilient compared to conventional bridges with a better seismic life-cycle performance from both seismic performance and economic perspective. Besides, further research investigating the production and processing of SMA will make it more cost-competitive in the coming days. It is expected that SMAs will emerge as an essential material in the construction industry in near future.

Biography

Dr. Shahria Alam is a Professor of Civil Engineering and the Tier 1 Principal's Research Chair in Resilient & Green Infrastructure in the School of Engineering and at The University of British Columbia (UBC)'s Okanagan campus. He is serving as the Director of the Green

Construction Research & Training Center (GCRTC) at UBC. Dr. Alam is the Chair of the Engineering Mechanics and Materials Division of the Canadian Society for Civil Engineering (CSCE). He received his PhD in Civil/Structural Engineering from Western University in 2008. His research interests include smart and recycled materials and their structural engineering applications. He has published more than 300 peer-reviewed articles in these areas. He is the recipient of numerous national and international awards including three best paper awards, and last year's EGBC Sustainability Award 2021. Currently, Dr. Alam is serving as an Associate Editor of ASCE's Journal of Bridge Engineering and Journal of Materials in Civil Engineering.

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Decentral Hydrogen

Paul Grunow

Trinity Solarbeteiligungen GmbH, Germany

Abstract

Decentral hydrogen is introduced as fast transition path to short and long-term power storage. It circumvents slow infrastructure installments and enables on-site storage and heat coupling in addition to direct use of local electric power. The power-to-gas approach is extended to small combined heat and power devices in buildings that alternately operate fuel cells and electrolysis. While their heat is used to replace existing fossil heaters on-site, the power is either fed into the grid or consumed via heat-coupled electrolysis to balance the grid power at the nearest grid node. In detail, the power demand of Germany is simulated as a snapshot for 2030 with 100% renewable sourcing. The standard load profile is supplemented with additional loads from 100% electric heat pumps, 100% electric cars, and a fully electrified industry. The renewable power is then scaled up to match this demand with historic hourly yield data from 2018/2019. An optimal mix of photovoltaics, wind, biomass and hydropower is calculated in respect to estimated costs in 2030. In most master plans,hydrogen is understood to be a substitute for fossil fuels. This talk focuses on hydrogen as a storage technology in an all-electric system. The target is to model the most cost-effective end-to-end use of local renewable energies, including excess hydrogen for the industry. The on-site heat coupling is the principal argument for decentralization here. Essentially, it flattens the future peak from exclusive usage of electric heat pumps during cold periods. Batteries are tried out as supplementary components for short-term storage, due to their higher round trip efficiencies. Switching the gas net to hydrogen is considered as an alternative to overcome the slow infrastructure expansions. Further decentral measures are examined in respect to system costs.

Biography

Paul Grunow has completed his Ph.D at the age of 30 years from Technical University Berlin and Helmholtz-Zentrum Berlin and postdoctoral studies from the COPPE/UFRJ in Rio de Janeiro, Brazil. He is the general manager of Trinity Solarbeteiligungen GmbH, an investment company in renewable energies. Before, he co-founded three companies in the area of photovoltaics based in Berlin, i.e. Solon, Q-Cells, PI Photovoltaik-Institut Berlin. He has published more than 12 papers in reputed journals.

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Shear Strength and Behavior of Reinforced Concrete Corbels with or without Carbon Fibers

Jalal Ahmed Saeed, SerwanKh Rafiq Ihsan Al-Shaarbaf

Civil Engineering Department, College of Engineering, University of Sulaimani-Kurdistan Region - Iraq
Civil Engineering Department, College of Engineering, Al-Nahrain University - Baghdad - Iraq

Abstract
The main objective of this work is to study the behavior and the load carrying capacity of fibrous and nonfibrous reinforced concrete corbels. A total of 15 specimens (with or without stirrups) were tested for which the length, thickness and amount of main reinforcement were kept constant. The variables were the shear span to effective depth ratio (a/d), the amount of carbon fibers, and the presence or absence of horizontal stirrups. It was found that when (a/d) ratio decreases an increase in cracking load of 45.1% is obtained, while the ultimate load is increased by 15.9%. For nonfibrous specimens with the same (a/d) ratio, when the amount of stirrups increased from zero to 56.54 mm2, an increase in the cracking load of 5.9% was observed while for fibrous specimens the increase was 8.85%. In addition an increase in the ultimate load of 5.88% and 2.79% were achieved respectively. The addition of carbon fibers resulted in a higher shear cracking load of 14.7% to 30.0% when the volume fraction of fibers increased from zero to 0.25% and 22.0% to 70.0% when the fiber fraction increased from 0.25% to 0.5%. Finally the presence of carbon fibers had increased the ultimate load carrying capacity by 2.6% to 8.8% as compared to the enhancement observed in the first cracking load.

Keywords
behavior, corbel, carbon fiber, shear strength

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Stereolithographic Additive Manufacturing of Practical Components for Environmental Engineering

Soshu Kirihara

Joining and Welding Research Institute, Osaka University, Japan

Abstract

In stereolithographic additive manufacturing (STL-AM), 2-D cross sections were created through photo polymerization by UV laser drawing on spread resin paste including nanoparticles, and 3-D models were sterically printed by layer lamination. The lithography system has been developed to obtain bulky ceramic components with functional geometries. An automatic collimeter was newly equipped with the laser scanner to adjust the beam diameter. Fine or coarse beams could realize high resolution or wide area drawings, respectively. As the row material of the 3-D printing, nanometer sized metal and ceramic particles were dispersed into acrylic liquid resins at about 60 % in volume fraction. These materials were mixed and deformed to obtain thixotropic slurry. The resin paste was spread on a glass substrate with 50 μm in layer thickness by a mechanically moved knife edge. An ultraviolet laser beam of 355 nm in wavelength was adjusted to 50 μm in variable diameter and scanned on the spread resin surface. Irradiation power was automatically changed for an adequate solidification depth for layer bonding. The composite precursors including nanoparticles were dewaxed and sintered in the air atmosphere. In recent investigations, ultraviolet laser lithographic additive manufacturing (UVL-AM) was newly developed as a direct forming process of fine metal or ceramic components. As an additive manufacturing technique, 2-D cross sections were created through dewaxing and sintering by UV laser drawing, and 3-D components were sterically printed by layer laminations with interlayer joining. Through computer-aided smart manufacturing, design, and evaluation (Smart MADE), practical material components were fabricated to modulate energy and material transfers in potential fields between human societies and natural environments as active contributions to Sustainable Development Goals (SDGs).

Keywords

Stereolithography, Additive Manufacturing, Functionally Geometric Structures

Biography

Soshu Kirihara is a doctor of engineering and a professor of Joining and Welding Research Institute (JWRI), Osaka University, Japan. In his main investigation “Materials Tectonics as Sustainable Geoengineering” for environmental modifications and resource circulations, multi-dimensional structures were successfully fabricated to modulate energy and materials flows effectively. Ceramic and metal components were fabricated directly by smart additive manufacturing, design and evaluation (Smart MADE) using high power ultraviolet laser lithography. Original stereolithography systems were developed, and new start-up company “SK-Fine” was established through academic-industrial collaboration.

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Advanced Numerical Modelling of Timber Structures

Zhiyong Chen

Building Systems, FP Innovations, 2665 East Mall, Vancouver, Canada

Abstract

Computer modelling is an essential part in the analysis and design of residential and commercial buildings as well as long-span structures. It is also a valuable tool in the development and optimisation of wood-based products, connections, and systems. A survey shows that practicing engineers are typically unfamiliar with timber structure modelling, and researchers generally lack resources for advanced modelling of timber systems. A global collaboration, including research institutes, consulting firms, manufactures, software companies, and government and associations, was initiated by FPInnovations in 2020 to develop a guide for supporting the application of numerical modelling on analysis and design of timber structures, and development and optimisation of wood-based products and systems. The guide – Modelling Guide for Timber Structures – covers a wide range of practical and advanced modelling contents, including a comparison among timber, steel, and concrete structures, in terms of modelling emphases; key modelling principles, methods, and techniques specific for timber structures; modelling approaches and considerations for wood-based components, connections, and assemblies; and analysing approaches and considerations for timber structures during progressive collapse, wind, and earthquake events. This paper provides a high-level overview of this guide, with the goal of assisting practicing engineers to apply computer modelling to timber structures, enriching researchers' resources for advanced computer modelling of timber systems; and assisting software companies to identify the gaps and upgrade programs accordingly to accommodate advanced computer modelling of timber structures.

Keywords

Timber Structures; Modelling; Analysis; Performance-based.

Biography

Dr. Zhiyong Chen is a Scientist in the Building Systems Group at FPInnovations. He is also an external graduate faculty at the University of Maine. He has over 15 years of research experience in the advanced multidisciplinary simulation of timber structures, subject to earthquakes, wind, fire, moisture and time effects. He has authored over 120 scientific and technical publications,

including textbook chapters, the Modelling Guide for Timber Structures, the Canadian Guide for Design of Tall Wood Buildings, and the Canadian CLT Handbook. Moreover, he is a member of technical task groups of the Canadian Standard for Engineering Design in Wood and the Wood Structures Committee of Canadian Society for Civil Engineering.

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Parameters of the Post-Yield Deformation of an RC Beam with Corroded Steel Bars

Divyashree Yadav

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Abstract

The post-yield behaviour of reinforced concrete (RC) beams with corroded reinforcing is depicted in this study. In order to assess whether current structures are seismically acceptable, it is necessary to conduct a study on how corrosion in reinforcement affects the behaviour of various structural components. Strong column weak beam behaviour should occur in seismically effective structures, allowing the largest number of plastic hinges to form in the beams. The idea of plastic hinges is essential because seismic analysis of existing RC constructions defines the deformation and load-carrying capacity of the RC beam. Eight different types of simply supported beams (three samples of each type) are studied utilising two point loading (about one-third and two-thirds of span) with M20 grade concrete, Fe250 grade reinforcement, and levels of reinforcement corrosion (10, 20, and 30%). According to test results, even though they were designed to fail in flexure, RC beams with 30% corroded bars shatter in unintended shear. As reinforcement bar corrosion grows from 10% to 30%, the plastic hinge length decreases, making it unsuitable as a seismic part.

Keywords

Concrete grade; corrosion; reinforcement grade; Reinforced concrete beam

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Modelling of Excess Pore Water Pressures Induced by Seismic Events in Silty Sands for Numerical Applications

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Abstract

The buildup of excess pore water pressure (PWP) in sandy soils during seismic loading causes a reduction in stiffness and strength and can lead to liquefaction. Therefore, an accurate prediction of excess PWP buildup induced by seismic events is a fundamental requirement for assessing the seismic safety and resilience of structures and infrastructures in saturated soils. Seismic strong-motion events that occurred during past years demonstrated that the excess PWP buildup in sandy soils must be properly accounted for the analysis of site response; nevertheless, this issue is still a demanding task for the design of infrastructures and facilities. This presentation presents some of the strategies that can be employed to model excess PWP induced by seismic events in silty sands: stress-based approach (e.g., Seed et al. 1975), strain-based approach (e.g., Vucetic & Dobry 1986), energy-based approach (e.g., Berrill & Davis 1985). The state of the art, advantages and disadvantages, and future perspectives of the three approaches mentioned above are reported. Considering that the energy-based approach for assessing the residual PWP buildup has received increasing attention recently, this approach was selected to show the most influential factors in predicting seismic PWP in silty sands. Starting from a comprehensive experimental program of undrained cyclic simple shear tests performed at the University Mediterranea of Reggio Calabria on Ticino sand mixed with different percentages of non-plastic fines at varying initial density state, initial vertical effective stress, soil fabric, fines content, and applied cyclic stress ratios, it was found that the relationship between excess PWP ratio and seismic dissipated energy per unit volume was dependent on relative density and fines content of the sand. In contrast, cyclic stress ratio, initial vertical effective stress, and soil fabric appeared to have a minor impact. Furthermore, it was shown that the energy-based Berril and Davis model used for predicting residual excess PWP in clean sands gave satisfactory results for silty sands, and specific correlations for the model parameters were developed. The last part of the presentation reported nonlinear effective stress analyses using DeepSoil software with stress-based, energy-based, and strain-

based models to evaluate their capabilities in predicting PWP buildup. Their implementation in a nonlinear 1D code have been examined by analysing a case study of a bank damaged during the 2012 Emilia seismic sequence. It was affected by deformations and ground cracks causing damages to numerous buildings and productive activities. The residual excess PWP values are linked to the post-seismic stability of bank slopes, reflecting the observed damages. Thus, an indirect way to evaluate the reliability of PWP models may turn out from the factor of safety obtained by post- seismic stability analysis of the bank slopes. In this context, the stress-based model provides the most conservative results, which are not confirmed by the observed damages. On the contrary, the strain- based model predicts a stable condition of the bank slopes, which is inconsistent with the observed damages. The energy-based model predicts an intermediate behaviour that can be considered reasonable when compared to the damages reported to buildings and ground surface.

Keywords
Excess Pore Water Pressures; Non-Plastic Silty Sands; Earthquake; Modelling

Biography
Giuseppe Tomasello is Research Assistant in Geotechnical Engineering at the University Mediterranea of Reggio Calabria, Department of Civil, Energy, Environmental and Material Engineering (DICEAM). He received his Ph.D. in Civil, Environmental and Safety Engineering at the University of Messina on December 2021. His main research activity is in the field of geotechnical earthquake engineering with particular reference to the undrained cyclic response of problematic soils such as crushable sands and transitional soils (i.e. non-plastic silty sands). He co-authored several scientific publications on good standing international journals on the following topics: liquefaction behaviour of intermediate soils and crushable sands under both monotonic and cyclic loading conditions, cyclic pore water pressure generation models of soils for seismic analyses, validation of energy based approaches to predict liquefaction resistance of clean sands. He has been actively involved in a research cooperation with the Ruhr-Universität of Bochum. In 2017-2021, he was member of the working group involved in a national research and development project. Giuseppe Tomasello is a registred professional civil engineer from 2017 and has been involved as consultant on important engineering projects during a postgraduate internship at Studio Geotecnico Italiano (SGI) in Milan.

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Optimizing Complex Supply Chains Using AI-Driven Risk Management, Immersive Simulation, and Qualitative Variables

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Abstract

Supply chains, such as those found for large aircraft, launch vehicles, satellites, and spacecraft, tend to be significantly complex, with bills of material (BOMs) of over 20,000 individual parts. Due to the many levels of the supply chain (which can reach 12 or more), along with the high performance requirements of the components, a supply chain for a single vehicle could last for over two years. This level of complexity also introduces a high potential for delays or shortages if even a small part of the supply chain fails, which can lead to schedule delays, redesigns, and ultimately cost overruns.

There are many supply chain tools available, including robust enterprise resource planning (ERP) systems that aim to map and manage the entire supply chain. However, these systems are not equipped to handle many of the most common obstacles faced by aerospace companies: missing/corrupt data, missed connections on the hierarchical bill of material, poor delivery estimates from vendors, and no variability data on delivery estimates. In addition, these tools cannot accommodate purely qualitative variables, which may be dictated by company leadership for reasons not included in the ERP (prioritizing one customer over another due to relationships or other factors instead of planning solely based on delivery dates.

This paper will discuss a framework that addresses the traditional needs of an ERP system, while also solving many of the key issues discussed above. This framework is built to manage not an ideal supply chain, but a supply chain that contains many of the difficult problems prevalent in supply chains of even the most complex, high tolerance vehicles.

Specifically, the paper will address:

- The critical role of delivery variability by individual part instead of a single value (eg. 30 days) or an average delivery estimate.
- Using AI-based classification techniques to supplement delivery variability values for a

component without the proper data. This can be completed by utilizing components with well-known delivery variability, and using the AI model to predict the delivery probability distribution.

- Developing models based on true cost of storage by component to allow ROI (return on investment) driven values for inventory stock/reorder levels.
- Using the completed supply chain data analysis to create a sophisticated simulation of the supply chain as a whole, then using Monte Carlo analysis to build accurate delivery predictions at every level of the BOM, plus identify various areas with notable uncertainty risk.
- The need to incorporate purely qualitative data for the purpose of reflecting management intent. This includes addressing qualitative elements, such as customer preferences, for a manufacturing line with multiple customers and limited resources to deliver the finished product on schedule. Ensuring that the model can simulate and accurately predict with solely qualitative adjustments is critical for its success in a realistic environment.

The resulting framework will introduce the ability to accurately manage a high-complexity supply chain, for optimum results, regardless of the realistic issues faced today by aerospace companies working to develop vehicles with significant supply chains.

Keywords
AI; Supply Chain Optimization; Simulation; Efficiency.

Biography
Nathan is an aerospace engineering professor at TU Delft, specializing in AI, robotics, manufacturing, project/business management, and rapid iteration prototyping. He holds degrees in business information systems, marketing, operations management, an MBA, and a masters of Data Science from Columbia University. Nathan has spoken at over 80 international conferences on AI, aerospace/defense, smart manufacturing, robotics, quantum computing, and other topics. He's worked for NASA, Raytheon, Northrop Grumman, and other aerospace organizations for over twenty years, with experience in product development, project management, supply chain, manufacturing, and AI architecture.

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Exploitation of Plastics Waste in Lime-Based Mortars

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Abstract

Plastics have prevailed in the modern life, leading to enormous waste. Nowadays, around 14-18% of plastic waste is recycled, 24% is thermally treated, while the rest is disposed in controlled or uncontrolled landfills and environment. In Europe, during the year 2020, 24.5Mt of plastic waste were generated, from which only the 14% was recycled and 50% was incinerated for energy recovery. Regarding the polymers type, the most popular concern polypropylene and polyethylene (packaging products), high-density polyethylene (toys, bottles, pipes), polyvinyl chloride (window frames, coverings, pipes) and polyethylene terephthalate (bottles). The exploitation of waste plastic in the constructional sector emerged during the last decade, with relevant research to focus on cement-based materials and highlighting the benefits arising from their use (natural resources and energy savings, protection of the environment, development of sustainable building materials).

In this paper, an effort has been made to investigate the influence of two types of waste plastics, polypropylene (PP) and polyvinyl chloride (PVC), in traditional mortars based on lime and natural pozzolan. To this direction, five mortar mixtures were designed and manufactured, where natural aggregates were partially substituted by PP and PVC (in proportions of 12.5 and 25% per volume of aggregates). The physical and mechanical properties of the mortars were afterwards determined, including shrinkage deformations, porosity, absorption, apparent specific gravity, capillary absorption index, dynamic modulus of elasticity, flexural and compressive strength. All results were comparatively evaluated, in order to investigate the impact of the different types and proportions of waste plastic particles on the performance of lime-based mortars and assess whether this substitution is feasible in the case of lime-based mortars.

From the correlation of the results, it was asserted that shrinkage deformations were reduced in the short-term (up to the 20d age) in all modified compositions, porosity varied according to the plastic waste type and apparent specific gravity decreased in all cases, resulting to lightweight materials. Mechanical characteristics were influenced by the type and proportion of plastics waste, improving in many cases the long-term strength of the specimens, as well as their post-failure state.

Generally, it was concluded that the exploitation of waste plastics in lime-based systems is feasible and may lead to sustainable, eco-friendly materials for specific applications. However, the application requirements and the individual properties of the waste plastic particles should be taken into account.

Keywords
Lime-based mortars; Plastics waste; Polypropylene; Traditional materials

Biography
Vasiliki Pachta is an Architect, holding a PhD in the School of Civil Engineering of the Aristotle University of Thessaloniki. She has a long-term research experience on the physico-mechanical analysis of building materials and the design of compatible restoration materials for heritage structures. She has participated in various Research projects as a member of the research group and coordinator, while has published more than 120 relevant papers in Conferences and scientific journals. She participates in various National and International Organizations (RILEM Technical Committees, ETEPAM etc), acts as Reviewer in peer reviewed Journals and member of organizing/scientific committees of National and International Conferences.

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Climate Change: Building the Resilience of Poor Rural Communities

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Abstract

Poor rural people and climate change

More than 3 billion people live in the rural areas of developing countries. Most live on less than US$2-a-day and depend on agriculture for their livelihoods. Many live in remote, marginal areas such as mountains, drylands and deserts – areas with poor quality natural resources, limited communication and transportation networks and weak institutions. ACOBIDER is a Civil society Organisation dedicated to reducing rural poverty and hunger. It provides financial and technical assistance to developing rural communities' countries to improve on agriculture and rural development programmes and projects. ACOBIDER was created in response to the droughts and food crises that affected millions of people in northern Cameroon and Eastern regions. Since beginning operations in 2016, ACOBIDER has helped more than 3000 poor rural women and men take steps to build better lives for themselves and their families. For 10 years, ACOBIDER has worked to help poor rural people manage their natural resources more sustainably, increase their agricultural productivity and reduce their vulnerability to climatic shocks. Helping smallholder farmers adapt to change has always been part of ACOBIDER core business, but in recent years, as these shocks. have increased, our focus on climate change issues has become more explicit. Today, much of AOBIDER work has strong climate change component because agriculture is the human activity most directly affected by climate change. Poor rural people are the most vulnerable to the effects of climate change and all too often lack the capacity to withstand its impacts. This is why ACOBIDER is acting at the policy, operational and regional levels to make climate change mitigation and adaptation a priority. Adaptation to climate variability has been a de facto part of IFAD's work for decades, through its efforts to build the resilience of poor rural people to difficult conditions. More recently, in response to the growing magnitude of climate change, IFAD is increasingly integrating adaptation into its projects and programmes and exploring innovative solutions, such as supporting crop research and index-based weather risk insurance. Climate change considerations are beginning to be incorporated into every aspect of ACOBIDER work, from project design to implementation and assessment to ensure that adequate attention is given to reducing the vulnerability of smallholder

farmers to increased climatic uncertainty. Steps are also being taken to ensure that mitigation measures are credible and can be feasibly implemented. ACOBIDER programmes and projects primarily support four types of adaptation activity: diversifying livelihoods to reduce risk; improving agricultural techniques and technologies; strengthening community-based natural resource management; and preparing for risk and coping with disaster. ACOBIDER is also stepping up its work on mitigation efforts in the areas of reforestation and improving land-use management, including rewards for environmental services and promoting renewable energy sources. Developing countries are critically short of resources for fighting climate change. The United Nations Framework Convention on Climate Change estimates that at least US$83 billion per year will be needed by 2030 to protect the livelihoods of poor rural people in developing countries. ACOBIDER is committed to working with developing countries to gain access to the financial and technical resources needed to mitigate climate change. Our experience shows that the most effective way to reduce poverty and increase food security is to ensure that poor rural people are involved in development planning and policymaking, and in implementing change themselves. Agriculture and climate change: working on adaptation and mitigation with poor rural people Over the centuries, human societies have developed the capacity to adapt to environmental change. These adaptations include practicing shifting cultivation, adopting new crop varieties, and modifying grazing patterns. But today the speed and intensity of climate change is outpacing the speed of autonomous adaptations and is threatening to overwhelm the ability of poor rural people to cope. Context is critical for effective climate change adaptation. As the Intergovernmental Panel on Climate Change notes, adaptive capacity is influenced by changes in wealth, human capital, information and technology, material resources, infrastructure, institutions and entitlements. Climate change poses a considerable threat to poor farmers and rural communities in developing countries. Even a small increase in local temperatures could lead to reduced crop yields for those living at lower latitudes, especially in seasonally dry and tropical regions. More frequent and extreme weather events, such as droughts and floods, are expected to make local crop production even more difficult. Climate change is expected to put an estimated 49 million more people at risk of hunger by 2020. While there is no single way to mitigate or adapt to the impact of climate change, experience shows that measures are most effective when local communities are involved from the start in planning and implementing changes. ACOBIDER has been steadily increasing its collaboration with farmers' organizations, as partners in development programmes and in policy dialogue. Only by working with poor rural people themselves can we hope to reduce the risks associated with climate change and make a dent in world poverty and hunger.

FACTS

In Between 15 and 37 per cent of land plants and animal species could become extinct by 2050 as a result of climate change in Emissions of greenhouse gases have increased, on average, by 1.6 per cent per year over the past 30 years in Agriculture and deforestation together contribute up to 30 per cent of all greenhouse gas emissions: forests act as carbon sinks, so deforestation results in higher carbon dioxide in the atmosphere. Recent climate changes and variations are beginning to have effects on many natural and human systems, including earlier spring crop planting at the higher latitudes in the northern hemisphere. In the Sahelian region of Cameroon, warmer and drier conditions have led to a reduced growing season with detrimental effects on crops. Yields from rainfed agriculture could be reduced by up to 50 per cent by 2020 in some countries. About 95 per cent of Cameroon's agriculture depends on rainfall. In East and Southeast Cameroon, crop yields could increase by up to 20 per cent by 2050. In north, Central and South Cameroon yields could decrease by 30 per cent by 2050,

Compensation for Environmental Services: local initiatives, global benefits Agriculture and forestry management can play a key role in mitigating the impacts of climate change and in promoting adaptation at the local level. Carbon sequestration and reduced carbon emissions can be achieved in a variety of ways, including afforestation and reforestation, improved livestock management, rehabilitation of degraded crop and pasture lands, and better land management practices such as agroforestry. Poor rural people – many of whom are indigenous peoples – depend on natural resources for their livelihoods. They are often the custodians of the natural resource base and can play a key role in protecting ecosystems that benefit everyone. However, people who are struggling to feed themselves and their families are often forced to resort to short term solutions, such as cutting down trees for firewood instead of preserving forests. For poor rural people to play an active role in climate change mitigation, it is essential that they are compensated for their activities that contribute to mitigation. It's a win-win situation for their families and for the planet as a whole. There are various schemes – such as Payment for Environmental Services (PES) and Rewards for Environmental Services (RES) – designed to compensate communities for sustainable management of natural resources and can help implement reduced emissions from deforestation and degradation in developing countries (REDD) activities. To effectively involve smallholders and poor communities, it is important to help them overcome barriers such as very high transaction costs, insecure property rights, inability to afford investments, lack of information and risk aversion. Incentives for environmental services are not necessarily monetary. They could also be strengthened property rights, better information, marketing opportunities, more inputs and improved credit services. Poor rural people, with their traditional knowledge, can significantly contribute to mitigation. International agencies, working together, should redouble their efforts to support initiatives that reward rural communities and smallholder farmers for environmental services.

Building alliances.

Climate change is a global environmental challenge. Helping poor rural people adapt to the impacts of climate change and enabling them to contribute to mitigation is not a task that can be performed by a single agency alone; it requires cooperation and a coordinated approach from the international community. Partnerships are a critical way for ACOBIDER to learn more about climate change, share its knowledge, strengthen the operations it supports, leverage additional funding, and influence the global policy agenda. ACOBIDER works with the governments, poor rural people's organizations, non-governmental organizations, and the private sector to design innovative projects and programmes that fit within national priorities for agriculture and rural development. ACOBIDER also works closely with other international agencies and multilateral financial institutions. ACOBIDER supports efforts to strengthen the impact of the local system's work and participates in pilot initiatives to better coordinate the efforts of international agencies at the country level to deliver as one. ACOBIDER also works closely with the other Home-based agencies: the Food and Agriculture Organization of the United Nations and the World Food Programme. The Global Environment Facility (GEF), as one of the main financial mechanisms for climate change, represents a key partner for ACOBIDER. ACOBIDER/Italian cooperation currently focuses on nurturing the links between poverty reduction, sustainable land management and climate change issues. Through the Global Environment and Climate Change (GECC) unit, ACOBIDER helps communities access funding within the adaptation programme. This includes the TREEDOM-managed resources under the United Nations Framework Convention on Climate Change (the Least Developed Country Fund, the Special Climate Change Fund and the Adaptation Fund), and the GEF Trust Fund. The Global Mechanism (GM) of the UN Convention to Combat Desertification (UNCCD) works with countries to mobilize financial resources in support of UNCCD implementation. ACOBIDER has worked with the GM on many occasions to link new supported projects to GM initiatives and UNCCD objectives. ACOBIDER is also party to the UNFCCC Work Programme on impacts, vulnerability, and adaptation to climate change. In addition, the UN System Chief Executives Board for Coordination (CEB) is encouraging a coordinated, action-oriented approach to climate change, under the leadership of the Secretary-General.

Keywords

climate change ; resilience; adaptation. Environmental Services

Biography

Nwafi NGEAYI ADI is a researcher in the domain of biodiversity conservation and rural Development. In this capacity he has worked for over 10 years in designing and developing

approaches to community resilience towards climate change. He has helped poor rural women and men take steps to build better lives for themselves and their families by managing their natural resources more sustainably, increase their agricultural productivity and reduce their vulnerability to climatic shocks. Helping smallholder farmers adapt to change.

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Fire Resistance of Prestressed Polypropylene-Firber-Concrete Bridge Girders

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Abstract

This paper presents an investigation on fire resistance of prestressed polypropylene- fiber-concrete (PPFC) bridge girders simultaneously suffered from localized hydrocarbon-fuel fire (diesel oil mixed with natural gas) and enforced structural loading. This investigation is comprised of two stages namely; thermal response and structural behaviours. Thermal responses, embracing temperature distributed inside chamber, temperature conducted within concrete and prestressing strands, were measured using fire resistance tests and analyzed throughout entire fire exposure duration. Further, structural behaviours, including mid-span deflection, effective prestress, spalling of polypropylene (PP) fiber concrete, failure modes, damage progression and fire resistance, generated from fire tests were investigated in detail. The research results indicate that PP fiber can highly mitigate pressure of water vapor generated within high-strength concrete applied in PPFC bridge girders, thus effectively enhancing spalling resistance of concrete in PPFC girders exposed to elevated temperatures. The designed diaphragm can maintain temperature inside chamber and also within top flange of PPFC box bridge girders consistent through a considerable period of time in the case of temperature surpassing 100 ℃. However, the configurated diaphragm has slight effects on structural behaviours of PPFC box bridge girders. Prestressing strands exhibit an instance of suddenly braking off, to thereby causing the effective prestress taking a dive towards final stage of fire exposure. Therefore, the mid-span deflection presents a sharp increase at final stage of fire exposure. Failure of PPFC bridge girders under fire exposure conditions is mainly governed by fracture of prestressing strands at elevated temperatures. Rate of deflection limit state can be reliable to evaluate fire resistance of PPFC bridge girders under fuel fire exposure conditions. This sudden failure of PPFC bridge girders can be prevented effectively dependent on usage of reserved prestressing strands.

Keywords

Bridge girders; Polypropylene-firber-concrete; Prestress; Fire resistance

Biography

Dr. Gang Zhang is a University Distinguished Professor at Chang'an University (CHD) and an International Famous Scientist in the field of bridge fire safety. He serves as Director of Research Center on Bridge Extreme Loading and Protection, and Head of Bridge Structure and Material Fire Laboratory at Chang'an University. Prof. Zhang's expertise is on the evaluation and protection of bridge structure and material behavior under extreme fire conditions. His research has focused on the experimental behavior, analytical modeling and numerical prediction of bridge structure under extreme fire exposure conditions, constitutive modelling of material properties at high temperatures, fire-resistant design of bridge structure, and bridge collapsed investigations. He has developed fundamental understanding on the behavior of bridge structure and materials subjected to extreme fire hazard. His research accomplishments, in the field of bridge fire safety and material at elevated temperatures, has great contribution and major impacts to improve development of disaster prevention and mitigation in transport infrastructure. Prof. Zhang, along with his students and collaborates, has led to over 150 peer-reviewed papers in journals and conferences. The most recent contribution from Zhang is a new text book on "Fire Theory and Calculation Method of Bridge Structure" published by China Communications Press. Prof. Zhang He has been "elected" as "Fellow" of two academies/ associations.

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New Age Technologies for Automation of Structural Health Monitoring of Wind Farms

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Abstract

The world is moving towards a cleaner and greener mode of energy generation system which involves Wind farms. Wind farms are usually located in large open and remote areas where sufficient quantity of air is available to move the turbine blades of the tower. Multiple such towers can combine and generate several Mwatts of power. However, these towers need continuous monitoring for any faults- breakage, erosion, strain, crack. Manual checking can be done only periodically due to the risk factors involved in it, the decay cannot be prevented but only cured in future. These structures need inspection, investigation, proper monitoring for the detection of damages, drawbacks or any kind of issues so that they can be repaired, refitted and restored. Structure health monitoring is a technique which provides information on the current status of structure and detecting the damages in different sections of structure.
The objective is to reduce the time-delay and danger involved in performing fault-detection in structures which are not accessible easily. By using our proposed method, several advantages can be achieved i.e., firstly, human intervention will be reduced. Secondly, real-time fault detection can be done. Thirdly, delay and danger involved in fault detection will be reduced. Lastly, it will be an automated system where a person sitting remotely can identify the type and nature of faults in the building and can deploy corrective measures without delay.

In the last years, due to the technological progress and wide spreading of the unmanned aerial vehicles i.e., drones were introduced to increase the performances of large scale monitoring. In western countries, the drones have been proposed to be used for providing SHM in Bridges, pipes etc. Also, new age computing technology like Artificial Intelligence and Machine Learning can club together with Drone system to generate a real-time structural health monitoring system for Windfarms.

Keywords

Structural health; Wind Farm; Drone; Artificial Intelligence

Biography

Dr. Deepshikha Agarwal is the Hed of Department (Information Technology) at IIIT, Lucknow(India). She received her PhD degree in 2015 from MNNIT Allahabad with research on "Applications of WSN for structural health monitoring of off-shore wind farm". In 2007, she received MTech degree from IIIT Allahabad with research on "A dynamic traffic monitoring system using WSN". With an experience of more than 17 years in teaching and research work, She gave project guidance to UG and PG in Machine Learning, Blockchain, IoT, Mobile Adhoc communications and Wireless sensor networks. She is an active reviewer for Journals - IEEE, IET, Science Direct and Springer. She has been invited for several guest lectures abroad including Turkey, China, Japan, Indonesia and Orlando. She holds membership of prestigious professional bodies IEEE, IET, PcPro and Oxford Journals. She also been Convenor, TPC member and Chairman in reputed International Conferences in the past.

She has authored and published 50+ research papers, articles, books and chapters. She has been awarded prestigious awards- Women Eduvisionary of the year and Swami Vivekanand Changemaker award by MentorX in 2021, International Academic Achievers Award (Excellent in Professional Achievement), JYD Int School of Higher education, Zurich, Switzerland in 2022. She was recognized as World Record International Author in 2022. Her profile is listed in Googlescholar; Citations 115+ ; h-index:6 & i10 index: 3

She has received two International Patent Grants. Her research interests include Smart Grid, Renewable Energy, Wireless communication, Sensor networks, Artificial Intelligence, Networks, Algorithms and optimization, Machine learning and IoT.

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Minimize the Size of Internal Voids of Low-cost Metal Material Extrusion Fabricated Parts by Changing Manufacturing Parameters

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Abstract
Additive Manufacturing (AM), also named as 3D Printing (3DP), is a set of technologies which can fabricate parts layer-by-layer from computer-aided design (CAD) models. Among all AM technologies, Fused Filament Fabrication (FFF) is the most widely used one. However, metal FFF is a difficult point since the working temperature of FFF 3D printers is much lower than most metal melting points. Thus, the researcher developed Low-cost Metal Material Extrusion (LCMME) to print metal parts without laser, and this paper focused on minimizing the size of internal voids of LCMME fabricated parts by changing manufacturing parameters.

Keywords
Additive Manufacturing, FFF, Low-cost Metal Material Extrusion, internal voids

Biography
Dr. Zhicheng Zhang finished his first Bachelor in Physics from Shandong Normal University (China) in June 2014, and received his second Bachelor in Physics from East Tennessee State University (USA) in May 2015. He entered Tennessee Technological University (USA) in August 2017 and received a Master of Science degree in Mechanical Engineering in August 2019. He stayed at Tennessee Technological University to complete his PhD in May 2022 and his research interests are Additive Manufacturing, Machine Learning and Low-cost Metal Material Extrusion. Dr. Zhang is an assistant professor in Machinery and Electronics Engineering College, Shandong Agriculture and Engineering University (China).

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Behaviour of Eccentrically Loaded Circular Concrete-filled Steel Tube Stub Columns with Localized Corrosion

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Abstract
In this paper, 12 concrete-filled steel tube (CFST) stub columns with localized corrosion were tested under eccentric load. The effects of the depth ratio, size and location of localized corrosion, and loading eccentricity on the eccentric compression behavior of circular concrete-filled steel tube stub columns were investigated. A finite element model of circular CFST stub columns with localized corrosion under eccentric load was developed and then parameter analysis was carried out. Based on the experimental and numerical results, it was found that the load bearing capacity decreases with increasing the depth ratio and size of localized corrosion. The localized corrosion at the mid-height caused more significant capacity deterioration than that at the column ends. In addition, the localized corrosion with □ = 0° and 180° has more adverse effects on the capacity of eccentrically loaded CFST columns than that with □ = 90°. Moreover, the localized corrosion with □ = 0° (at compression side) is more harmful than that □ = 180° (at tension side) for the specimens with compression-controlled failure, and vice versa for the specimens with tension-controlled failure. Finally, a design model of eccentrically loaded CFST column with localized corrosion was proposed based on an established equivalent specimen. The results suggested that the proposed model predicted the load bearing capacities with reasonable accuracy.

Keywords
Concrete-filled steel tube; Localized corrosion; Eccentric compression; Design

Biography
Dr. Siqi Lin is currently a professor at the Faculty of Architecture, Civil and Transportation Engineering of Beijing University of Technology, China. He obtained his Ph.D. from the Kanagawa University, Japan in 2019. His research interests mainly focused on composite structures (e.g., CFST, FRP-confined concrete), recycled aggregate concrete and its structural

application. He has published more than 20 SCI/EI indexed papers in the international/domestic journals, including <Journal of Composites for Construction-ASCE>, <Journal of Structural Engineering-ASCE>, <Composite Structures>,<Engineering Structures>. He is the principal investigator of 4 research projects, and serves as the the guest editor of Buildings journal and a regular reviewer of more than 10 international/domestic SCI/EI journals.

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Natural Capital Statements: A Financial Statement Approach for Sustainability in Natural Capital Accounting

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Abstract

The main reason that natural capital valuation is needed is to assist stakeholders in making regulations and decisions on the conditions of natural resources on the basis of monetary value information. The conventional financial statement becomes especially useful when applied to natural capital records and documents natural capital as something transparent. This paper aims to provide a broader picture of the use of financial statements of natural capital so that sustainable development of natural capital can be calculated. We illustrate and explain the application of conventional financial statements to the financial statements of natural capital by producing natural capital balance sheets and natural capital income statements. With the diverse characteristics of forest resource capital, it is necessary to carry out a categorization system with a structured sequence of identification, classification, and assessment. The concept of the accounting process and natural capital assessment and valuation can be implemented as described in this paper. With a monetary valuation, natural capital becomes something of value that can be processed by a financial accounting mechanism in a financial account. Implementation of such a framework makes it easier for policymakers and decision-makers to act so that the analysis conducted on natural capital is more comprehensive, meaningful, and practically relevant.

Keywords

monetary valuation; natural capital accounting; natural capital statements

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Disaster Resilience of Natural Gas Pipeline System: based on Deterministic and Probabilistic Evaluations

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Abstract

Based on the development of integrity and reliability, resilience research of natural gas pipeline system (NGPS) has been focused more, which is still in budding stage. It is important to build a methodology framework of the NGPS resilience evaluation, according to the practical characteristics of NGPS. Based on the disturbances of NGPS, which are deterministic and probabilistic, an integrated framework is proposed for evaluating the supply resilience of NGPS, a novel concept proposed from this research.

The framework of supply resilience includes global resilience, temporal resilience and threshold resilience. Supply resilience is considered with deterministic and probabilistic disturbances of NGPS. It is difficult to analyse the supply resilience based on hydraulic calculation, so the evaluation is based on complex networks theory (CNT). Based on CNT, the maximum flow method and shortest path method are integrated with operation and structural parameters to calculate the amounts and routes of gas supply, before/after disturbance, to provide information for the pre-disturbance performance and topological structure, including choices of spare gas sources and gas routes. The focus is changed from whole system to the affected area, based on complex networks theory and graph theory. For the supply resilience under probabilistic disturbance, Markov Chain and Monte Carlo simulation are applied to determine the status of the network pipes. Two practical numerical examples, from Europe and China, show the process of analysis in detail.

The results can contribute to the guidance of NGPS topological designing and the building of prewarning scheme, including spare gas sources and gas routes optimization, and the strategy of pipeline maintenance, also can help the rapid analysis of disturbance consequences and the enhancement of evaluating accuracy in NGPS resilience

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Keywords
natural gas pipeline system; resilience; complex networks theory; deterministic evaluation; probabilistic evaluation

Biography
Zhaoming Yang focuses on the research of Oil & Gas transportation and storage for 7 years, especially on the areas of system resilience, multiphase flow and separation technology. He received bachelor and master degrees in China University of Petroleum (East China), and does Ph.D. research in City University of Hong Kong and China University of Petroleum (Beijing). Now he is in Aalborg University, Risk, Resilience, Safety, and Sustainability of Systems Research Group. He has published papers in Journal of Cleaner Production, Energy, Journal of Natural Gas Science and Engineering, Petroleum Science, Reliability Engineering System Safety, International Journal of Oil Gas and Coal Technology et al, and also has applied more than 10 patents in key areas of Oil & Gas industry. He is the session chair of CUE2022-Applied Energy Symposium: LOW CARBON CITIES & URBAN ENERGY SYSTEMS.

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Enhancing the Fatigue of Mechanical Systems Such as Dispensers Entrenched on Generalized Life-Stress Models and Sample Sizes

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Abstract

To lengthen the life of a mechanical system, parametric accelerated life testing (ALT) is recommended as an established way to help identify structural imperfections and reduce fatigue-related failures. It involves (1) a parametric ALT scheme, (2) fatigue design, (3) ALTs with alterations, and (4) an estimate of whether design(s) achieve the BX lifetime. The application of a quantum-transported time to failure prototype and a sample size expression is also suggested. The improvements in the reliability of a water dispenser made of stainless steel or polypropylene (PP) in a bottom-mount domestic refrigerator was used as a case study. In the first ALT, the hinge and front corner of the dispensing system was cracked. The water dispenser lever was altered by increasing the thickness of its ribs and fillets. In the second ALT, the altered dispensing lever system cracked because there was an insufficient thickness in its front corner for impact loading. The critical design factors for improving reliability were corner fillet rounding and rib thickening in a dispenser lever. As there were no difficulties in the third ALT, the dispenser life was verified to have a B1 life of 10 years.

Keywords

parametric ALT; mechanical product; fatigue; water dispenser; design faults

Biography

Dr Woo has a BS and MS in Mechanical Engineering, and he has obtained PhD in Mechanical Engineering from Texas A&M. He majors in energy system such as HVAC and its heat transfer, optimal design and control of refrigerator, reliability design of thermal components, and failure Analysis of thermal components in marketplace using the Non-destructive such as SEM & XRAY. In 1992.03–1997 he worked in Agency for Defense Development, Chinhae, South Korea, where he has researcher in charge of Development of Naval weapon System.

He was working as a Senior Reliability Engineer in Refrigerator Division, Digital Appliance, SAMSUNG Electronics. Now he is working as associate professor in mechanical department, Ethiopian Technical University.

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Analysis of the Top-7 Modern Projects of Ship Wind Systems

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Abstract

One of the main threats to modern humanity is the threat of global warming of the Earth's climate. The consequence of this threat is the melting of the glaciers of the Northern Ocean and Antarctica, which contain 1.81% of fresh water from its total amount of 2.46%, since the basis of 97.54% of water on Earth is salt water of oceans and seas. The fresh water of the glaciers dissolves in it and is lost forever. One of the causes of the threat to the climate is emissions of greenhouse gases CO and CO_2. Of these, 3% of the total annual emissions are emissions from traditional fuels used by the transport fleet. Taking into account the need to reduce annual CO and CO_2 emissions by 7.4%, the transition of the transport fleet to alternative energy sources allows solving this problem by 41%. Among the main types of alternative ship energy is wind, which was the main one in the fleet until the beginning of the 20th century. Since the 60s of the 20th century, in the face of the threat of exhaustion of traditional fuels, the revival of the sailing fleet began, but no significant progress was made, which indicates the difficulty of solving this problem. In such conditions, it is important to determine the best projects of ship sailing systems, which allows you to avoid spending money and resources on the development of unpromising projects, which is an important task for the development of ship alternative energy. In 2019, Captain Watson highlighted the TOP-7 projects of ship wind systems. However, over the past 4 years, these projects have developed, which changed their old positions in the TOP-7. Therefore, the main goal of the work being performed is to determine the new TOP-7 projects, taking into account the best modern achievements in this field. The scientific novelty of the work is the development of recommendations for choosing the best projects and determining the most promising ways of their development. Work results. On the basis of developed criteria and analysis of modern projects of ship wind systems, the basic rating of Captain Watson has been significantly changed and the most promising projects in the new TOP-7 have been clarified. At the same time, the main task for the implementation of developments is realized - avoiding unproductive spending of money, time and resources on unpromising projects.

Conclusions. The new rating of TOP-7 projects of marine wind systems is recommended for

all companies engaged in such developments.

Biography

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Optimization of Model Order Reduction Techniques and Deep Learning Algorithms for Real-Time Detection of Abnormal Changes in Structural Behaviour

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Abstract

The Digital Twin (DT) technology is a new technology defined as the digital representation of living and non-living physical assets. By connecting the physical and virtual assets, data are transmitted smoothly, allowing the virtual asset to fully represent the physical asset. DT technology appeared in the early 21st century, 2002. Even though the DT concept has been the subject of numerous investigations, little is known about the DT models' propensity for monitoring and detecting sudden and unexpected changes in structural behaviour in real time. The reasons for that are the analysis requires a large computational effort and the excessive large amount of data transferred from sensors. Furthermore, there is a lack in predicting the damage location and severity in the structure once it has appeared, small damage levels. This research aims to develop the DT concept by optimizing model reduction techniques and deep learning algorithms used for establishment of DT models to be able to detect sudden and unexpected changes in structural behaviour in real time considering model uncertainties. The first stage is to develop Finite Element (FE) models during offline stage to be used with Reduced Basis (RB) model order reduction techniques for construction of low-dimensional space to speed the analysis during the online stage. The RB model was validated against experimental test results for establishment of a DT model of a two-dimensional truss. The location of damage was identified once it has appeared during the online monitoring using the established DT model and deep learning algorithms. The RB model was used again to identify the damage severity. It was found that using the RB model, constructed offline, speed the FE analysis during the online stage. The constructed RB model showed higher accuracy for predicting the damage severity, while deep learning algorithms were found to be useful for estimating the location of damage with small severity.

Keywords

Deep Learning (DL); Digital Twin (DT); Reduced Basis (RB); Model Order Reduction (MOR)

Biography

Shady Adib is a third-year doctoral researcher in Civil Engineering department at the University of Newcastle, Newcastle Upon Tyne, UK, studying under Doctor Vladimir Vinogradov and Professor Peter Gosling. Before coming to Newcastle Upon Tyne he completed master's degree in Structural Engineering (2017-2019) at the Vilnius Gediminas Technical University, Vilnius, Lithuania. His research focused on structural analysis, design, and application of high strength steel cold-formed tubular beams. Prior to that, he completed bachelor's degree in Civil Engineering (2012- 2017) at German University in Cairo, Cairo, Egypt. His research focused on comparison between reinforced concrete and steel structures (different types of structures). The topic of his PhD research is 'Development of digital twin concept to detect abnormal changes in structural behaviour'. His research focuses on developing the Digital Twin (DT) concept to detect abnormal changes in structural behaviour in real-time using advanced modelling techniques with help of deep learning algorithms.

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Optimization of the Thermal Environment in Industry and its Contribution to Sustainability

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Abstract

Occupational Health considers the work environment as the most stressful environment in which a person moves, whether of psychological, physical, chemical, and/or ergonomic origin. Thermal factors are one of the most influential physical pollutants. A healthy thermal environment is conducive to healthy workers, allowing the development of the individual in a framework of progress and well-being. While steps are being taken to assess and manage heat and cold stress, the problem is being exacerbated by climate change. According to a report from the International Labour Organization (ILO), rising global temperatures will lead to increased heat stress and this effect will become a common problem, leading to loss of jobs and productivity, either because it is too hot to work or because the pace of work slows down due to the effect of thermal load.However, the thermal comfort levels for the calculation of air-conditioning installations are difficult to specify, both because of the number of physical variables involved and because of their subjective nature. Different methods of thermal comfort analysis exist, but they have limitations in their application in industry and in the data processing. Therefore, an investigation of technological parameters for industrial comfort has been carried out using ICT (Information and Communication Technologies), and in particular, the techniques associated with the use of AI (Artificial Intelligence) in the context of 4.0, which represent an opportunity to improve thermal comfort levels, in particular, data analytics and its probability prediction algorithms calculated from data collection. Bayesian inference techniques have made it possible to obtain different pairs of indoor temperature and indoor relative humidity alternatives, depending on the variables presented, to solve different

scenarios, that allow obtaining:

- Better work environment
- Reduction of accidents and occupational diseases
- Greater energy efficiency
- Increased productivity
- Better quality of life

The challenge is to have a work methodology that facilitates the determination of hygrothermal parameters for industrial comfort, applicable to any geographical region, under operational conditions, to promote a thermally healthy work environment, which allows for improving the quality of indoor air in the work environment, in accordance with the right of each person to work in a safe and healthy environment, to live with quality according to the principles of occupational health, industrial safety, and sustainability. This research is aligned with the following SDGs (Sustainable Development Goals).

- Decent work and economic growth
- Industrial innovation and infrastructure
- Environmental care.

Keywords

Thermal environment; Occupational health; Energy saving; Sustainability

References

1. Salud Ocupacional para todos: propuesta para una estrategia mundial de la OMS. Boletín de la Oficina Sanitaria Panamericana 119(5), 1995. Retrieved from: https://iris.paho.org/bitstream/handle/10665.2/15528/v119n5p442 pdf?sequence=1&isAllowed=y .
2. OIT. Nuevo informe: El aumento del estrés térmico podría llevar a una pérdida de productividad equivalente a 80 millones de empleos, 2019. Disponible en: https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_711946/lang--es/index.htm#:~:text=El%20nuevo%20informe%20de%20la,a%20escalas%20nacional%2C%20regional%20y, on March 5, 2023
3. Fanger, P. O. (1973). Assessment of man's thermal comfort in practice, British Journal of Industrial Medicine, 30, 313-324. http://dx.doi.org/10.1136/oem.30.4.313 on April 17, 2021.
4. Diego-Mas, J. A. Evaluation of thermal comfort with the Fanger method. Ergonautas, Polytechnic University of Valencia, 2015. Retrieved from http://www.ergonautas.upv.es/metodos/fanger/fanger-ayuda.php on April 16, 2021.
5. Brager, G. & De Dear, R. (1998). Thermal adaptation in the built environment: a literature review- Energy and Building, Volumen 27, Issue 1, pp 83-96. ISSN 0378-7788- https://doi.org/10.1016/S0378-7788(97)00053-4 on April 15, 2021.
6. Nicol, Fergus & Humphreys, Michael. (2002). Adaptive Thermal Comfort and Sustainable Thermal Standards for Buildings. Energy and Buildings. 34. 563-572. Elsevier Ltd. https://www.sciencedirect.com/science/article/abs/pii/S0378778802000063. DOI 10.1016/S0378-7788(02)00006-3
7. Gómez-Azpeitia, L., Bojorquez, G. & Ruiz Torres, R. (2007). Thermal comfort: two confronted theoretical focuses. Journal of Scientific Research on Architecture. 2. 45-57.

Retrieved from https://www.researchgate.net/publication/285832706_El_confort_termico_Dos_enfoques_teoricos on April 15, 2021.
8. Benito, P.; González Gaya, C. & Sebastián Pérez, M. A. (2020). Evaluation, using Algorithms, of Thermal Comfort Levels in the Industrial Area of the Region of Buenos Aires, Argentina in ICPME 2020 [175]- 24 th International Congress on Project Management and Engineering. Alcoi, 7th – 10th July 2020. Available in http://dspace.aeipro.com/xmlui/handle/123456789/2555
9. Benito, P., Gonzalez Gaya, C. & Sebastián, M. A. (2021). Methodology for the analysis of industrial thermal comfort levels and its application to the southern zone of Argentina in ICPME 2021 [165]- 25th International Congress on Project Management and Engineering. Alcoi, 6th – 9th July 2021. Available in http://dspace.aeipro.com/xmlui/handle/123456789/3027
10. Benito, P.I.; Sebastián, M.A.; González-Gaya, C. Study and Application of Industrial Thermal Comfort Parameters by Using Bayesian Inference Techniques. Appl. Sci. 2021, 11, 11979. https://doi.org/10.3390/app112411979
11. 11. ONU. Objetivos y metas de desarrollo. https://www.un.org/sustainabledevelopment/es/objetivos-de-desarrollo-sostenible/ on March 5, 2023

Biography

Dr. Patricia Inés Benito is the Head of the Degree in Occupational Health and Safety at Universidad de Morón (UM), Argentina. She holds a degree in Civil Engineering. She obtained a Diploma of Advanced Studies (DEA) in Physics of Materials and a PhD from the Industrial Technologies Program of EIDUNED, both at the National University of Distance Education (UNED), Spain. She is a professor and researcher at undergraduate and postgraduate levels. She achieved the rank of Tenured Professor by contest in 2007 and was appointed Senior Researcher in the Professor-Research Categorization System in 2017. She served as Technical Secretary in the School of Engineering, and as Director of Studies in the School of Computer Science, Communication Sciences, and Special Techniques (FICCTE) at Universidad de Morón. Currently, she is the Head of the Specialization degree in Occupational Health and Safety, category “A” by CONEAU. She participates in the meetings for the Thermal Stress Normative Project of the SRT representing the Argentine Safety Institute (IAS). During her academic life, she has been on a jury of teaching contests at National Universities. She has directed several funded research projects, supervising the training of teacher-researchers and undergraduate students in the following lines of research: Engineering and Occupational Health and Safety. She has participated in numerous scientific meetings as speaker, panelist, and moderator. She has published articles in national and international journals. She is the author of book chapters and e-books.

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Buckling of Lattice Columns Made from Three-Dimensional Chiral Mechanical Metamaterials

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Abstract

The three-dimensional (3D) chiral mechanical metamaterials were found to exhibit unique compression-twisting coupling effect. The metamaterial will twist in addition to axial shortening when subjected to the external compressive load. For a slender structure made from 3D chiral mechanical metamaterial, global buckling may occur if the compressive load exceeds the critical value. In this work we investigated the buckling strength of the chiral lattice columns which were constructed by periodically placing the inclined straight beams in a chiral manner. Based on the Cosserat rod theory, a novel constitutive model with a new parameter governing the compression-twisting coupling was built to describe the deformation of 3D chiral metamaterial. A semi-analytical homogenization method was proposed to connect the stiffness parameters of arbitrary sized lattice column to the properties of the unit cell. The constitutive model together with the homogenization method well interpreted and quantified the size dependency of the chirality. The fourth-order governing equations of buckling were developed and solved analytically to predict the critical buckling load of 3D chiral metamaterial. The effects of chirality on the buckling strength and buckling mode were revealed.

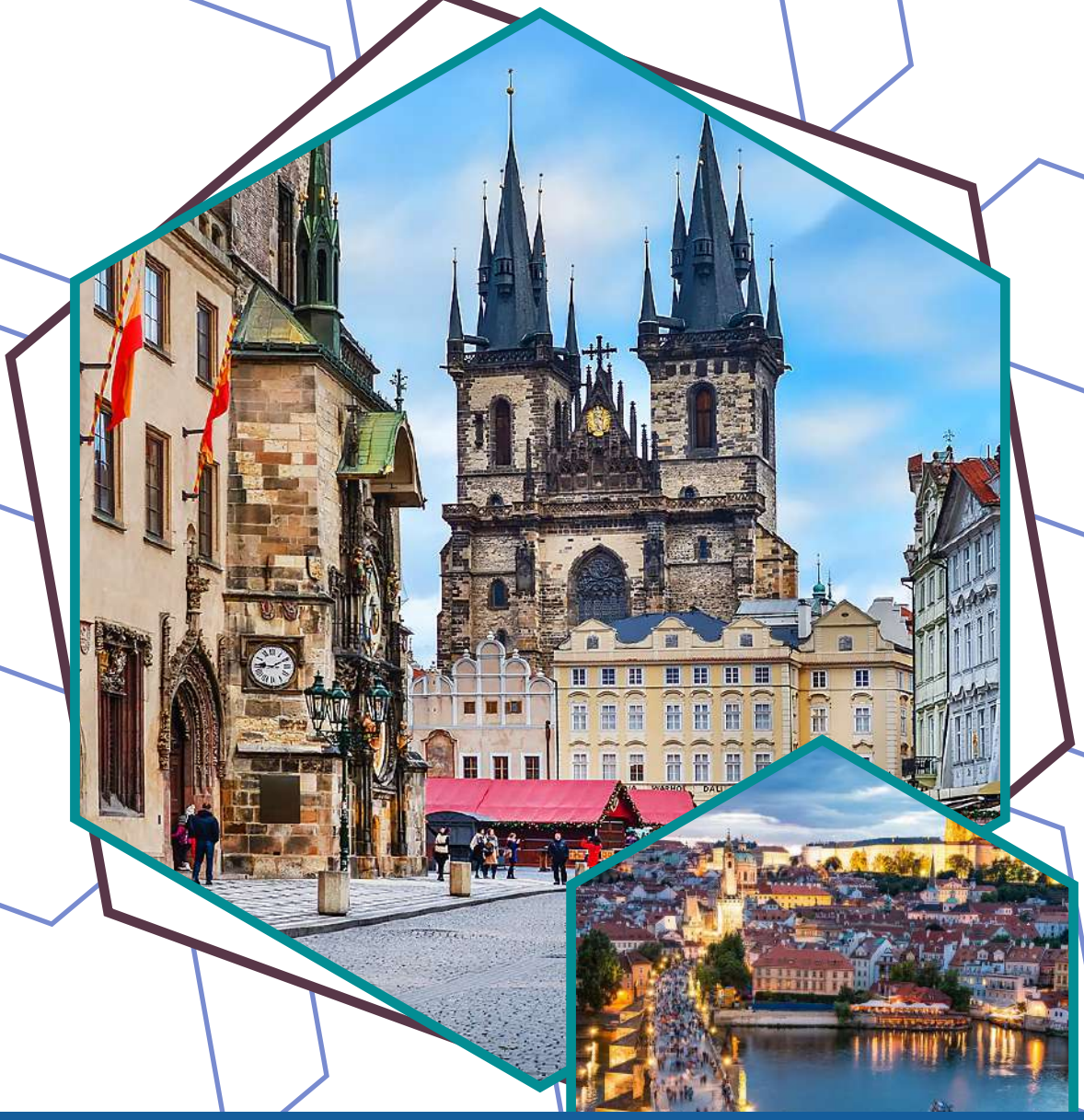
Keywords

Mechanical metamaterial; Lattice column; Buckling strength; Finite element simulation

Biography

Dr. Gaojian Lin is currently an associate professor at Beijing Institute of Technology. In 2018, he received his Ph.D. from Temple University, Unite States. After that, he worked at BIT for post-doctoral research from 2019 to 2022. Then he joined the State Key Laboratory of Explosion Science and Technology at BIT. Dr. Lin's research interests are on mechanics of advanced materials and structures at multi scales, as well as its broad applications in energy, environment, and healthcare. Dr. Lin has co-authored more than 20 international journal papers.

He has been the PI of NSFC projects, and a core member of Project of National Key R&D Program of China, and NSF (US) projects. He is a member of Chinese Society of Theoretical and Applied Mechanics (CSTAM) and Chinese Society for Composite Materials (CSCM).



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