Advances in Civil Engineering

Hindawi

Special Issue on

Reuse of Recycled Waste Materials as Stabilizers and Geopolymer Mortars to Improve Problematic Soils 2023

CALL FOR PAPERS

The construction of civil engineering structures, such as bridges, highways, roads, airfield runways, and railways on problematic soils can be extremely precarious. This is due to the low compressive and shear strength and high compressibility of such soils, which can lead to the destruction of any structure built upon them. Furthermore, increasing rates of urbanization and construction across the globe have led to an increase in cement production each year. Cement production process is highly energy-intensive and for every ton of cement, the same amount of CO2 is released into the atmosphere, which is one of the main factors in climate change. To address this problem, there are two main methods: the partial replacement of cement with other pozzolanic additives, or the use of alternative binders such as alkali-activated materials and geopolymers.

Despite extensive studies on improving the properties of soils using traditional additives (i.e., cement and lime), researchers are always looking for alternatives to cement. The utilization of alternative materials, in addition to increasing the efficiency of the stabilization/geopolymerization process, reduces the use of cement, which significantly helps to protect the environment. Due to the high amount of CO2 released in the cement production process, decreasing cement consumption can reduce the amount of irreparable damage done to the environment. Therefore, one of the main concerns of researchers is the development of materials with increased quality and efficiency in soil treatment compared to existing stabilizers, ensuring their production causes less consumption of raw materials and energy. This technique is one of the most cost-effective ways to improve the strength, stability, permeability, and durability of problematical soils even under harsh conditions such as wet-dry or freeze-thaw cycles. In addition, exploring the potential of soft computing techniques for identifying and predicting the properties of problematic soils stabilized by industrial and agricultural wastes is a promising research avenue. Soft computing techniques, such as artificial neural networks, fuzzy logic, genetic algorithms, and support vector machines, offer a flexible and robust approach to modeling and predicting the behavior of complex systems. By leveraging the capabilities of these techniques, it is possible to develop accurate and reliable models that can aid in the design and construction of stable civil engineering structures on problematic soils.

This Special Issue aims to provide in-depth insights into the use of industrial wastes in construction and the improvement of problematic soils under buildings, roads, and pavements. We hope to provide an environmentally friendly approach to enhance the mechanical properties of these soils. We welcome both original research and review articles.

Potential topics include but are not limited to the following:

- Evaluating the impact of non-conventional industrial and agricultural wastes on strengthening dispersive soils, expansive soils, collapsible soils, and marl samples
- Impact of industrial by-product-based geopolymers on the engineering properties of clays
- Effect of by-products on the mechanical, physical, chemical, and microstructural characteristics of stabilized soils under wet-dry and freeze-thaw cycles
- Sustainable utilization of industrial by-products as novel stabilization materials for problematic soils
- Effect of temperature on the stabilization efficiency of problematic soils using industrial wastes
- Environmental impact and sustainability considerations in using recycled waste materials for soil improvement
- Field applications of recycled waste materials in soil stabilization projects
- Optimization techniques for achieving the desired engineering properties of treated soils
- Compatibility and long-term performance of recycled waste materials in soil stabilization applications
- Novel techniques and advancements in utilizing recycled waste materials for soil improvement
- Development of predictive models using soft computing techniques to assess the stabilization effectiveness of different waste materials on problematic soils
- Application of artificial neural networks for identifying soil properties and predicting soil behavior after stabilization with waste materials
- Integration of fuzzy logic systems with geotechnical parameters to improve the accuracy of soil stabilization performance prediction
- Assessment of uncertainty and sensitivity analysis of soft computing models in predicting the behavior of stabilized soils

Authors can submit their manuscripts through the Manuscript Tracking System at https://review.wiley.com/submit?specialIssue=755915.

Papers are published upon acceptance, regardless of the Special Issue publication date.

Lead Editor
Amir Hossein Vakili, Department of Environmental Engineering, Faculty of Engineering, Karabuk University, Karabuk, 78050, Turkey; Department of Civil Engineering, Faculty of Engineering, Zand Institute of Higher Education, Shiraz, Iran, Iran
amirvakili@karabuk.edu.tr

Guest Editors
Mahdi Salimi, University of Guilan, Rasht, Iran
salimi@phd.guilan.ac.ir

Aghileh Khajeh, Federal University of Rio Grande do Sul, Porto Alegre, Brazil
aghileh.khajeh@ufrgs.br

Submission Deadline
Friday, 16 August 2024

Publication Date
December 2024