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The acoustical performance of water hyacinth based porous-ceramic compared to the biomass fiber composites for architecture application

Setyowati, Erni[a]; Hardiman, Gagoek[a]; Grafiana, Nur Farida[b]

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Abstract

The hyacinth plant (Eichhornia crassipes) is an aquatic weed that causes the silting of swamps. The water hyacinth research was developed because of concerns over the threat of biodiversity in swamps by utilizing water hyacinth for ceramic and composite mixtures. This current research highlights the comparative acoustical performances of ceramic and composite with water hyacinth contents. Dried water hyacinth was added to the clay ceramic mixture with a weight percentage of 2, 6, 8, and 10 wt%. The ceramic dough was then shaped hexagonally with an interlock system and molded overlay respectively before burning and biscuits, while the composite dough consisted of 200 ml polyester resin: 25 mg water hyacinth: 20 ml catalyst. The acoustic test methods refer to ASTM 1050-98 and ASTM E2611-09 for sound absorption and sound transmission loss respectively. The result showed that

the 8 wt% water hyacinth mixture of porous ceramic had an average absorption coefficient of 0.29 and a sound transmission loss of a wide range of frequencies with an average of 59.1 dB. Meanwhile, the resin composite has a poor average of sound absorption of 0.10-0.11 and 58.08-58.36 dB on its STL. The innovation of the water hyacinth-ceramic, however, had a promising character as a Helmholtz-based diffuser-absorber.

Author keywords

Diffuser Absorber; Eichhornia crassipes; Porous Ceramics; Swamp Sedimentation

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The Acoustical Performance of Water Hyacinth Based Porous-Ceramic Compared to the Biomass Fiber Composites for Architecture Application

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KEYWORDS
Eichhornia crassipes, Swamp Sedimentation, Porous Ceramics, Diffuser Absorber

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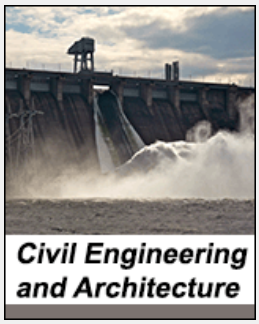

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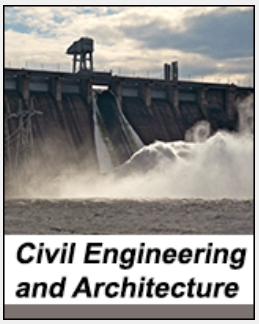

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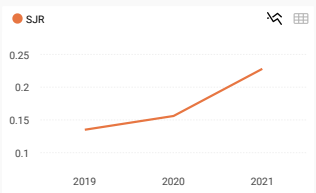

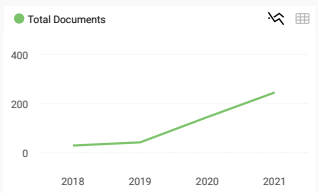

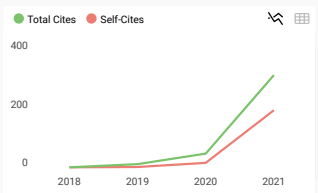

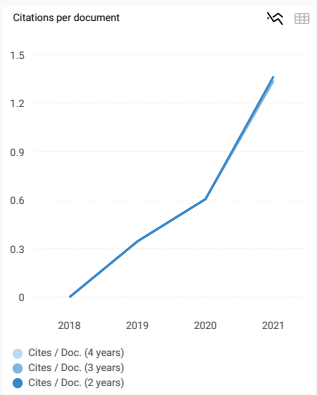

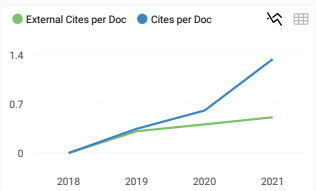

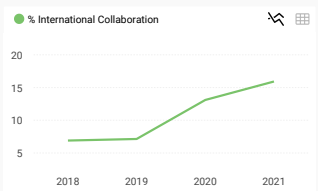

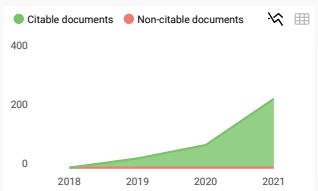

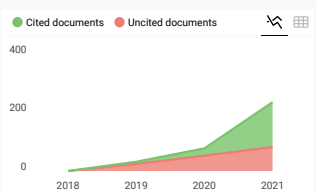

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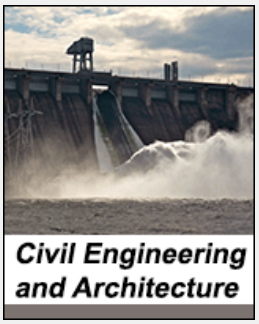

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Environmental Innovation Model with Product and Outcomes Dimension of Green Kampung in Surabaya City

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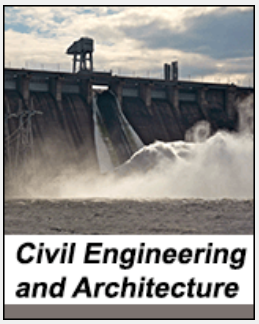

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Energy Equivalent of Rainwater Harvesting for High-Rise Building in the Philippines

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Abstract The Philippines is in a tropical location where rainwater is abundant for the frequent rain in a year. Rainwater becomes waste flowing down the drains causing flood, especially in urban areas. This problem initiates local governments in some cities in the Philippines to adapt and implement Green programs that require the installation and utilization of rainwater catchment system. Though this program addresses the control of flood caused by the rain, the generation of energy by utilizing rainwater as an energy source is not yet considered. With this, the study computes the equivalent energy generation by utilizing rainwater. The rainwater energy equivalent includes the following: the increasing number of high-rise building construction as catchment facility; the rainfall precipitation of 58 stations in the Philippines; the floor area and the types of the building; and the volume of water consumption per person per day. The energy equivalent was computed using the 40% of the time the rainfall precipitation equaled or exceeded the other with the average floor area specified from the approved building permit as of 2017. The study established a mathematical equation as an equivalent energy of rainwater utilization. The equation of energy equivalent was derived using the initial building height of 5 meters and an additional succeeding height of 3 meters per floor level.

Keywords Rainwater, Rainfall Precipitation, Energy, High-Rise Buildings

1. Introduction

Heavy rainwater precipitation, which in other contexts is welcomed because it provides and supplies the necessary water for agricultural purposes and even for domestic use. On the other hand, heavy rainwater precipitation may also cause deadly and destructive flash floods. The presence of rainfall exists in many locations and is considered an abundant source of water. Though it might have a negative impact in a few aspects, the utilization of this water resource was studied in terms of rainwater harvesting system abbreviated as RWH or RHS. Studies on rainwater harvesting were considered sustaining shortage of water supplies for irrigation, washing purposes as well as potable water. Rainwater harvesting is an indigenous resources considered as a source of renewable energy. This implies that this RWH contributes importance for sustainable development since it has zero environmental impact compared to conventional energy [1].

The study on hybrid system, solar-wind-rain eco-roof system also includes and mix Rainwater harvesting [2]. Rainwater in this study is collected in the tanks purposely for the efficient use of energy in which the collected rainwater will be used to spray the roof to maintain cooling in the building. Another tank in the design system was used for washing purposes. Rainwater harvesting technique was significantly studied as a supply of water needed mostly for non-potable water application followed by rainwater treatment for potable or drinking water purposes.

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Effect of Additional Reinforcement Length in Beams on Base-Shear Capacity in Performance-based Design of Low-Rise Buildings

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Abstract Most of the existing low rise RCC buildings with 4 to 6 floors were constructed pursuant to the code provisions without detailed Earthquake analysis. To comply with the revised code provisions, it is essential to build up the seismic resistance of the existing buildings. International building safety agencies such as NEHRP, FEMA, and ATC etc., formulated the Performance-based design methods to verify the seismic resistance of the existing buildings and also recommend the retrofit the building to achieve the targeted performance. Pushover method (nonlinear static analysis) is one of the methods. This paper describes the increase of seismic capacity of structure with the additional steel contribution from 25 % to 75% increase in the beams near the beam-column joints. Moreover, this additional steel is placed up to 02.L, 0.25L and 0.3L of the beam span. To accomplish the above parameters, 4-storey, 5-storey and 6-storey rectangular framed structures are analyzed with the pushover analysis. The seismic capacity curves in terms of base shear versus displacement are illustrated. It is found that 10 to 25% of base shear is increased when beams are provided with additional reinforcement from 25% to 75% @0.2L. In this case of increasing the additional steel length from 0.20L to 0.3L, nearly 5% increase of the base shear is observed in width direction but no augmentation is observed in the length direction of the building.

Keywords Pushover Analysis, Base Shear Capacity, Seismic Demand, Hinge

1. Introduction

Buildings in urban India are predominantly observed from 4 to 6 floors which were constructed long back as per the code provision applicable at that point of time. The codal provisions for the seismic design are being updated/revised based on the research done in the field of seismic engineering. About thirty earthquakes occurred in India during the last 50 years. It was estimated that more than one lakh people died and more than two lakh people injured in the last 20 years due to the damages occurred to the buildings and other structures during the earthquakes in the Indian subcontinent.

To reduce the human loss and property damage in future, it is essential to provide the adequate seismic capacity to the existing buildings. In this context, a lot of research work is being carried out in the USA and other developed countries. Guidelines were formulated in

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Comparative Study on Restaurants' Furniture: Ginkgo and Niazi's Restaurants in Famagusta, Cyprus

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(b): *Ejeng Ukabi, Huriye Gurdalli (2021). Comparative Study on Restaurants' Furniture: Ginkgo and Niazi's Restaurants in Famagusta, Cyprus. Civil Engineering and Architecture, 9(1), 23 - 41. DOI: 10.13189/cea.2021.090103.*

Abstract The role of furniture in commercial spaces supports the diversity of human interactions. Beyond the user's importance, furniture also reflects cultures and exerts psychological influences on people at different levels of social stratification. The style tells about a period, and its arrangement with form can contribute to the restaurant's ambiance. Today, restaurants have become an integral part of the urban space's functioning in food servicing provision and in conjunction with other subsidiary functions like Cafe to ease users' taste and intentions. This paper aims to identify the similarities and differences in the furniture used in two restaurants with different construction periods and districts-historical and modern within a city, Ginkgo Restaurant and Niazi's Restaurant in Famagusta-Cyprus. The study will also consider the spatiality of the restaurants and their synthesis with the outdoor space. The paper adopts a case-oriented approach, a thorough physical assessment of the indoor and outdoor spatiality of the restaurants selected. The techniques included field sketches/preparation of measured drawings and making field notes complemented by taking photographs. This comparative furniture analysis highlights public consciousness for tourists, designers, students, and Public-Private Partnership for cities undergoing urban change to pay attention to restaurant spaces as a proponent to sustainable urban health.

Keywords Interior elements, Furniture, Restaurant trend, Seating, Spatiality, Ginkgo Restaurant, Niazi's Restaurant

1. Introduction

Furniture, as part of interior elements, influences the esthetic of spaces and contributes enormously to users' preference of a concrete space due to satisfaction derived in providing proximity and sensual consumption within a given context [1]. Researchers also estimated that a restaurant space's tangible and intangible environmental elements generate perceptional clues to direct users' preference [2,3]. As a follow-up, restaurants represent social-spatial structures for humans to express themselves [4]. Restaurants are patronized frequently by festivity, home-away dining, break time at work/schools, and tourism/hospitality activities. The availability of restaurants in Famagusta with the internationalization of tertiary education and tourism development is another cultural tendency that constitutes urban drivers. The ambiance of the restaurant's spatial layering for which furniture plays a key role represents sustainable input for the design and operation of foodservice and hospitality outfits.

Additionally, the endemic Mediaeval textures of Famagusta represent an open-door exhibit site endowed with historical ruins and monuments of Cyprus heritage, providing another richness of the city, forming a primary source of attraction. Perhaps, it is time to take up the study to compare the restaurants' furniture of Ginkgo and Niazi's restaurant as we watch the changing demographics, urban life, and morphology of Famagusta. The literature on the works completed on furniture comparative is few, tailored to user patterns [5]. The principal aim of this paper

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Semi-Empirical Model for Predicting the Swelling Stress of Compacted, Unsaturated Expansive Soils

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Abstract Heaving soils are the most problematic worldwide. These soils develop swelling stress that produces uplift forces detrimental to the foundations. In engineering practice, swelling stress is not considered in general. Considering the swelling stress in foundation design enhances the service life of construction. The oedometer swelling test is the technique ordinarily used to assess the swelling stress. Nonetheless, the oedometer swelling test is cumbersome, time-consuming, making the test unattractive, and not cost-effective for the low-cost housing project. The objective of this research work is to propose a model to predict swelling stress as an alternative to oedometer testing. Geotechnical studies such as Atterberg limits, particle size distribution, free swell ratio, specific gravity, linear shrinkage, suction measurement, Proctor compaction test, and zero-swell test are performed to estimate the soil properties. Multivariate regression analysis is performed using NCSS.11 Program to develop the predictive model. The model is assessed base on the following: determining coefficient value, comparing predicted values with experimental values, comparing the proposed model with other existing models found in the literature. Besides, the Box-cox transformation function is used to improve the accuracy of the model. The developed model can be utilized to assess the swelling stress of compacted heaving soils, and it is much more accurate than other existing models.

Keywords Geotechnical Index Properties, Heaving Soils, Optimum Water Content, Soil Suction, Swelling Stress

1. Introduction and Background

Defects on constructions caused by heaving soils were first reported in South Africa in 1950, especially in Goldfield Mine Free State. In South Africa, heaving soils are considered the most problematic [1]. The repair cost of damages induced by heaving soils in South Africa is around R100 million yearly [1]. The expense of defects in the UK is estimated at £400 million every year [2]. Heaving soils cause a higher yearly financial loss than the hurricane, flood, earthquake, and tornadoes combined [3]. A good understanding of the hydro-mechanical properties of heaving soils is imperative to enhance engineering design. The objective of this research work is to develop a model to predict the swelling stress of compacted heaving soils as an alternative to oedometer testing. Equations shown in Table 1 have been developed throughout the years to predict the swelling stress. Reference [4] attempted the utilization of soil suction to predict swelling stress using bentonite and kaolinite. The estimation of soil suction is performed using a thermocouple psychrometers technique on artificial compacted soil specimens. A standard swell volume experiment is performed on soil specimens. The proposed Equations (1) & (2) are in Table 1. These models cannot predict a swelling stress value beyond 350 kPa. Reference [5] performed one-dimensional swell tests on heaving clay containing kaolinite, bentonite