Processing of modified fiber concrete composition

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Abstract

The possibility of obtaining a natural mineral-active supplement containing SiO_2 of ultra pomegranate on the basis of Umbaki quartz sand, located in the territory of the Republic of Azerbaijan, was determined experimentally. It was determined that when this type of additive is used up to 8-10% of the cement consumption, the compressive strength limit of cement-sand systems increases by 7.9%, the flexural strength limit by 4.35%, and the average density increases by 1.46%. With the complex use of ultra pomegranate SiO_2-containing mineral additive, superplasticizing and hyperplasticizing additives, these indicators increase even more. Heavy concrete and fiber concrete compositions modified by the application of such complex additives were developed, and mathematical models of the compressive strength limit parameter were established using the mathematical statistical analysis method of the experiments. Fiber concrete composition is optimized. Modified heavy concrete composition with a compressive strength limit of 43 MPa, an average density of 2379 kg/m^3, a compressive strength limit of 49.70 MPa, a fiber concrete composition with SiO_2-containing natural mineral admixture and a superplasticizer additive of pomegranate with an average density of 2403 kg/m^3, a compressive strength limit of 59 MPa, average density of 2475 kg/m^3, fiber concrete composition with SiO_2-containing natural mineral additive HP 777 hyperplasticizer was processed.

Introduction

Concrete and reinforced concrete products and structures are used in the construction and installation of all types of objects. This is due to the variety of components used in the preparation of the concrete mixture and the presence of local production, the possibility of obtaining required strength index, wide operational index (abrasion resistance, crack resistance, frost resistance, low water resistance, chemical resistance, radioactive resistance, etc.) and yeast. that the value is partially low. Achieving concrete stone with different performance indicators is the quality of the components used and especially the use of additives for different purposes.

Design/Other information

Purpose of the work: The purpose of the presented work is to obtain a SiO2-containing mineral-active additive prepared by grinding natural effusive rocks and studying its effect on cement systems, applying it in the development of heavy concrete and fiber concrete composition based on modified cement. Studies have shown that it is possible to activate natural rocks as industrial waste by grinding pomegranate and to apply it as a mineral-active additive in the production of adhesive materials and in the production of concrete for various purposes.

Raw materials and materials: In the experiments, Holcim Expert 42.5 R brand cement produced by the Republic of Azerbaijan, sand from the Bahramtepe deposit and crushed stone from the Gudiyalchay quarry located in the Guba region and fine sand were used as fine fillers. S520 brand superplasticizer, HP777 brand hyperplasticizer, and SikaFiber PPM-12 brand polypropylene fibers were used in order to regulate concrete properties. In the experiments, the quartz sand of the Umbaki field, located in the territory of the Republic of Azerbaijan, was used after grinding to a specific surface of ≥ 5000 cm^2/g. X-ray spectroscopic and X-ray analyzes of the quartz sand of the Umbakı deposit were carried out at the analytical center of the Institute of Geology and Geophysics. The chemical composition of the quartz sand of the Umbaki deposit (in % by mass): SiO_2 – 95, 69; Al_2O_3 – 0,8; Fe_2O_3 – 2,51; CaO – 0,71; Na_2O – 0,01; MgO – 0,01; P_2O_5 – 0,01; SO_3 – 0,01; K_2O – 0,01; TiO_2 – 0,01; MnO – 0,01; Cl^- – 0.01; YTİ – 0,19 (denotes the amount of volatile components at a temperature of 9500C) and its mineralogical composition is α-quartz SiO2 (95%), hematite Fe_2O_3 (2%) and feldspar (3%).

Set up

Results

The possibility of obtaining a natural mineral-active supplement containing SiO2 of ultra pomegranate on the basis of Umbaki quartz sand, located in the territory of the Republic of Azerbaijan, was determined experimentally. It was determined that when this type of additive is used up to 8-10% of the cement consumption, the compressive strength limit of cement-sand systems increases by 7.9%, the flexural strength limit by 4.35%, and the average density increases by 1.46%. With the complex use of Ultranar's SiO_2-containing mineral additive, superplasticizing, hyperplasticizing additives, these indicators increase even more. Using the method of mathematical statistical analysis of experiments, the composition of heavy concrete and fiber concrete modified in terms of composition and properties was optimized by taking into account the influencing factors of the compressive strength limit parameter. Cement with a compressive strength limit of 43 MPa, an average density of 2379 kg/m^3: SiO_2-containing mineral additive: sand: crushed stone: S520 = 1: 0.105: 1.27: 3.62: 0.017 ratio of heavy concrete composition, compressive strength limit is 49.70 MPa, cement with an average density of 2403 kg/m^3: natural mineral additive containing SiO_2 of ultramarine: sand: crushed stone: S 520: polypropylene fiber = 1: 0.022: 0.98: 1.97: 0.0064: 0.034 fiber concrete composition with superplasticizer, in compression cement with a strength limit of 59 MPa, an average density of 2475 kg/m^3: natural mineral additive containing SiO_2 of ultra pomegranate: sand: crushed stone: HP 777: polypropylene fiber = 1: 0.029: 0.99: 2.02: 0.019: 0.0119 hyperplasticizing fiber concrete the composition has been worked out.

Conclusions

References

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