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TO STUDY THE EFFECT OF THE AMOUNT OF DISPERSED FIBERS ON THE CEMENT STONE AND DETERMINE THE OPTIMAL COMPOSITION

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Abstract
The article presents the results of experimental research on the effect of the amount of basalt fiber on the physical and mechanical properties of fine-grained concrete. The selected composition of micro-reinforced sandy concrete is recommended for the manufacture of thin-walled spatial structures. Conclusions on the research work carried out are presented.

Keywords: fine-grained concrete, basalt, cement, fiber, water, micro-reinforcement, dispersion.

Introduction
Reinforcement of reinforced concrete products and structures with dispersed fibers is widely used today to increase their resistance to cracking, bending and elongation. In addition, fiber-dispersed reinforcement prevents cracks from penetrating into the inner layers of concrete, increasing the strength of the cement stone, as well as the penetration of concrete, also serve to improve the strength of the joints between the structural elements. The effective effect of different fibrous materials on the properties of concrete depends on the ratio of the elastic modulus of the dispersed fiber and the concrete. That is, when the ratio of the modulus of dispersed reinforcement to the modulus of concrete is greater than one (Eф/Eb >1), it will be possible to obtain concrete that is resistant to elongation and cracking. Various metallic and non-metallic fibrous materials are used to reinforce concrete. Basalt fibers, asbestos, polymer, wollastonite and other fibers can be used as metal-free disperse fibers. In such dispersed reinforcement, we used basalt fiber. When basalt fiber is added to fine-grained concrete, the fibers in such concrete do not change their properties in various harmful aggressive environments. As a result, it is possible to increase the strength of the material, the service life.

In this study, it was studied that fine-grained concrete works in conjunction with chemical additives. In this case, the strength of concrete on the obtained (selected) composition was studied.

Materials and Methods

Determination of the normal thickness and hardening period of the selected cement paste was carried out according to the standard method on the basis of DAST 310.3-81 "Cements normal

thickness, uniform volume change and hardening time" on the Vika tool. GOST 30744-2001 was used to determine the strength of cement. The compressive and flexural strength of sandy concrete samples were determined in accordance with DAST 310.4-81. The mobility and average density of the concrete mix were determined in accordance with DAST 5802-86.

Results and Discussion

Cement. One of the main components used in the preparation of concrete is these binders. As a binder we use portland cement. Portland cement is a hydraulic binder obtained by softening clinker and gypsum (3-5%) together, which hardens very well in water and air and does not lose its strength.

Portland cement M400 D0 of JSC "Kyzylkumcement" was used for the research. GOST 30744-2001 was used to determine the strength of cement.

Chemical composition of Portland cement

Table 1

№	Naming of raw materials	Massive amount of oxides, %								
		SiO_2	Fe_2O_3	Al_2O_3	R_2O	CaO	MgO	SO_3	к.м.к.	total
1	PC 400 D0	21,84	3,75	4,78	1,47	64,79	2,59	0,33	0,30	99,82

Basalt fiber. Fibers are also used in concrete. Basalt fiber was used as fibro. Basalt fiber differs from metal fittings by a number of advantages:

- 4-5 times lighter than metal;
- Resistant to aggressive environments;
- Thermal conductivity is zero;
- Bending strength 1200 Mpa;
- Does not lose its strength from -70 ° C to + 100 ° C;
- Lifespan up to 80 years;
- Fiber diameter 10-21 micro m;
- Fiber length 15-20mm.

Water. For the preparation of the concrete mix is used drinking water or natural water that does not contain harmful compounds that interfere with the normal hardening of the concrete and the shape of the structure. The hydrogen index of the water used should be rN≥4 and the amount of sulfate ions SO4 SO2700 mg / l, as well as the absence of harmful compounds (mineral and organic acids, fats, sugars, etc.).

In order to analyze the results, compare, determine the optimal composition of fine-grained concrete with the addition of basalt fiber, to study the effect of basalt fiber on the strength of concrete in different compositions, the strength of concrete samples of several compositions is determined.

In these studies, we added basalt fiber to the controlled concrete composition first at a rate of 1.5; 3; 5% relative to the cement mass, and then at a rate of 4; 5; 6%.

The analysis of the gold results, the implementation of changes in the strength of fine-grained concrete with the addition of basalt to the strength of ordinary concrete depends on the community. With this in mind, the joint strength of ordinary concrete composition in concrete samples built on the foundation is determined in parallel with the above experiments, in parallel conditions.

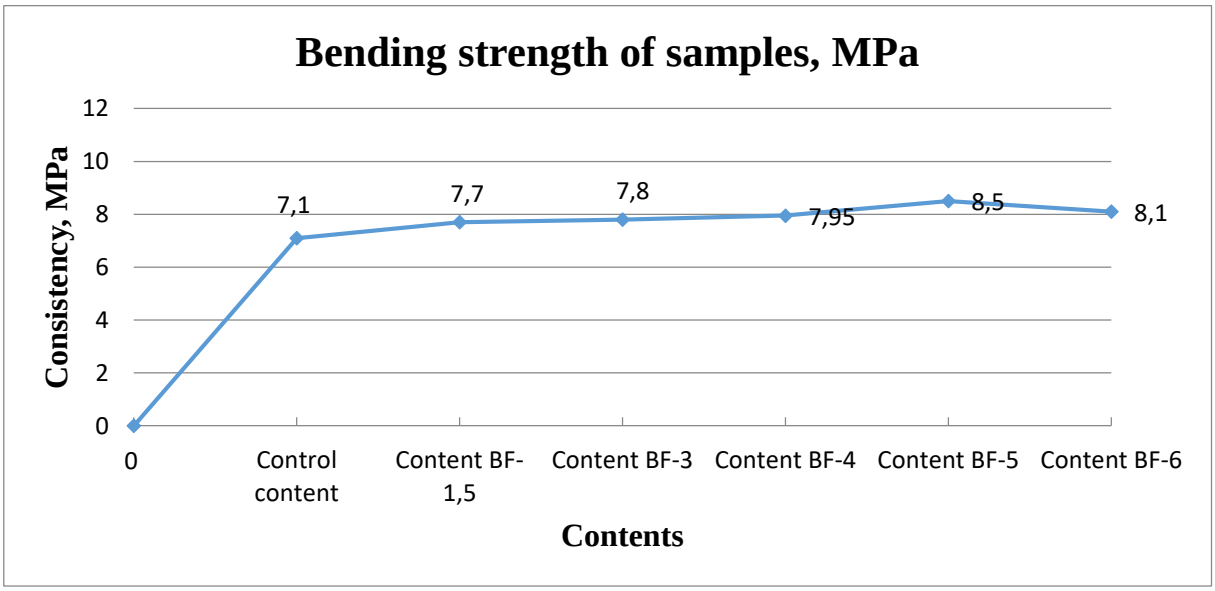
The results obtained are presented in the following tables and graphs.

Table 2.

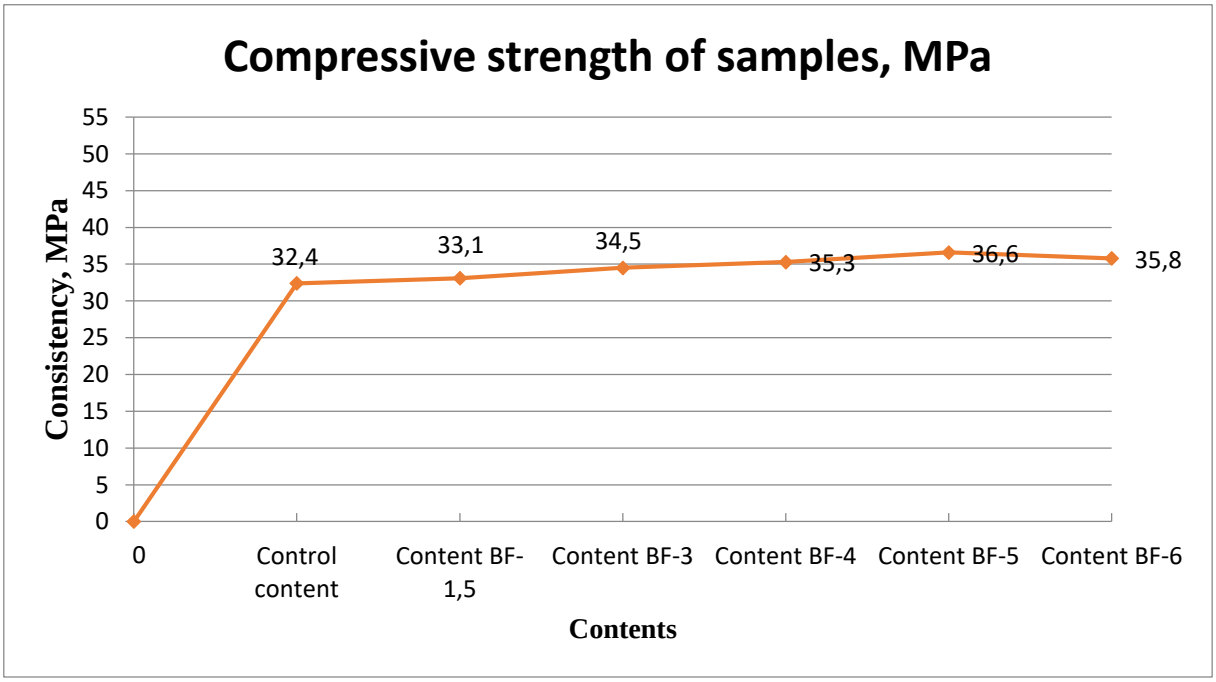
Strength of samples, MPa			
№	Contents	When hot processed	
		$R_{ben.str.}$	$R_{com.str.}$
1	Control content	7,1	32,4
2	Basalt fiber content (BF-1,5)	7,7	33,1
3	Basalt fiber content (BF-3)	7,8	34,5
4	Basalt fiber content (BF-4)	7,95	35,3
5	Basalt fiber content (BF-5)	8,5	36,6
6	Basalt fiber content (BF-6)	8.1	35,8

Note: $R_{ben.str.}$ - bending strength. $R_{com.str.}$ - compressive strength

Graphics 1.



Graphics 2.



Conclusion

The following conclusions can be drawn from the experimental research:

- The flexural strength of samples with 1.5% basalt fiber added to the cement mass increased by 8.4% and the compressive strength increased by 4.06%.
- The flexural strength of samples with 3% basalt fiber added to the cement mass increased by 9.8% and the compressive strength increased by 5.07%.
- The flexural strength of samples with 4% basalt fiber added to the cement mass increased by 11.97% and the compressive strength increased by 6.59%.
- The flexural strength of samples with 5% basalt fiber added to the cement mass increased by 19.71% to the control composition, and the compressive strength increased by 11.67%.
- The flexural strength of samples with 6% basalt fiber added to the cement mass increased by 14.08% to the control composition, and the compressive strength increased by 7.86%.

The bending and compressive strength of the samples reached the highest values when basalt fiber was added to the fine-grained concrete composition in the amount of 5% of the cement mass.

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