ISSN NO: 2770-0003
Date of Publication: 14-12-2022

Application of Curtain Formers for New Constructed Concrete Care

[1]Sh.Khakimov, [2]B.Mamadov, [3]A.Mirzamakhmudov
[1]Namangan Engineering-Construction Institute, Uzbekistan
Corresponding Author: shukrullo.abduraxmonovich.56@gmail.com
[23] Namangan Engineering-Construction Institute, Uzbekistan
mamadov.boxodir85@gmail.com

Abstract: The results of experiments on the physical processes that occur during the hardening process of concrete in dry hot-climatic seasons and the reduction of their negative effects - as well as on the physical and mechanical properties. In areas with a hot climate, heat treatment is used to intensify the hardening of concrete. Considering that in these areas intense solar radiation provides enough heat for 6-7 months, this can be used to accelerate the hardening of concrete instead of heat and moisture treatment.

Keywords: dry hot climate, evaporation, plastic sinking, concrete care, ambient temperature, continuous evaporation.

1. Introduction

Dry-hot climate (high temperature, low humidity, solar radiation and wind speed) are factors that negatively affect concrete technology. As a result of intensive evaporation of water from the bottom of the concrete mixture upwards, interconnected pores are formed, resulting in a defective structure of the concrete, which leads to a decrease in the strength of concrete. As a result of dehydration of the concrete mix, the process of cement hydration slows down and may even stop. If the hardening of the concrete is not adequately controlled, its strength can take up to 50% of the design strength.

According to the research of Krylov BA, Hakimov Sh.A. [17, 19, 20, 21], plastic deposition in concrete in dry hot climates is one of the main factors influencing the physical destructive processes and deterioration of physical and mechanical properties [2]. The plastic deposition process of freshly laid concrete continues until the water in the concrete reaches a critical evaporation level and gradually begins to stabilize over time. From the above, it can be seen that the issue of plastic subsidence that occurs in hardening concrete in dry hot climates should be given serious consideration.

2. Method

The main part of the experimental work was carried out in the process of production of concrete and reinforced concrete products, using indicator s of continuous evaporation of water from the surface of freshly laid concrete in an open landfill, in dry and hot climates, using the influence of natural solar energy at the "4 - Experimental Test Plant of Building Structures" in Aktash, Namangan region under the Ministry of Agriculture and Water Resources[3]. At the Experimental Experimental Building Structures Plant in the town of Aktash, we studied the effect of curtain-forming compositions on the process of plastic deposition of freshly laid concrete [3]. This experiment takes into account the process of plastic settling during the initial period of concrete hardening when using different curtain-forming compositions for the care of newly laid concrete. In this case, the assessment of the effect of various curtain-forming compositions (CFC) used for the care of the concrete mixture in the initial period on the process of plastic deposition, the coefficient of care of concrete is determined by the following formula:

$$Kef = 1 - \frac{Ei - Eo}{Emax - Eo} \qquad (1)$$

In this case: Eo - initial deformations in the newly laid concrete (water evaporation is not allowed), mm/m;
Emax is the maximum amount of concrete plastic sink that hardens without care, mm/m;

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

Ei- amount of plastic subsidence of concrete protected by CTC, mm/m. The formula shows that K_{ef}=1 when using the most effective CTC, K_{ef}= 0 when using inefficient CTC. According to factory-based studies, K_{ef} = 0.89 when using a water-soluble content (WSC) and K_{ef} = 0.81 when using an aqueous dispersion content (ADC) for the care of freshly laid concrete.

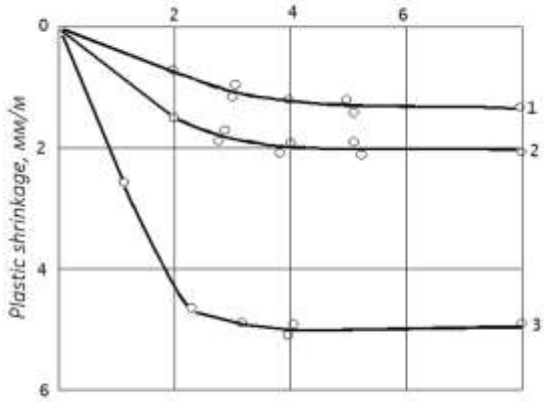


Fig. 1. shows the results of the study.

As can be seen from the graph, the plastic deposition in the hardening process of concrete is significantly reduced when curtain-forming compositions are used for concrete care performed as an experiment. Studies have shown that hardening concrete leads to a decrease in its strength with increasing ambient temperature (if the humidity does not change) [3]. Experiments have shown that the strength of hardened concrete in summer conditions (neglected in dry hot climates) can be reduced by up to 50% compared to the strength of hardened concrete under normal conditions [4].

Factory-based studies have shown that Kef = 0.89 when used with a water-soluble content (WSC) and K_{ef}= 0.81 when used with an aqueous dispersion content (ADC) for the care of freshly laid concrete. The following basic requirements are set for materials that form a coating on a newly laid concrete surface: a) they must be well sprayed on the concrete surface, form a waterproof integral surface on the surface, which protects the concrete from dehydration and adheres to its surface;

b) do not corrode concrete and reinforcement; c) not toxic; g) must be the same during storage and transportation;

3. Results and Discussion

The application of curtain-forming compositions for the care of freshly laid concrete is of great efficiency, because the technology of application of this method is simple, relatively inexpensive compared to other methods, the raw material is sufficient. Under the curtain-forming coatings, favorable moisture conditions are created for the concrete to harden. In order to determine the frost resistance of concrete on its strength, based on the results of the study, a concrete mix of the following composition was prepared. In this case, for 1 m3 of concrete mix composition (1:2.20:4.07, W/C=0.55) cement (Kuasoy cement brand M400) - 334 kg/m^3; Water - 186 l/m^3; sand - 734 kg/m^3; gravel (fraction-5-20mm) -1356 kg/m^3. Curtain-forming ingredients were sprinkled on freshly prepared 100x100x100 mm samples. Content effect was 350-400 gm^2. Unsprinted samples (without care) were taken for control. After spraying on the samples, some of the samples were placed under natural conditions and some in a special climatic chamber [2]. After R28 days, the samples were separated from the mold and tested. The results of the studies are presented in Figure 1 and Table 1.

Table 1. Indicator s of cold resistance of concrete

№	Method of care	Compressive strength of concrete	

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

		Before the test, 100 cycles	After the test, 100 cycles	Before the test, 150 cycles	After the test, 150 cycles	Frost resistance, cycle
1	WSC (water soluble content)	304	265	310	278	150
2	ADC (aqueous dispersion content)	298	258	309	276	150
3	Careless concrete	284	214	-	-	75

As can be seen from Figure 1 and Table 1, when the curtain-forming compounds are used for concrete care, it can be seen that its frost resistance is 150 cycles. The frost resistance of the untreated concrete sample was 75 cycles. Studies have shown that when WSC (water-soluble content) and ADC (aqueous dispersion content) are used for the care of freshly laid concrete, its frost resistance is 150 cycles, and therefore these compositions can ensure the strength and frost resistance of hardening concrete in dry hot climates [4].

When using curtain-forming compositions for the care of newly laid concrete, its efficiency is $K_f = 0.90$ and 0.80%. It is also resistant to cold and waterproof. One of the important aspects of the dry-hot climate that leads to negative conditions in concrete hardening is the occurrence of continuous evaporation on the open surface of the concrete. Continuous evaporation of moisture from freshly laid concrete is a continuous evaporation in hardened concrete - **j** (kg / m^2 S), Δm-concrete weight, weight lost over time Δτ -time and F-evaporating surface, which is expressed as follows:

$$j = 1/F \,; \Delta m/\Delta \tau = const$$

During this interval, the external equilibrium exchange rate has the highest rate, causing continuous evaporation on the concrete surface, during which time it does not conform to the internal equilibrium of the concrete. As a result, there is a gap between the complete transfer of moisture from the inner layers of concrete to its surface (transfer of moisture to the evaporating surface). Experimental results have shown that dehydration (loss of moisture due to evaporation) occurs in 50-70% of the total water effect in concrete during the first day in concrete that has not been maintained or adequately maintained since the initial period [12.14.15.19,20]. Most importantly, this figure occurs within 6 -7 hours of the initial period. Evaporation, which occurs at a large rate in such an interval, has a negative effect on the compaction and interconnection of newly formed internal structures in concrete. In the initial hardening of concrete, ie when the concrete is in a soft state that has not yet hardened, "plastic subsidence" causes small cracks and other small defects during the period when the concrete takes its structural shape. As a result, small cracks and other small defects appear on the formed concrete surface. Experiments have shown that in hardened concrete in dry and hot climates, mainly in the initial period, after 2.5-3.0 hours, plastic subsidence occurs significantly, and in subsequent periods it continues to be insignificant in concrete stored under normal conditions. Under such conditions, the water absorption index of hardened concrete is 8-10 times, and the frost resistance is significantly reduced.

Table 2. Results of chemical analysis of cements

Cement type	Chemical composition, in%								
	SiO_2	Al_2O_3	Fe_2O_3	CaO	MgO	SO_3	K_2O	Na_2O	n.n.n.
Portland cement	23,71	5,78	4,21	55,24	2,91	4,00	1,13	0,19	2,2
a) clinker	20,30	5,73	4,43	62,71	2,84	0,86	0,92	0,12	0,9
b) slag (37.2%)	38,78	8,15	-	38,94	8,84	-	1,18	-	-
v)treble (10%)	71,82	8,51	2,91	4,38	1,72	0,58	1,43	-	8,67

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

NTs-20 brand stretched cement	21,9	7,97	4,00	57,23	1,95	3,65	0,52	0,38	2,20

If the concrete is not maintained, then the size of the void layer on the concrete surface is assumed to be infinite (∞), so that -j reaches its maximum value. It follows that the greater the clearance distance between the concrete surface and the heliocoating, the greater its dewatering. That is, the larger the gap between them, the greater the dehydration in the concrete top layer [3,4,15,16].

Table 3. Mineralogical composition of cements

Cement type	Amount of minerals, in %			
	C_3S	C_2S	C_3A	C_4AF
Portland cement	64	15	6	12
Slag portland cement	69	14	8	13
NTs-20 brand stretched cement	55,5	18	8,2	12,1

As a result, the "plastic sinking" of concrete $(\Delta l/l)_{max} = f_{(i)}$ is even greater. Conducting research under natural conditions is mainly aimed at fulfilling the equation ($\Delta l/l$)max = f (j). Some separate experiments were performed at different times of the year, over a period of 6–7 months (Figure 2).

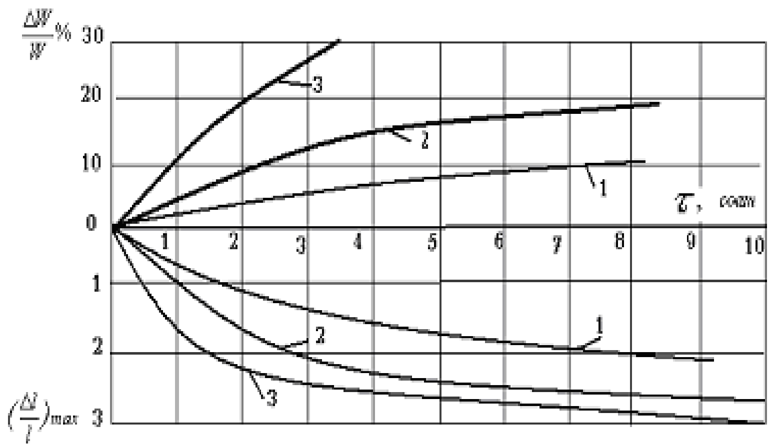


Fig. 2 In continuous evaporation of concrete (j, kg / m^{2}h) its plastic settling and water loss index is 1. if j = 0.077; 2. if j = 0.28; 3. if j = 0.65.

The results of the scientific work are that in concrete hardening under different environmental conditions 1) t = 20^0 C, φ = 40%; 2) t = 40^0 C, φ = 22-25%; 3) t = 60^0 C, φ= 6 ... 7%; in turn, the magnitude of continuous evaporation j_{max} = 0.213, j_{max} = 0.583, j_{max} = 0.834 kg / m2 h, in which case in experimental concrete, the magnitude of plastic subsidence changes insignificantly and 2.4; 2.41; Showed a range of 2.46 mm/m. In his research, it can be seen that the plastic deposition of concrete under close environmental conditions does not significantly change the j-value at certain intervals. However, according to the results of the study, ($\Delta l/l$)$_{max}$ increases with increasing j-quantity [25] In conducting the experiments, locally produced binders and fillers were used [20, 21, 22].
The results of experiments show that in dry-hot climates, plastic deposition in hardened concrete occurs depending on the amount of water leaving its surface, ie "evaporation". If the continuous evaporation index - j is 0.2 = 0.3 ≤ j ≤ 1.0 = 1.1 kg/m^2 in the following intervals, then ($\Delta l/l$) max is the same or insignificant change, if this value is j ≥1.1 kg / m^2 hour, we observe that the ($\Delta l/l$) max indicator gradually increases. An

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

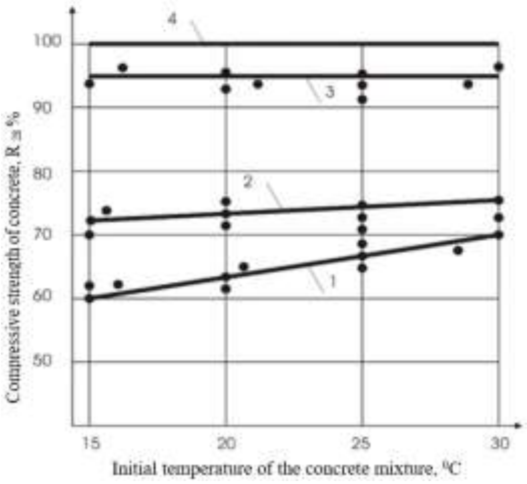
increase in the evaporation rate of the hardened concrete surface, if j=1.0-1.1 kg/m2.hours, then leads to an increase in the value of ($\Delta l / l$) max, which, in our opinion, significantly increases the magnitude of the j-value, the state of the concrete and very is associated with the appearance of a voltage indicator in the small cavities (Fig. 2). That is, the magnitude of the "plastic sink" that occurs as a result of continuous evaporation does not change at intervals of $0.2\text{-}0.3 \leq j \leq 1.0\text{-}1.1$ kg/m2. . Therefore, the larger the j-value is, the faster the "plastic sinking" that occurs. To do this, based on the above considerations, it is necessary to take into account the impact of physical processes occurring in the initial period in the selection of the most perfect state of the void layer between concrete and solar cover.

As a large aggregate in the concrete, crushed stone is mainly a product of the Aktash quarry plant in Namangan region from local factories, crushed grain size 5-20 mm, bulk density 1382 kg / m^3, as well as quartz sand used as a fine aggregate has the following characteristics: modulus of magnitude - 1.88; density - 2.65 t/m^3; water demand - 9.0%; pollution - 0.9%; materials at the required level were used. It has been found that changes in temperature have a significant effect on the permeability of the concrete mix in concretes with a low W/C content compared to concretes with a high W / C. This means that when the temperature of the concrete mix is t_6=20^{0}C (the temperature at which the cement effect norm is set) and t_6=20^{0}C (the temperature of the concrete mix in the summer months), the lower the W/C value, the greater the fluidity of the concrete mix. Numerous studies on the determination of heat treatment regimens have shown that pre-holding time should be at least 2 hours. The time of temperature rise depends on the rate of temperature rise, which is determined by the initial strength of the concrete (Table 4). For this purpose, experiments were conducted to study the effect of the initial temperature of the concrete mix and the ambient temperature on the heat treatment procedures [13; 16; 17; 21].

Table 4. The rate at which the temperature rises during the heat treatment of concrete.

Initial compressive strength of concrete, MPa	Temperature rise rate, degrees / hour
0,1-0,2	10-15
02-0,4	15-25
0,4-0,5	25-35
0,5-0,6	35-45
0.6 and higher	45-60

An increase in the initial temperature of the concrete mix from 15^{0}C to 30^{0}C resulted in a 10% increase in the strength of the concrete at the end of the heat treatment. After 3 days, a significant reduction was observed in the strengths detected. The strengths determined after 28 days showed that concrete samples with different initial temperatures had almost the same strength. Hence, an increase in the initial temperature of the concrete mix leads to an increase in the strength of the concrete at the end of the heat treatment period. This can reduce the total duration of heat treatment (Figure 3).



ISSN NO: 2770-0003
Date of Publication: 14-12-2022

Fig. 3. Concrete samples treated in the same heat regime but with different initial temperatures have different strength values at the end of the heat treatment.

As can be seen from the above:
1. The negative effect of the increase in ambient temperature is reflected in the loss of permeability of the concrete mix. In hot weather, the specified strength of concrete can be achieved by increasing water effect and, accordingly, cement effect.
2. High ambient temperature can have a positive effect on the hardening process of concrete. An increase in temperature accelerates the hydration reaction and the hardening of the cement. It is of practical importance to take this factor into account when determining the procedures for heat transfer to concrete.
To reduce or eliminate these negative effects, it is recommended to take care of the newly laid concrete:
1. Cover the newly laid concrete surface with a water-absorbent material (sand, cover cloth, etc.) and apply it regularly. After pouring and compaction of the newly laid concrete into the mold, after 25-30 minutes, its surface is covered with a water-absorbent material and moistened 3 times a day for 7 days.
2. Keeping open horizontal surfaces of concrete under a layer of water (method of closing water basins). In this case, a mold with waterproof beams 6-7 cm above the newly laid concrete is used. 30 minutes after laying the concrete, the exposed surfaces of the devices are filled with water to a thickness of 2-5 cm.
3. Continuous spraying of water on the newly laid concrete surface in the form of droplets using various humidifiers. This method can only be used where a centralized water supply is available.
4. Sealing the concrete surface with inventory thermal insulation coatings (ITVP). These coatings are made by pulling a two-layer polyethylene pellicle on wooden or metal frames.
5. Sprinkle curtain-forming ingredients on a freshly laid concrete surface. These compositions form a moisture-proof pellicle on the concrete surface in a short time. Its advantage over other methods is that these compositions can be sprayed within 10-15 minutes after laying on the concrete surface. It is advisable to concretize structures (road and airfield pavements, canal tiles, etc.) where the open surface modulus (ratio of surface area to its volume) is large.
6. The following basic requirements are set for materials that form a coating on the surface of newly laid concrete:
a) they should be well sprayed on the concrete surface, form a waterproof integral coating on the surface, which should protect the concrete from dehydration and adhere to its surface;
b) do not corrode concrete and reinforcement;
c) not toxic;
g) must be the same during storage and transportation.

3. Conclusions

The application of curtain-forming compositions for the care of freshly laid concrete is very effective, because the technology of application of this method is simple, relatively inexpensive compared to other methods, the raw material is sufficient. Under the curtain-forming coatings, favorable moisture conditions are created for the concrete to harden.

References

1. Рахимов, А. М., Жураев, Б. Г., & Хакимов, Ш. А. (2016). Энергосберегающий метод тепловой обработки бетона в районах с жарким климатом. Символ науки, (4-3), 63-65.
2. Ҳакимов ША, М. К., & Эгамбердиев, И. Х. (2021). ОСОБЕННОСТИ ТВЕРДЕНИЯ БЕТОНА НА ПОРТЛАНДЦЕМЕНТЕ С УЧЕТОМ ПОГОДНО-КЛИМАТИЧЕСКИХ ФАКТОРОВ. *МЕХАНИКА ВА ТЕХНОЛОГИЯ ИЛМИЙ ЖУРНАЛИ*, (4), 102.
3. Хакимов, Ш. А., & Муминов, К. К. ОБЕЗВОЖИВАНИЕ БЕТОНА В УСЛОВИЯХ СУХОГО-ЖАРКОГО КЛИМАТА. *НАУЧНЫЙ ЭЛЕКТРОННЫЙ ЖУРНАЛ «МАТРИЦА НАУЧНОГО ПОЗНАНИЯ»*, 86.

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

4. Хакимов, Ш. А., & Чулпонов, О. Г. ОПИТ ИСПОЛЬЗОВАНИЯ СОЛНЕЧНОЙ ЭНЕРГИИ ПРИ ИЗГОТОВЛЕНИИ БЕТОННЫХ ИЗДЕЛИЙ НА ОТКРЫТЫХ ПЛОЩАДКАХ. *НАУЧНЫЙ ЭЛЕКТРОННЫЙ ЖУРНАЛ «МАТРИЦА НАУЧНОГО ПОЗНАНИЯ»*, 93.
5. Хакимов, Ш. А., & Муминов, К. К. ОБЕЗВОЖИВАНИЕ БЕТОНА В УСЛОВИЯХ СУХОГО-ЖАРКОГО КЛИМАТА. НАУЧНЫЙ ЭЛЕКТРОННЫЙ ЖУРНАЛ «МАТРИЦА НАУЧНОГО ПОЗНАНИЯ», 86.
6. Abduraxmanovich, X. S. H. (2021). HELIOTHERMO CONCRETE PROCESSING IN HOT CLIMATES. *INFORMATION TECHNOLOGY IN INDUSTRY*, *9*(3), 973-978.
7. Khakimov, S. A., Mamadov, B. A., & Madaminova, M. U. (2022). CONTINUOUS VAPORING PROCESSES IN NEW FILLED CONCRETE. *Innovative Development in Educational Activities*, *1*(3), 54-59.
8. Хакимов, Ш. А. (1972). Особенности трещинообразования в балках с различной толщиной защитного слоя бетона. *Воздействие статических, динамических и многократно повторяющихся нагрузок на бетон и элементы железобетонных конструкций*, 65-86.
9. Хакимов, Ш. А. (1972). Особенности трещинообразования в балках с различной толщиной защитного слоя бетона. *Воздействие статических, динамических и многократно повторяющихся нагрузок на бетон и элементы железобетонных конструкций*, 65-86.
10. Хакимов, Ш. А. (2017). Сейсмобезопасность конструктивных систем современных жилищно-гражданских зданий Центрально-Азиатского региона. *Геориск*, (1), 54-60.
11. Хакимов, Ш. А. (2009). Оценка экономического ущерба при землетрясениях на урбанизированных территориях с учетом региональных факторов риска/Актуальные проблемы исследований по теории сооружений. In *Сб. научных статей в трех частях, 4.3-ЦНИИСК им. ВА Кучеренко.* (p. 29).
12. Хакимов, Ш. А. (2005). К вопросу учета факторов, влияющих на сейсмический риск. *Сейсмостойкое строительство. Безопасность сооружений.*, (6), 50.
13. 13 Хакимов, Ш. А. (2001). Некоторые вопросы оценки сейсмического риска и антисейсмического усиления зданий. Исследование сейсмостойкости сооружений и конструкций, (20 (30)), 167.
14. Хакимов, Ш. А. (2014). Проблемы сейсмобезопасности конструктивных систем гражданских зданий современной застройки и концепции ее повышения. Вестник АО «КазНИИСА», (10), 29.
15. Хакимов, Ш. А. (2003). Оценка уязвимости наиболее распространенных конструктивных типов зданий при сейсмических воздействиях и антисейсмическое. *Оценка и снижение сейсмического риска.-М.: ВНИИНТПИ*.
16. Хакимов, Ш. А. (2000). Уязвимость зданий при землетрясениях и вопросы снижения сейсмического риска на урбанизированных территориях. *Архитектура и строительство Узбекистана*, (2-3), 23.
17. Хакимов, Ш. А. (2019). Новые конструктивные системы жилищно-гражданских зданий и проблемы актуализации сейсмических норм. In *XIII Российская национальная конференция по сейсмостойкому строительству и сейсмическому районированию* (pp. 192-202).
18. Хамидов, А. И., & Ваккасов, Х. С. (2018). ИСПОЛЬЗОВАНИЕ ГЕЛИОТЕХНОЛОГИЙ ДЛЯ УСКОРЕНИЯ ТВЕРДЕНИЯ БЕТОНОВ НА ОСНОВЕ БЕЗОБЖИГОВЫХ ЩЁЛОЧНЫХ ВЯЖУЩИХ. Вестник Науки и Творчества, (2 (26)), 45-47.
19. Хакимов, Ш. А., Ваккасов, Х. С., & Бойтемиров, М. Б. У. (2017). Основные принципы проектирования энергоэффективных зданий. Вестник Науки и Творчества, (3 (15)), 136-139.
20. Хакимов, Ш. А., & Азизов, А. Т. (2018). ПРОБЛЕМЫ СЕЙСМИЧЕСКОЙ БЕЗОПАСНОСТИ И СОСТОЯНИЕ РАЗВИТИЯ ЖИЛИЩНОГО СТРОИТЕЛЬСТВА В ЦЕНТРАЛЬНОАЗИАТСКОМ РЕГИОНЕ. *Вестник Международной ассоциации экспертов по сейсмостойкому строительству*, (6), 29-32.
21. Хакимов, Ш. А., Ваккасов, Х. С., & Каюмов, Д. А. У. (2017). ПРОБЛЕМЫ ОБЕСПЕЧЕНИЯ ЭНЕРГОСБРЕЖЕНИЯ И ПОВЫШЕНИЯ ЭНЕРГОЭФФЕКТИВНОСТИ ЗДАНИЙ, ОСНОВНЫЕ НАПРАВЛЕНИЯ ИХ РЕШЕНИЯ. Вестник Науки и Творчества, (3 (15)), 140-142.

 ISSN NO: 2770-0003
Date of Publication: 14-12-2022

22. Хакимов, Ш. А. (2017). СЕЙСМОБЕЗОПАСНОСТЬ СОВРЕМЕННЫХ ЖИЛИЩНО-ГРАЖДАНСКИХ ЗДАНИЙ В ЦЕНТРАЛЬНОАЗИАТСКОМ РЕГИОНЕ (ОЦЕНКИ, ПРОБЛЕМЫ И ПУТИ ЕЁ ПОВЫШЕНИЯ). *Природные и техногенные риски. Безопасность сооружений*, (4), 9-10.
23. Хакимов, Ш. А. (2016). ПРОБЛЕМЫ СЕЙСМОБЕЗОПАСНОСТИ ЗДАНИЙ СОВРЕМЕННОЙ ЗАСТРОЙКИ ГОРОДОВ ЦЕНТРАЛЬНОАЗИАТСКОГО РЕГИОНА И КОНЦЕПЦИИ ЕЕ ПОВЫШЕНИЯ. Вестник Международной ассоциации экспертов по сейсмостойкому строительству, (1), 7-14.
24. Хакимов, Ш. А. (2015). Сейсмобезопасность жилищно-гражданских зданий современной застройки городов центральноазиатского региона и пути ее повышения. Будівельні конструкції, (82), 74-84.
25. Хакимов, Ш. А. (2013). Новые концепции повышения сейсмобезопасности зданий на основе инженерного анализа последствий землетрясений. Сейсмостойкое строительство. Безопасность сооружений, (5), 40-44.
26. Хакимов, Ш. А. (2012). О НОРМИРОВАНИИ МЕТОДОВ ВОССТАНОВЛЕНИЯ И АНТИСЕЙСМИЧЕСКОГО УСИЛЕНИЯ ЗДАНИЙ СУЩЕСТВУЮЩЕЙ ЗАСТРОЙКИ. Сейсмостойкое строительство. Безопасность сооружений, (5), 27-32.
27. Абдурахмонов С. Э., Мартазаев А. Ш., Эшонжонов Ж. Б. Трещины в железобетонных изделиях при изготовлении их в нестационарном климате //Вестник Науки и Творчества. – 2017. – №. 2. – С. 6-8.
28. Ризаев, Б. Ш., Р. А. Мавлонов, and А. Ш. Мартазаев. "Физико-механические свойства бетона в условиях сухого жаркого климата." Инновационная наука 7-1 (2015): 55-58.
29. Хакимов Ш. А., Мартазаев А. Ш., Ваккасов Х. С. Расчет грунтовых плотин методом конечных элементов //Инновационная наука. – 2016. – №. 2-3 (14). – С. 109-111.
30. Абдурахмонов С. Э., Мартазаев А. Ш., Мавлонов Р. А. Трещинастойкость железобетонных элементов при одностороннем воздействии воды и температуры //Символ науки. – 2016. – №. 1-2. – С. 14-16.
31. Насриддинов М. М., Мартазаев А. Ш., Ваккасов Х. С. Трещиностойкость и прочность наклонных сечений изгибаемых элеменов из бетона на пористых заполнителях из лёссовидных суглинков и золы ТЭС //Символ науки. – 2016. – №. 1-2. – С. 85-87.
32. Абдурахмонов С. Э. и др. Трещинообразование и водоотделение бетонной смеси в железобетонных изделиях при изготовлении в районах с жарким климатом //Вестник Науки и Творчества. – 2018. – №. 2. – С. 35-37.
33. Мартазаев А. Ш., Эшонжонов Ж. Б. Вопросы расчета изгибаемых элементов по наклонным сечениям //Вестник Науки и Творчества. – 2017. – №. 2 (14). – С. 123-126.
34. Шукуриллаееич М. А. и др. ПРОВЕРКА НЕСУЩЕЙ СПОСОБНОСТИ ИЗГИБАЕМЫХ ЖЕЛЕЗОБЕТОННЫХ ИЗДЕЛИЙ ПО НАКЛОННОМУ СЕЧЕНИЮ //Science Time. – 2018. – №. 6 (54). – С. 42-44.
35. Эгамбердиев И. Х., Мартазаев А. Ш., Фозилов О. К. ЗНАЧЕНИЕ ИССЛЕДОВАНИЯ РАСПРОСТРАНЕНИЯ ВИБРАЦИЙ ОТ ДВИЖЕНИЯ ПОЕЗДОВ //Научное знание современности. – 2017. – №. 3. – С. 350-352.
36. Мартазаев А. Ш., Цаюмов Д. А. У., Исоцжонов О. Б. У. СТАТИЧЕСКИЙ РАСЧЕТ ГРУНТОВЫХ ПЛОТИН //Science Time. – 2017. – №. 5 (41). – С. 226-228.
37. Ваккасов Х. С., Фозилов О. К., Мартазаев А. Ш. ЧТО ТАКОЕ ПАССИВНЫЙ ДОМ //Вестник Науки и Творчества. – 2017. – №. 2 (14). – С. 30-33.
38. Мартазаев А. Ш., Фозилов О. Қ., Носиржонов Н. Р. Значение расчетов статического и динамического воздействия наземляные плотины //Инновационная наука. – 2016. – №. 5-2 (17). – С. 132-133.
39. Jurayevich R. S., Shukirillayevich M. A. Calculation of Strength of Fiber Reinforced Concrete Beams Using Abaqus Software //The Peerian Journal. – 2022. – Т. 5. – С. 20-26.

ISSN NO: 2770-0003
Date of Publication: 14-12-2022

40. Shukirillayevich M. A., Sobirjonovna J. A. The Formation and Development of Cracks in Basalt Fiber Reinforced Concrete Beams //CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES. – 2022. – Т. 3. – №. 4. – С. 31-37.
41. Juraevich R. S., Shukirillayevich M. A. The Effect of the Length and Amount of Basalt Fiber on the Properties of Concrete //Design Engineering. – 2021. – С. 11076-11084.
42. Раззақов, С. Ж., Мартазаев, А. Ш., Жўраева, А. С., & Ахмедов, А. Р. (2022). Базальт толалари билан дисперс арматураланган фибробетоннинг иқтисодий самарадорлиги. Фарғона политехника институти Илмий техника журнали, 26(1), 206-209.
43. Jurayevich S. R., Shukirillayevich A. M. Calculation of Basalt Fiber Reinforced Concrete Beams for Strength.
44. Juraevich R. S., Shukirillayevich M. A. Mechanical properties of basalt fiber concrete.
45. Martazayev A., Muminov K., Mirzamakhmudov A. BAZALT, SHISHA VA ARALASH TOLALARNING BETONNING MEXANIK XUSUSIYATLARIGA TA'SIRI //PEDAGOG. – 2022. – Т. 1. – №. 3. – С. 76-84.
46. АШ Мартазаев, АР Мирзамахмудов ТРЕЩИНАСТОЙКОСТЬ ВНЕЦЕНТРЕННО-РАСТЯНУТЫХ ЖЕЛЕЗОБЕТОННЫХ ЭЛЕМЕНТОВ ПРИ ОДНОСТОРОННЕМ ВОЗДЕЙСТВИИ ГОРЯЧЕЙ ВОДЫ //PEDAGOG. – 2022. – Т. 1. – №. 3. – С. 68-75.
47. Раззаков С. Ж. Исследование напряженно-деформированного состояния одноэтажной постройки с внутренней перегородкой при статической оттягивающей нагрузке по верхнему поясу строения //Строительная механика инженерных конструкций и сооружений. – 2016. – №. 6. – С. 14-19.
48. Juraevich R. S., Abdujabbarovich H. S., Gulomovich J. B. The study of seismic stability of a single-storey building with an internal partition with and without taking into account the frame //European science review. – 2016. – №. 7-8. – С. 217-220.
49. Juraevich R. S. Experimental and theoretical approach to the determination of physical and mechanical characteristics of the material of the walls of the low-strength materials //European science review. – 2016. – №. 7-8. – С. 215-216.