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Editorial

Special Issue "Reinforced Concrete: Materials, Physical Properties and Applications Volume II"

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Concrete and reinforced concrete remain the most popular building materials for use in building structures in modern construction and production. A huge amount of concrete and reinforced concrete is required for the construction of various buildings and structures and all types of construction projects. Strict compliance with building codes, compliance with the rules of technology, and control over the construction of buildings and structures is necessary.

The most important aspect of the production and control of concrete and reinforced concrete is compliance with the recipe and technological parameters and the establishment of clear relationships in terms of fundamental research and applied developments in the relationship between the composition, structure, and properties of concrete. In this case, important aspects are the materials used, the physical characteristics, and the operational parameters of the resulting materials.

The purpose of this Special Issue was to collect and present all modern breakthrough research on technology, control, formulation, composition, and properties of modern concrete and highlight the latest developments in this area. The issue presents a total of eight articles relating to various aspects of technology and quality control of concrete. One study [1] addresses the problem of the possibility of controlling the maturation process and thereby the strength of concrete using non-destructive methods. The study was the first to examine the dependence of temperature and time of concrete hydration in determining the main concrete maturation curves. The work used generally accepted non-destructive testing methods: ultrasonic pulse and resonant frequency. The results showed significant benefits compared to traditional maturity modeling.

In addition, another study [2] investigated the issue of visual automatic non-destructive testing using machine vision algorithms. This approach to the detection, classification, and segmentation of defects in building materials and structures can be effectively implemented using convolutional neural networks. The results showed that the developed model has high accuracy in solving defect detection problems.

Reference [3] addressed such aspects of construction as the use of drainage consolidation methods and the reduction of fluffiness and consolidation of soft soils. This study involves the use of a new method of siphon drainage. The method is energy-saving, environmentally friendly, and highly efficient, as proven by numerical simulation and field tests carried out in Zhoushan, Zhejiang Province when processing soft soils.

Reference [4] touches upon the topic of the operation of such structures as reinforced concrete piles. In this work, the real conditions for the perception of a whole complex of internal force factors by piles were studied. Of particular interest is the effect of shear force

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on the cross-section. The authors developed numerical models of rectangular and T-section beams. We studied analytical dependencies and carried out full-scale tests of reinforced concrete beams of various sections. As a result, they found that when taking into account the work of the entire section, the load-bearing capacity of concrete under lateral force is 20% greater than when calculating only the main section without taking into account the flanges.

Another study [5] studied the Poisson's ratio in the compressed zone of real single- and two-layer reinforced concrete beams and performed a comparison with a theoretical model. The results made it possible to more accurately predict transverse deformations and corresponding cracks, determine a new limit state during the bending of reinforced concrete elements, and, accordingly, carry out more accurate calculations of bending reinforced concrete elements.

The solution to the important problem of a dangerous type of cyclic impact, characteristic of a number of regions of the world, in the form of alternating effects from wetting and drying on concrete and reinforced concrete structures, was solved in [6]. The authors conducted a study of the influence of various technological, compositional, and other factors on the final resistance of varitropic concrete to alternating cycles of wetting and drying. The authors determined the qualitative and quantitative picture of such dependencies.

Another article [7] proposed a method for predicting the load-bearing capacity of a fixed head connection, which is used in precast concrete structures, in particular when connecting steel bars between precast elements. This research has high engineering and scientific value.

Reference [8] also addressed the issue of reinforcing steel in terms of corrosion. It is known that aging concrete infrastructure is susceptible to destruction primarily for this reason. The authors presented an overview of research conducted to improve the performance of hybrid reinforced concrete beams made of fiberglass and steel and reviewed analytical models that take into account mechanical effects such as ductility, crack width, bending and shear, and thermal stability when exposed to temperature. The review proved the viability of a hybrid fiberglass and steel reinforcement system.

This Special Issue outlines the prospects for the development of the conducted research.

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