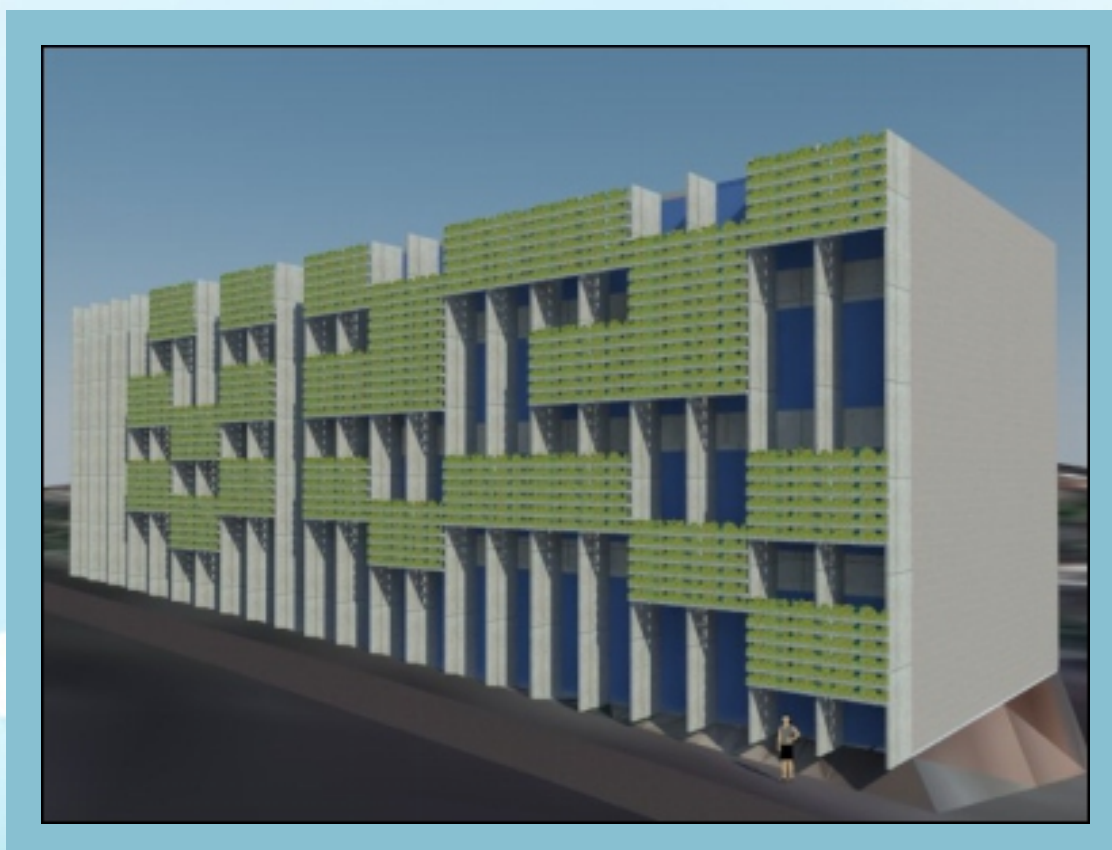


# Open Journal of Civil Engineering



ISSN: 2164-3164



<https://www.scirp.org/journal/ojce>

# Journal Editorial Board

ISSN Print: 2164-3164      ISSN Online: 2164-3172

<https://www.scirp.org/journal/ojce>

---

## Editor-in-Chief

Prof. Hwai-Chung Wu

Wayne State University, USA

## Associate Editor

Prof. Raja Rizwan Hussain

King Saud University, Saudi Arabia

## Editorial Board

Dr. Olanrewaju Abdullateef

Universiti Tunku Abdul Rahman, Malaysia

Prof. Alireza Afshari

Aalborg University, Denmark

Dr. Ali Awaludin

Gadjah Mada University, Indonesia

Prof. Ayman Batisha

Ministry of Water Resources and Irrigation, Egypt

Prof. Fabio Bisegna

Sapienza University of Rome, Italy

Prof. Christopher Chao

The Hong Kong University of Science and Technology, China

Prof. Carlos Chastre

NOVA University of Lisbon, Portugal

Dr. You Dong

The Hong Kong Polytechnic University, Hong Kong (China)

Dr. Massimiliano Ferraioli

University of Campania "Luigi Vanvitelli", Italy

Prof. Cristina Gentilini

University of Bologna, Italy

Dr. Behzad Kalantari

Hormozgan University, Iran

Prof. Jian Kang

University of Sheffield, UK

Prof. Vojko Kilar

University of Ljubljana, Slovenia

Prof. Kiyoshi Kobayashi

Kyoto University, Japan

Dr. Guan Lin

The Hong Kong Polytechnic University, Hong Kong, China

Prof. Triantafyllos Makarios

Aristotle University of Thessalonik, Greece

Prof. George C. Manos

Aristotle University of Thessaloniki, Greece

Prof. Haji Mohd Idrus Haji Mohd Masirin

Universiti Tun Hussein Onn Malaysia, Malaysia

Prof. Ali M. Memari

Pennsylvania State University, USA

Dr. Hosein Naderpour

Semnan University, Iran

Prof. Deepa G. Nair

Cochin University of Science & Technology, India

Prof. John-Paris Pantouvakis

National Technical University of Athens, Greece

Prof. Low Sui Pheng

National University of Singapore, Singapore

Prof. Miroslav Premrov

University of Maribor, Slovenia

Prof. Nicola Pugno

University of Trento, Italy

Dr. Ying Qin

Southeast University, China

Dr. Gian A. Rassati

University of Cincinnati, USA

Dr. Rehan Sadiq

University of British Columbia, Canada

Prof. Evangelos J. Sapountzakis

National Technical University of Athens, Greece

Prof. Mehdi Setareh

Virginia Tech University, USA

Dr. Xijun Shi

Texas State University, USA

Prof. Zengqing Sun

Central South University, China

Prof. Wen-Pei Sung

National Chin-Yi University of Technology, Chinese Taipei

Prof. Chong-Shien Tsai

Feng Chia University, Chinese Taipei

Prof. Francesco Ubertini

University of Bologna, Italy

Dr. Roberto Valentino

University of Parma, Italy

Dr. Heng Wei

The University of Cincinnati, USA

Prof. Ka-Veng Yuen

University of Macau, China

Prof. Vahid Zanjani Zadeh

Bechtel Corporation, USA

Prof. Jun Zhang

Tsinghua University, China

# Table of Contents

**Volume 12    Number 4**

**December 2022**

**Characterization of the Physical and Mechanical Properties of the Harrat Ash  
Shaam Basalt (HASB)/Northeast Jordan**

K. Tarawneh, M. Amaireh, N. Abdelhadi, A. Titi, M. Dweirj.....463

**GFRP Poles for Traffic Signs and Signal Poles: A Case Study in Saudi Arabia**

W. A. Khatri, M. Al Mehthel, M. M. Baig, T. Al Baker.....476

**Integrating Universal Design Standards and Building Information Modeling at the  
Conceptual Design Stage of Buildings**

V. Rostamiasl, A. Jade.....492

**Daylighting Performance Design for Art Studios of Old Factory Renovation  
Buildings in Subtropical Regions**

P. Pei, Y. W. Men, S. Jiang.....524

**Deployment of Self-Propelled Modular Transporter for Vessel Installation**

M. A. Stogdill, M. K. Al-Dossary, N. H. Al-Khalifah.....554

**Detecting Damage in Reinforced Concrete Beams Using Vibrational Characteristics**

H. T. Hien, N. D. Thang, N. N. Dang.....559

**Comparative Analysis of Facility Present Condition of Selected Schools and  
Hospitals in Rivers State, Nigeria**

K. Kejeh, I. L. Nwaogazie, S. Samuel.....572

**The Effects of Nanoparticle Additives on Thermophysical Properties of Concrete Mixtures**

K. R. Shadbad, A. Foroughi-Asl, S. Talatahari, S. Mohasseb.....587

**Bio-Inspired of Pyramidical Concrete Barrier Walls against the Effects of Explosion Waves**

M. S. Zahran, W. S. Hassan, A. Osman.....615

**Effects of Soil-Cement Stabilization on the Index Properties of Subgrades of  
Three Selected Roads in the Niger Delta Region of Nigeria**

J. O. Irokwe, I. L. Nwaogazie, S. Sule.....630

**Development of Empirical Models for the Estimation of CBR Value of Soil from Their Index  
Properties: A Case Study of the Ogbia-Nembe Road in Niger Delta Region of Nigeria**

J. O. Irokwe, I. L. Nwaogazie, S. Sule.....648

# Open Journal of Civil Engineering (OJCE)

## Journal Information

### SUBSCRIPTIONS

The *Open Journal of Civil Engineering* (Online at Scientific Research Publishing, <https://www.scirp.org/>) is published quarterly by Scientific Research Publishing, Inc., USA.

#### **Subscription rates:**

Print: \$79 per issue.

To subscribe, please contact Journals Subscriptions Department, E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### SERVICES

#### **Advertisements**

Advertisement Sales Department, E-mail: [service@scirp.org](mailto:service@scirp.org)

#### **Reprints (minimum quantity 100 copies)**

Reprints Co-ordinator, Scientific Research Publishing, Inc., USA.

E-mail: [sub@scirp.org](mailto:sub@scirp.org)

### COPYRIGHT

#### **Copyright and reuse rights for the front matter of the journal:**

Copyright © 2022 by Scientific Research Publishing Inc.

This work is licensed under the Creative Commons Attribution International License (CC BY).

<http://creativecommons.org/licenses/by/4.0/>

#### **Copyright for individual papers of the journal:**

Copyright © 2022 by author(s) and Scientific Research Publishing Inc.

#### **Reuse rights for individual papers:**

Note: At SCIRP authors can choose between CC BY and CC BY-NC. Please consult each paper for its reuse rights.

#### **Disclaimer of liability**

Statements and opinions expressed in the articles and communications are those of the individual contributors and not the statements and opinion of Scientific Research Publishing, Inc. We assume no responsibility or liability for any damage or injury to persons or property arising out of the use of any materials, instructions, methods or ideas contained herein. We expressly disclaim any implied warranties of merchantability or fitness for a particular purpose. If expert assistance is required, the services of a competent professional person should be sought.

### PRODUCTION INFORMATION

For manuscripts that have been accepted for publication, please contact:

E-mail: [ojce@scirp.org](mailto:ojce@scirp.org)



**Call for Papers**

# Open Journal of Civil Engineering

ISSN Print: 2164-3164 ISSN Online: 2164-3172

<https://www.scirp.org/journal/ojce>

Open Journal of Civil Engineering (OJCE) is an international journal dedicated to the latest advancement of civil engineering. The goal of this journal is to provide a platform for scientists and academicians all over the world to promote, share, and discuss various new issues and developments in different areas of civil engineering.

## Editor-in-Chief

Prof. Hwai-Chung Wu

Wayne State University, USA

## Associate Editor

Prof. Raja Rizwan Hussain

King Saud University, Saudi Arabia

## Editorial Board

Dr. Olanrewaju Abdullateef  
 Prof. Alireza Afshari  
 Dr. Ali Awaludin  
 Prof. Ayman Batisha  
 Prof. Fabio Bisegna  
 Prof. Christopher Chao  
 Prof. Carlos Chastre  
 Dr. You Dong  
 Dr. Massimiliano Ferraioli  
 Prof. Cristina Gentilini

Dr. Behzad Kalantari  
 Prof. Jian Kang  
 Prof. Vojko Kilar  
 Prof. Kiyoshi Kobayashi  
 Dr. Guan Linv  
 Prof. Triantafyllos Makarios  
 Prof. George C. Manos  
 Prof. Haji Mohd Idrus Haji Mohd Masirin  
 Prof. Ali M. Memari  
 Dr. Hosein Naderpour

Prof. Deepa G. Nair  
 Prof. John-Paris Pantouvakis  
 Prof. Low Sui Pheng  
 Prof. Miroslav Premrov  
 Prof. Nicola Pugno  
 Dr. Ying Qin  
 Dr. Gian A. Rassati  
 Dr. Rehan Sadiq  
 Prof. Evangelos J. Sapountzakis  
 Prof. Mehdi Setareh

Dr. Xijun Shi  
 Prof. Zengqing Sun  
 Prof. Wen-Pei Sung  
 Prof. Chong-Shien Tsai  
 Prof. Francesco Ubertini  
 Dr. Roberto Valentino  
 Dr. Heng Wei  
 Prof. Ka-Veng Yuen  
 Prof. Vahid Zanjani Zadeh  
 Prof. Jun Zhang

## Subject Coverage

All manuscripts must be prepared in English, and are subject to a rigorous and fair peer-review process. Accepted papers will immediately appear online followed by printed hard copy. The journal publishes original papers including but not limited to the following fields:

- Assemblage and System
- Behavior of Structures
- Behavior of Structures under Seismic Loads
- Building and Environmental Acoustics
- Building Climate Systems
- Building Energy
- Civil and Environmental Engineering
- Coastal Engineering
- Composite Materials
- Concrete Structures
- Construction Economics
- Construction Engineering
- Design and Performance of Green Building
- Design Optimization of Structures
- Earthquake Engineering
- Energy Efficient Building Technology
- Energy Saving Building Materials
- Evaluation of Building Envelope Systems under
- Structural and Environmental Loads
- Evaluation of Glazing Systems for Energy Performance
- Fire Engineering
- Foundations Dynamics
- Geotechnical Engineering
- Health Monitoring and Life Prediction of Structures
- High Performance Concrete
- Hydraulic Engineering
- Life Cycle Engineering
- Materials and Durability
- Materials Engineering
- Mechanics and Materials Aspects of Advanced Construction Materials
- Municipal or Urban Engineering
- Nondestructive Testing and Evaluation
- Numerical Modelling of Structures
- Optimal Design of Structures
- Properties and Mechanics of Concrete
- Residential, Commercial, Industrial and Public Works
- Seismic Evaluation of Building Nonstructural Components
- Simulation Optimization and Risk Management
- Soil-Structure Interaction
- Structural Engineering
- Structural Evaluation of Panelized and Masonry Wall Systems
- Structural Reliability Analysis
- Surveying
- Sustainable Structures
- Transportation Engineering
- Ventilation and Indoor Air Quality
- Water Supply and Drainage

We are also interested in: 1) Short Reports—2-5 page papers where an author can either present an idea with theoretical background but has not yet completed the research needed for a complete paper or preliminary data; 2) Book Reviews—Comments and critiques.

## Notes for Intending Authors

Submitted papers should not have been previously published nor be currently under consideration for publication elsewhere. Paper submission will be handled electronically through the website. All papers are refereed through a peer review process. For more details about the submissions, please access the website.

## Website and E-Mail

<https://www.scirp.org/journal/ojce>

E-mail: [ojce@scirp.org](mailto:ojce@scirp.org)