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PUBLICATION

Journal of Hydrology: Regional Studies
Volume 46, April 2023, 101324

Quantifying the flood risk index of the Malaysian "rice bowl"

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Abstract

Study region

Sg. Kedah basin, Malaysia.

Study focus

This study proposed a novel method to estimate the flood susceptibility index based on topographical conditions using Multi Criteria Decision Making approach with a specific hazard classification, to determine the paddy flood vulnerability index considering all paddy growth periods and to establish risk classification by integrating flood inundation and damage, as risk is a combination of probability and impact of an event to occur.

New hydrological insights

Flood occurrences at paddy fields are not uncommon and pose a serious threat, because rice is a staple food for most Asian countries. In a tropical environment, paddy cultivation normally undergoes three growth stages, namely vegetation, reproductive and ripening. These stages have different water requirements. Therefore, it is essential to include the paddy growth stages in the risk assessment, as well as the inundated duration and depth which are unique to the specific location and the paddy seed variety. These parameters have not been investigated in previous studies. The risk indices were classified into 5 major classes, namely very low, low, moderate, high and very high. A comprehensive flood risk map developed in this study can be used by all relevant authorities and stake holders to evaluate the level of flood risk.

Ain Shams Engineering Journal
Volume 14, Issue 5, May 2023, 101970

Environmental degradation of structural glass systems: A review of experimental research and main influencing parameters

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Abstract

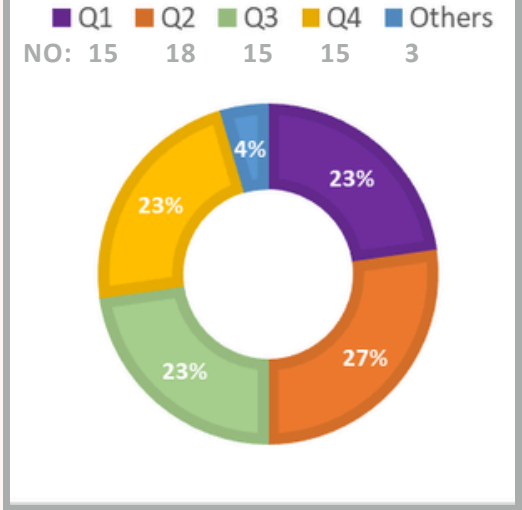
Several factors, including incentives associated with aesthetics, transparency, high chemical, and mechanical durability, and its excellent corrosion resistance, have rapidly accelerated the interest and use of glass as windows, façades, or load-bearing elements in structural applications. Nonetheless, the glass is chemically attacked when subjected to certain environmental conditions and its chemistry, structure, as well as its optical and mechanical properties, are altered by the different weathering processes throughout its service life. Several techniques exist for evaluating the performance of weathered glass. These include both natural and artificial ageing techniques. However, little correlation has been shown to exist between natural and artificial ageing, especially the comprehensive comparison between the naturally aged and artificially weathered glazing systems have yet to be examined. In this review paper, the weathering of structural glass systems when exposed to environmental conditions is presented. Emphasis in the literature has been placed chiefly on the different types of glazing in the construction industry and their resistance to three main weathering agents: humidity, temperature, and soiling. Main optical and mechanical tests reported in the literature are summarized, and the properties described in each of them are examined, providing evidence of current challenges, limitations, and insight on future prospects.

2023 WoS/SCOPUS PUBLICATION

*UP TO JUNE 2023

66
INDEXED PUBLICATION

JOURNAL'S QUARTILE



Ain Shams Engineering Journal
Volume 14, Issue 4, 5 April 2023, 101932

Optimization problems in water distribution systems using Non-dominated Sorting Genetic Algorithm II: An overview

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Abstract

The application of a genetic algorithm inspired multi-objectives optimization algorithms, known as the Non-dominated Sorting Genetic Algorithm (NSGAii) in solving optimization problems related to Water Distribution System (WDS) is critically reviewed. The list of variations of NSGAii used by other researchers in solving WDS are assessed, including an improved version of NSGAii and its combination with other algorithms in solving the problems. The optimization problems include WDS optimal design, pipe rehabilitation strategies, water quality, leakages and pump operation. The existing algorithm has been improved to solve multi-objectives and yet researchers are keen in using the NSGAii algorithm. Improvised and revolutionary algorithms, such as RNSGAii, ε-NSGAii and NSGAiii, still received less attention even though these algorithms have been introduced since 2005 and model capabilities to solve more complex problem is proved. The application of these algorithms should be seriously considered due to increasing aging of pipe in the future.

Structures
Volume 54, August 2023, Pages 1381-1390

Preliminary pre-damaged level assessment for concrete structures: A review

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Abstract

Deterioration due to arising in service loads or overloading is a key issue affecting the durability, safety, and sustainability of buildings and structures. Most of reinforced concrete (RC) structure is suffered from this type of damage. Therefore, it is important to offer repair methods of buildings vulnerable to the degrading effects of pre-damaged. But most of the researcher and practitioners underestimated the influence of pre-damaged level in design of repair structure. The first step of understanding this pre-damaged level is through determining the level of pre-damaged level undergone by visual assessment of concrete structures. However, there is a lack of integrated guiding principles in this field. Thus, this review paper identifies the visual assessments of determining the pre-damaged level of deterioration, with particular attention given to cracking issues. The paper also provides a categorization of pre-damaged level for plain cylinder and RC structures. This research contributes to the field by providing a readily available reference for practitioners and researchers on the current state of knowledge on pre-damaged level assessments.

forests
MDPI
Article

Modification Model of Glued-In Rods Splice Connection Using Statistical Analysis for Mengkulang Glulam Timber

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Abstract: The statistical study of the glued-in rod splice connection for Mengkulang glulam timber is presented in this research. This type of connection is used in many applications, such as bridge construction and wide hall, besides becoming increasingly popular due to its cost-effectiveness and ease of installation. Using statistical analysis to evaluate the performance of glued-in rod splice connections is relatively new. Statistical analysis can assess the connection's performance by examining the glued-in rod splice connection's strength, stiffness, and durability. Glued-in rods have several advantages over traditional mechanical connections generally used in beam designs, such as higher stiffness, more uniform stress distribution, fewer rod corrosion problems and better appearance. Due to this limitation, the standard design for glued-in rods using glulam is the estimated extrapolation for solid timber guidelines. The main objectives of this research were to develop the pull-out model and validate the effectiveness of the model equation for glued-in rods parallel ($GRPS0^{\circ}$) and perpendicular ($GRPS90^{\circ}$) to the grain directions using a statistical package for the social sciences (SPSS). The variables examined were the number of rods, diameter, length, spacing, the kind of glue utilised, and the number of adhesive layers. In conclusion, the model development clearly shows that most of the parameters achieved the R^2 more than 80% accurate for both parallel ($GRPS0^{\circ}$) and perpendicular ($GRPS90^{\circ}$) to the grain directions.

Keywords: tropical timber; glulam beam; pull-out; structural analysis; SPSS

The current issue and full text archive of this journal is available on Emerald Insight at: https://www.emerald.com/insight/1471-4175.htm

Industry 4.0

The knowledge, attitude and practices (KAP) of Industry 4.0 between construction practitioners and academicians in Malaysia: a comparative study

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Purpose – The purpose of this study is to explore the knowledge, attitude and practices (KAP) of Industry 4.0 between the academicians and industry players in construction engineering, further suggesting a mechanism to narrow the gap between the distinct parties.

Design/methodology/approach – This study was conducted through structured online and face-to-face interviews, using KAP survey, and semi-structured interviews. This constructive research was conducted among Malaysian construction industry players and academicians from the construction engineering department in public universities.

Findings – The findings exhibit the similarities and differences of KAP between academics and industry on Industry 4.0 in construction engineering. In general, both categories of respondents have displayed more similarities than differences in all aspects, except for knowledge. The better knowledge profile of Industry 4.0 among the academicians reflects the nature of the academic works that constantly seek new knowledge, thus suggesting the establishment of an industry-academic (I-A) knowledge equilibrium framework to leverage the knowledge profile between both parties.

Research limitations/implications – This exploratory study that showcases the perspective of the academia and industry practitioners on Industry 4.0 acts as a cornerstone for bridging the gap between the two distinct sectors within the same field.

Practical implications – The gap between the academic and industry was highlighted, further establishing the I-A knowledge equilibrium framework that could also be applied to other fields of study.

Originality/value – The originality of this paper was the profiling of the KAP of Industry 4.0 for the academicians and industry players in construction engineering, further distinguishing the gap between both parties.

Keywords Knowledge, Attitude and practices (KAP), Industry 4.0, Industry practitioners, Academicians, Construction, Malaysia

Journal of Building Engineering
Volume 75, 15 September 2023, 106760

Stress strain response of pre-damaged concrete confined with recycled steel straps- A green confining material

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Abstract

When an engineer is determining the restoration strategy for a deteriorated concrete building, a precise design model is particularly essential. Although many design models have been proposed previously for various confining techniques, these models are not suitable for confinement using pre-tensioned recycled steel straps. This because pre-tensioned steel straps confinement has larger confining pressure at the onset of loading stage compared to other existing confining techniques. In this study, stress-strain responses of concrete repaired using pre-tensioned steel straps are assessed through experimental tests. Concrete cylinders were prepared and pre-damaged to a certain damaged degree to resemble damaged structures. They were then confined by using pre-tensioned steel straps. This acts as a repairing technique to restore the loading capacity of the damaged concrete. The experimental results showed that the confining volumetric ratio and pre-damaged degrees are two most important parameters that affects the stress-strain response. For this reason, previously developed design models are unable to capture the experimental test results in this study. Hence, confining volumetric ratio and pre-damaged degrees should be included in the development of the design model in future. In this study, a new design model is proposed by calibrating these two parameters into previous models. This proposed model is shown to be able to capture the stress-strain behaviour and is in good agreement with the experimental results. It is believed that engineers can apply this model in the design of repair works for a deteriorated concrete building.

Q1 JOURNAL

PUBLICATION

Journal of Building Engineering
Volume 70, 1 July 2023, 106221

Iron slag pervious concrete for reducing urban runoff contamination

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Abstract

This study investigates the engineering properties of Iron Slag Pervious Concrete (ISPC) along with its ability on reducing urban runoff contaminations. For this reason, different proportions (up to 15%) of fine-grained iron slag (0.6–1.2mm) were added to pervious concrete mixture design. With regarding to mechanical characteristics ISPC with 15% of iron slag (IS15) had the better performance by improving the average fresh density (9%), and strength (compressive (16.12%), flexural (10.28%), tensile (9.23%)). However, a decreasing in slump (41.17%), permeability (16.19%) and porosity (15.29%) was observed compared to that of the control sample. Also, the average cementitious paste thickness declined as the iron slag added to ISPC mixture. Apart from this, IS15 had a better performance in reducing urban runoff contaminations, due to having a porous nature and decreasing the size of pores in ISPC to capture more pollutants, in which Chemical Oxygen Demand, Total Suspended Solids, and turbidity declined by 69.75%, 68%, and 69%, respectively. Overall, IS15 mixture, which requires a little lower cost of mixing and implementation than conventional concrete, is recommended to be applied in urban areas with low traffic loads to collect urban runoffs and enhance its quality.

Chemosphere
Volume 330, July 2023, 138666

Occurrence of per- and polyfluoroalkyl substances in aquatic environments and their removal by advanced oxidation processes

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Abstract

Per- and polyfluoroalkyl substances (PFAS), one of the main categories of emerging contaminants, are a family of fluorinated organic compounds of anthropogenic origin. PFAS can endanger the environment and human health because of their wide application in industries, long-term persistence, unique properties, and bioaccumulation potential. This study sought to explain the accumulation of different PFAS in water bodies. In aquatic environments, PFAS concentrations range extensively from <0.03 (groundwater; Melbourne, Australia) to 51,000ng/L (Groundwater, Sweden). Additionally, bioaccumulation of PFAS in fish and water biota has been stated to range from 0.2 (Burbot, Lake Vättern, Sweden) to 13,900ng/g (Bluegill samples, U.S.). Recently, studies have focused on PFAS removal from aqueous solutions; one promising technique is advanced oxidation processes (AOPs), including microwaves, ultrasound, ozonation, photocatalysis, UV, electrochemical oxidation, the Fenton process, and hydrogen peroxide-based and sulfate radical-based systems. The removal efficiency of PFAS ranges from 3% (for MW) to 100% for UV/sulfate radical as a hybrid reactor. Therefore, a hybrid reactor can be used to efficiently degrade and remove PFAS. Developing novel, efficient, cost-effective, and sustainable AOPs for PFAS degradation in water treatment systems is a critical area of research.

IATSS Research
Contents lists available at ScienceDirect

Research Article

Modelling of motorcyclists' risky behaviour at an urban T-junction using generalised linear model: An exploratory study

Noor Azreena Kamaluddin [a,b,*], Carmelo D'Agostino [a], Aliaksei Laureshyn [a], András Várhelyi [a]

ARTICLE INFO

ABSTRACT

Motorcyclists represent the greatest share of recorded traffic crashes and fatalities in Malaysia. The association between motorcyclists' behaviour and traffic conflict occurrence was assessed at a typical stop-regulated T-junction in an urban area of Kuala Lumpur, Malaysia. Traffic activities were filmed over four months and the behaviour of motorcyclists entering the main road from the minor road was observed from recorded video sequences. Situations ending in a traffic conflict were compared to similar interactive situations not ending with a conflict. In total, 447 sets of interactions of motorcyclists and other motorists at the T-junction were analysed where 242 interactions ended in conflicts (three of them ended with traffic crashes). The generalised linear model with a binomial response and link logit was adopted to assess the association of motorcyclists' behavioural variables with the probability of conflict occurrence. The significant behavioural variables were classified into categories according to the statistical variation of the value they can assume in the dataset. The motorcyclist's entering angle was the most significant contributory factor in the probability of traffic conflict. The findings can be helpful in deciding on road safety countermeasures. The results could feed into the decisions of policymakers to structure the education and licensing process.

Construction and Building Materials
Volume 388, 24 July 2023, 131720

Mechanical behaviour of adsorbent pervious concrete using iron slag and zeolite as coarse aggregates

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Abstract

Using low-cost industry waste and mineral adsorbentsto produce Adsorbent Pervious Concrete (APC) is a sustainable solution with manifold environmental advantages.This study investigates the engineering properties of APC to widen the potential of its further utilization as a post-treatment step in refinery and wastewater treatment plants. For this reason, coarse aggregate in pervious concrete was replaced by coarse iron slag and zeolite in portions of 25%, 50%, 75%, and 100% by volume. The statistical analysis of variance (ANOVA) and visualization of the microstructure of APC using Scanning Electron Microscopy (SEM), and Energy Dispersive X-Ray Spectroscopy (EDS) were also presented. Experimental results showed that replacing coarse aggregate with iron slag increased the APC's strength, and the maximum value of compressive strength (16.80MPa) occurred at 75% of replacement. Alternatively, increasing the zeolite proportion caused the strength reduction of APC, and the minimum compressive strength (9.40MPa) happened in a sample with only coarse zeolite. The effect of cementitious paste thickness (CPT) on the compressive strength indicated that the iron slag did not markedly change the average of CPT, only a minor reduction compared to the control sample (0.30–1.5mm), while zeolites caused considerable increase of average CPT (0.00–2.1 mm). Hence, increasing the average CPT resulted in reducing the APC compressive strength. Also, the specific gravity, resistance to compression, rectangular shape, and micropores on the surface of adsorbents affected the mechanical properties, porosity, and permeability of APC. All APC samples had a satisfactory porosity (more than 15%) and permeability (more than 1.17mm/s), and the APC sample containing 75% of iron slag had the highest values. The role of adsorbents shape affects the porosity and permeability of APC, especially in the replacement portion of 50% and less, while for samples with more than 50% of adsorbents due to homogenization of the mix and having the same size as aggregates, the void content and infiltration rate approached the value of the control sample. Eventually, iron slag and zeolite based APC could potentially be used in wastewater treatment plants for post-treatment of wastewater as a new cleaner production.

Physics and Chemistry of the Earth, Parts A/B/C
Volume 129, February 2023, 103342

Influence of road and environmental factors towards heavy-goods vehicle fatal crashes

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Abstract

Heavy-goods vehicles (HGVs) remain a hazard to other road users due to their physical size and operation characteristics. Collisions with HGVs are more severe than other traffic crashes when the injury's severity is considered. Despite the high number of fatal crashes involving HGVs, limited studies on HGVs have been conducted. The aim of this study is to identify the significant factors contributing to fatal HGV-related crashes from the road and environmental factors. The research was conducted based on crash records in Malaysia for three consecutive years. Descriptive and chi-square test for the association was used to determine the influence of statistically significant variables between accident severity with road and environmental factors. The result shows that road geometry, shoulder type, lane marking, location type, road type, area type, control type, traffic system, speed limit, light condition, hour and state are a statistically significant factors of fatal HGV-crash. Road defect, road condition, quality of surface, road surface type, road surface condition, weather, month and day of the week were insignificant factors in fatal HGV-crash. The findings can be used to select significant factors to develop models using an advanced and sophisticated analysis technique considering heterogeneous conditions. This work may also serve as a preliminary step to establish efficient countermeasures to improve road design.

Environmental Technology & Innovation
Volume 29, February 2023, 102995

Influence of pH and concentration on the growth of bacteria - fungus and benzo[a]pyrene degradation

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Abstract

The bioremediation method has been widely used in wastewater treatment. The fungi and bacteria have been recognized as useful bioremediation agents. Benzo[a]pyrene, the polycyclic aromatic hydrocarbons (PAHs), was used in this study, degraded by *Sphingobacterium spiritivorum* and *Aspergillus brasiliensis*. Here, the batch culture experiment has been executed to evaluate the optimum condition of pH and benzo[a]pyrene concentration towards the bacteria and fungus growth. Later, the statistical method of response surface methodology (RSM) was performed to fit the experimental results with the study's parameters. From the experimental results, the optimum conditions were found to be at pH 6 and 40 mg/L benzo[a]pyrene concentration, which yields the maximum growth of 4.37E+07 CFU/ml bacteria and 0.254 g/l fungi growth, respectively. The percentage removal of benzo[a]pyrene in the batch experiment was 38.98% under bacteria consumption and 44.14% by the fungi bioremediation process. In comparing with RSM, the optimum conditions evaluated from the model were found to be at pH 6.41 and 38.8 mg/L benzo[a]pyrene concentration, which the maximum growth of 4.46E+07 CFU/ml bacteria and 0.242 g/l fungi, accordingly. To fit the model, the percentage of removal obtained was 41.9% benzo[a]pyrene degradation by bacteria and 42.34% of benzo[a]pyrene removal done by fungi. It has been denoted that the experimental and statistical models' results were parallel and acceptable. Therefore, the ANOVA for all the results obtained was significant, which showed the reliability of the results. It can be deduced that the fungi exhibited a better removal percentage of benzo[a]pyrene than the bacteria in the wastewater.

Articles

Causes, effects and potential measures of cost deviations in high-rise building projects in Egypt

A. T. Raghib, S. Belayutham, M. Z. Mohammad & C. K. I. C. Ibrahim

Abstract

Cost deviation is a global issue that has negative impacts on projects, stakeholders and the industry. Egypt, a developing nation with the rising demand for high-rise buildings is also plagued with the issue. It is inevitable that high-rise buildings cost more than low-rise buildings, further accentuating the needs to study cost deviation from all angles, which was previously absent. Therefore, this study aims to provide an overall perspective (causes, effects and measures) of cost deviation in high-rise building projects in Egypt by adopting both quantitative (questionnaire survey) and qualitative (brain storming sessions) approaches. The questionnaire survey has been administered among various construction practitioners (project manager, consultant, quantity surveyor, site engineer) with experiences in high-rise building projects, while the brainstorming session involved expert panels from the industry. Findings from the 106 questionnaires have revealed inflation as the major cause of cost deviation that has the most effect on profit loss for the contractor. Government and project-based measures with great collaboration has been proposed to address the issue. The overall perspective (causes, effects, measures) provided in this study would be of interest to the local construction stakeholders, as well as foreign investors towards improving the cost performance of high-rise building projects in Egypt.

Keywords: Cost deviation, cause and effect, measures, high-rise building, construction project, Egypt

Articles

Applications of serious games in construction: the current state, classifications and a proposed process framework

Mohamad Salah Taleb, Sheila Belayutham & B. Che Khairil Izam Che Ibrahim

Abstract

Serious Games (SG) is a pedagogical approach with technical integration of entertainment and knowledge. Even though this approach has been applied in construction, most of the studies have focused on specific areas, such as sustainability and construction safety. Therefore, a general representation of SG applications in construction is in-evident. This gap creates uncertainties and lack of directives on the know-what and know-how of SG in construction. A systematic review and detailed content analysis of 50 post-screened articles related to SG in construction/building have depicted the current state and consolidated view on the applications of SG in construction. The applications of SG were categorized into several subject matters, such as construction safety, management and fire evacuation. Further, an overall classification system for SG in construction has been established, by including elements such as user and purpose. Based on the established classification, a SG process framework was developed and the framework could serve as a reference for construction stakeholders/game developers in designing games for their needs. The main outcome from this study (classification and process framework) would benefit the academic and industry practitioners, as the establishments could guide game development in construction, particularly in empowering construction education and training.

Keywords: Serious games, construction, classification, current state, process framework

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