Spectrum Journal of Innovation, Reforms and Development
Volume 10, Dec., 2022 | ISSN (E): 2751-1731
Website: www.sjird.journalspark.org

INFLUENCE OF DRY HOT CLIMATE ON THE DEFORMABILITY OF COLUMNS MADE OF HEAVY CONCRETE

Rizayev Bakhodir, Islombek Akhmedov, Yusupov Shavkat, Isroiljon Umarov, Aleksandr Kazadayev, Dedaxanov Farruh
Namangan engineering-construction institute, Islom Karimov Avenue, 12, Namangan, Uzbekistan, 160103

Annotation
In this article, we will consider the stressful effect of a dry hot climate on the deformed state of operated reinforced concrete columns. Based on theoretical and experimental studies, we have studied the deformability of reinforced concrete elements.
In a dry, hot climate, fluctuations in temperature and humidity during the day and season of the year (summer and winter) adversely affect the formation of the concrete structure. Intensive dehydration of concrete at elevated temperature and low relative humidity of the medium leads to a decrease in its strength and modulus of elasticity.
A large daily temperature drop causes an uneven distribution of temperature stresses across the concrete sections . The design and construction of reinforced concrete structures for dry hot climates without taking into account the strain forces caused by changes in elevated temperature and low humidity lead to early formation of cracks in concrete, their excessive disclosure, as well as to large deformations of the structure.

Keywords: crack, concrete pavements, Portland cement, strength, reconstruction.

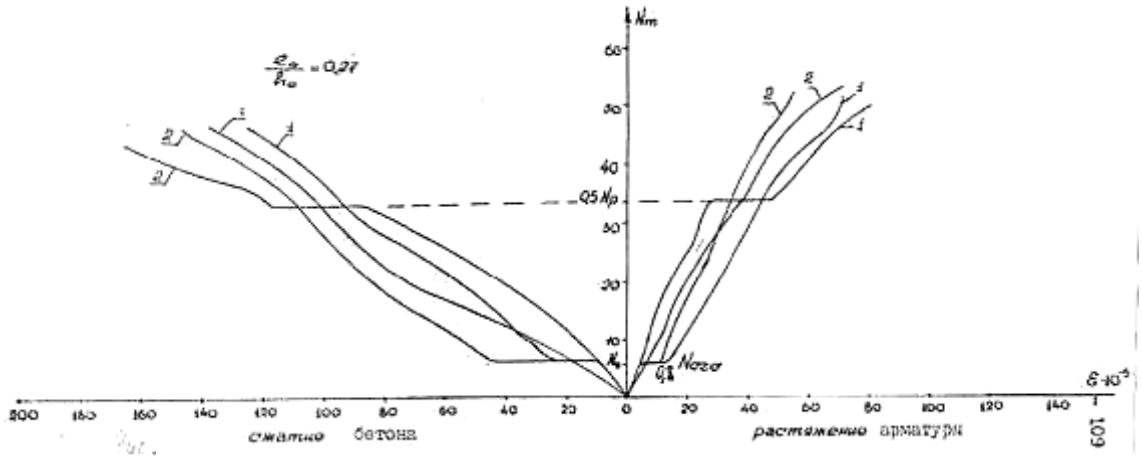
One of the most important factors in improving the reliability and durability of structures of buildings and structures , especially for the Republic of Uzbekistan , is the further improvement of their calculation methods taking into account real operating conditions.
In this regard, an urgent task is to conduct experimental and theoretical studies of the strength, deformability and crack resistance of non-centrally compressed reinforced concrete elements made of heavy concrete under the influence of force factors and adverse effects of dry hot climate.
To identify the influence of a dry hot climate on the strength and crack resistance of non-centrally compressed reinforced concrete elements, experimental rectangular columns with dimensions of 16×30 sm and a height of 100 sm were made of heavy concrete, which had consoles. The columns had symmetrical reinforcement of 4 rods with a diameter of 14 mm of class A – III. All columns after concreting were in the formwork under wet sawdust for 7 days, and then they were unpacked.
8 columns were tested for the long-term effect of the longitudinal compressive force in a dry hot climate, 4 columns were loaded with a longitudinal force equal to 0.8 Ncrc, the remaining 4 columns with a force equal to 0.5 N_p with an eccentricity equal to e = 0,5y=7sm, and e = y = 15cm. Portable indicators based on 250mm were used to measure the deformation of reinforcement and concrete during prolonged exposure of samples under load. The readings

were taken three times a day in the first two months, and once a week for a year in the following months.

The loading of the columns with a long-acting load was carried out on the stand with the help of lever installations. Cast iron loads weighing 20-25 kg and concrete blocks weighing 20 kg were used. To establish the influence of solar radiation on the deformations of the stretched and compressed zone, some columns were installed so that at noon solar radiation acted from the stretched zone and in other columns from the compressed zone of concrete. The expected destructive load and the appearance of cracks were obtained based on the results of testing the column with a short-term load. The columns, after being under prolonged load and solar radiation for one year, were unloaded and brought to destruction by a short-term load on the press in order to establish how the dry hot climate affects the strength, deformation and crack resistance of the columns.

The appearance of cracks in the columns causes an increase in the average relative deformations of the stretched reinforcement and the extreme compressed fiber of concrete. Prior to the formation of cracks, the growth of deformations of stretched reinforcement and concrete of the compressed zone is approximately the same. As the load increases further and, especially after cracks appear in the stretched zone, the intensity of the increase in deformations of the stretched reinforcement, as well as compressed concrete, increases.

The deformation of the stretched reinforcement of the column, which during the year were in a dry hot climate under a prolonged load of 0,8 N_{crc}, was $10{,}5 \cdot 10^{-5}$ when solar radiation was applied to the stretched zone, and $4{,}9 \cdot 10^{-5}$ to the compressed zone. After the action of solar radiation on the stretched zone for one year in a dry hot climate under a prolonged load of 0,8 N_{crc}, the deformation of the extreme compressed fiber was $148{,}5 \cdot 10^{-5}$ with the action of solar radiation on the compressed zone – $84{,}5 \cdot 10^{-5}$ (IMG 1).



IMG. 1. Average deformations of compressed concrete fiber and stretched deformation of reinforcement of columns that are under a load of 0.5 Np and 0.8 Ncrc for a long time in a dry hot climate.

1- after the action of solar radiation on the stretched zone

2- after the effect of solar radiation on the compressed zone

The conditions of a dry hot climate increase the relative deformation of the reinforcement. In the columns under the influence of solar radiation during one year, the deformations of the reinforcement were 13-14% greater than in the columns located in the workshop. The elevated temperature and low relative humidity of the dry hot climate also increases the deformation of the extreme fiber of the compressed zone of concrete. When the columns were in the shop for 1 year, the relative deformation of the extreme compressed fiber was $\mathbf{E_{bc}=65\cdot10^{-5}}$. The relative deformations of the extreme compressed concrete fiber in columns that were under the influence of solar radiation for 1 year (at 0.5 Np) increased by 35-60% compared with concrete deformations under short-term load in an increase of 40 days.

The increase in the deformation of reinforcement and concrete from prolonged loading in a dry hot climate is due to changes in the elastic-plastic properties of concrete. Theoretical deformations of stretched reinforcement and compressed extreme fiber of concrete, taking into account changes in the strength and deformative properties of concrete, are determined as follows. The average deformations of the stretched armature under off-center compression were calculated by the formula [1:2]

$$\varepsilon = \frac{\mathrm{N}\cdot e_s}{E_s A h_o Z} - \frac{N}{h_o}\cdot\frac{\Psi_s}{E_s A_s}; \qquad (1)$$

Here is a coefficient that takes into account the work of stretched concrete on a site with cracks determined by the formula

$$\psi_s = 1.25 - \varphi_{es}\varphi_m - \frac{1-\delta_m^2}{(3.5-1.8\varphi_m)\cdot\dfrac{e_s}{h_o}} \qquad (2)$$

The average deformations of the extreme fiber of the concrete of the compressed zone are determined by the formula:

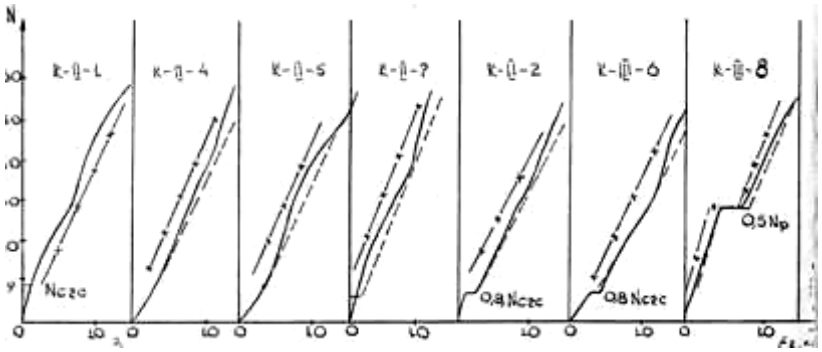
$$\varepsilon_b = \frac{N\cdot e\psi_b}{(\varphi_f+\xi)bh_o E_b\beta_b V} - \frac{N}{h_o}\cdot\frac{\psi_s}{\mathrm{E}_s A_s} \qquad (3)$$

Ψ_b - the coefficient taking into account the uneven distribution of deformations of the extreme compressed fiber of concrete along the length of the section with cracks is assumed for heavy concrete to be equal to-0.9.

The theoretical deformations of the stretched reinforcement and the extreme compressed concrete fiber determined by the formula (1) and (3) taking into account the recommendations of SniP 2.03.01-84 were less experienced (IMG.2-IMG.3)

Theoretical values of deformation of stretched reinforcement and extreme compressed concrete fiber, determined by the formula (1) and (3) taking into account the influence of hot

climate, R_b, Y_{b7}, $R_{bt,Ser}$, Y_{tt}, E_b, B_b - they have a satisfactory convergence with the experimental values of deformations (IMG.2-IMG.3).

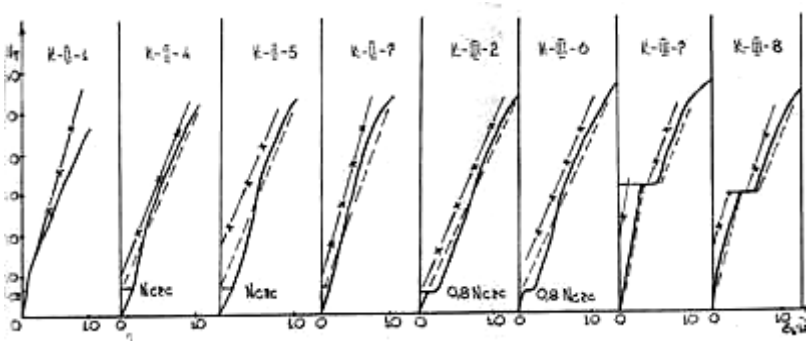


IMG.2 Concerning the deformation of the reinforcement in a dry hot climate with load eccentricity e=0,5y

_____ - experienced

___x____x___ - theoretical according to the formula (1)

---------- - also taking into account the influence of a dry hot climate



IMG.3 Average relative deformations of the extreme fiber of the compressed zone of concrete in a dry hot climate with load eccentricity e=0,5y

_____ - experienced

___x____x___ - theoretical

---------- - also taking into account the influence of a dry hot climate

1. According to the results of experimental and theoretical studies, the calculation of reinforced concrete non-centrally compressed elements operated in a dry hot climate should be carried out according to the SniP 2.03.01-96 method, taking into account changes in the strength and deformative properties of concrete from the effects of temperature, humidity, shrinkage and swelling of concrete..

2. When calculating deformations of non-centrally compressed reinforced concrete elements operated in a dry hot climate, the values of the coefficient φв1 taking into account the development of short-term creep of concrete, for a dry hot climate, 0.75 should be taken, the coefficient φв2

-taking into account the influence of prolonged creep of concrete , for reinforced concrete elements unprotected from the effects of solar radiation , for a dry hot climate at the first design stage of work is 3.0, and at the second design stage 3.5. It is also necessary to take into account

the reduction in the compressive strength of concrete by introducing the coefficient of working conditions of concrete γв7

3. The development of concrete deformation of the compressed zone and stretched reinforcement depending on the eccentricity of the load application and orientation of the compressed and stretched zone to the cardinal directions (south, north, west, east) was revealed and the influence of orientation on the development of concrete deformation of the compressed zone and stretched reinforcement was established.

REFERENCES

1. Akhmedov, I., Khamidov, A., Shavkat, Y., Jalalov, Z., Umarov, I., & Kazadayev, A. (2022). RESEARCH OF ASH-SLAG MIXTURES FOR PRODUCTION OF CONSTRUCTION MATERIALS. Spectrum Journal of Innovation, Reforms and Development, 10, 85-91.
2. Akhmedov, I., Khamidov, A., Shavkat, Y., Umarov, I., & Kazadayev, A. (2022). DISTRIBUTION OF SEDIMENTS IN THE MOUNTAIN RIVER BED. Spectrum Journal of Innovation, Reforms and Development, 10, 101-106.
3. Khamidov, A., Akhmedov, I., Shavkat, Y., Jalalov, Z., Umarov, I., Xakimov, S., & Aleksandr, K. (2022). APPLICATION OF HEAT-INSULATING COMPOSITE GYPSUM FOR ENERGY-EFFICIENT CONSTRUCTION. Spectrum Journal of Innovation, Reforms and Development, 10, 77-84.
4. Akhmedov, I., Khamidov, A., Kholmirzayev, S., Umarov, I., Dedakhanov, F., & Hakimov, S. (2022). ASSESSMENT OF THE EFFECT OF SEDIBLES FROM SOKHSOY RIVER TO KOKAND HYDROELECTRIC STATION. Science and innovation, 1(A8), 1086-1092.
5. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Umarov, I., Dedakhanov, F., & Hakimov, S. (2022). USE OF SULFUR CONCRETE IN REINFORCED CONCRETE STRUCTURES. Science and innovation, 1(A8), 985-990.
6. Kholmirzayev, S., Akhmedov, I., Yusupov, S., Umarov, I., Akhmedov, A., & Kazadayev, A. (2022). THE ROLE OF INTEGRATION OF SCIENCE, EDUCATION AND DEVELOPMENT IN STAFF PREPARATION FOR CONSTRUCTION. Science and innovation, 1(B8), 2237-2241.
7. Akhmedov, I., Khamidov, A., Kholmirzayev, S., Yusupov, S., & Umarov, I. (2022). IMPROVING RIVER SEDIMENT DISTRIBUTION CALCULATION IN MOUNTAIN RIVERS. Science and innovation, 1(A8), 1014-1019.
8. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Akhmedov, A., Dedakhanov, F., & Muydinova, N. (2022). CALCULATION OF REINFORCED CONCRETE STRUCTURES OF BUILDINGS BASED ON THE THEORY OF RELIABILITY. Science and innovation, 1(A8), 1027-1032.
9. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Yusupov, S., Umarov, I., & Hakimov, S. (2022). ANALYSIS OF THE EFFECT OF DRY HOT CLIMATE ON THE WORK OF REINFORCED CONCRETE ELEMENTS. Science and innovation, 1(A8), 1033-1039.

10. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Jalalov, Z., Yusupov, S., & Umarov, I. (2022). THE ROLE OF THE INTEGRATION OF SCIENCE, EDUCATION AND PRODUCTION IN THE TRAINING OF PERSONNEL FOR CONSTRUCTION EDUCATIONAL AREAS. Science and innovation, 1(A8), 1040-1045.
11. Khamidov, A., Akhmedov, I., Kholmirzayev, S., Jalalov, Z., Yusupov, S., & Umarov, I. (2022). EFFECTIVENESS OF MODERN METHODS OF TESTING BUILDING STRUCTURES. Science and innovation, 1(A8), 1046-1051.
12. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Umarov, I., Axmedov, A., & Abdunazarov, A. (2022). PROSPECTS FOR THE DEVELOPMENT OF REINFORCED CONCRETE STRUCTURES IN UZBEKISTAN. Science and innovation, 1(A8), 1052-1057.
13. Xamidov, A., Kholmirzayev, S., Rizayev, B., Umarov, I., Dadaxanov, F., & Muhtoraliyeva, M. (2022). THE EFFECTIVENESS OF THE USE OF MONOLITHIC REINFORCED CONCRETE IN THE CONSTRUCTION OF RESIDENTIAL BUILDINGS. Science and innovation, 1(A8), 991-996.
14. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Jalalov, Z., Yusupov, S., & Akhmedov, A. (2022). THE USE OF MONOLITHIC REINFORCED CONCRETE STRUCTURES ON THE TERRITORY OF THE REPUBLIC OF UZBEKISTAN. Science and innovation, 1(A8), 997-1003.
15. Kholmirzayev, S., Akhmedov, I., Khamidov, A., Umarov, I., Dedakhanov, F., & Kazadayev, A. (2022). ANALYSIS OF METHODS FOR PROCESSING SERA RAW MATERIALS AND MAKING SEROBETON. Science and innovation, 1(A8), 1004-1008.
16. Kholmirzayev, S., Akhmedov, I., Rizayev, B., Akhmedov, A., Dedakhanov, F., & Khakimov, S. (2022). RESEARCH OF THE PHYSICAL AND MECHANICAL PROPERTIES OF MODIFIED SEROBETON. Science and innovation, 1(A8), 1009-1013.
17. Khamidov, A., Akhmedov, I., Kholmirzayev, S., Qodirova, F., Nomonova, S., & Kazadayev, A. (2022). RESEARCH OF ASH-SLAG MIXTURES FOR THE PRODUCTION OF BUILDING MATERIALS. Science and innovation, 1(A8), 1020-1026.
18. Adhamjon, K., Islombek, A., Sattor, K., Shavkat, Y., Aleksandir, K., & Begyor, S. (2022). APPLICATION OF HEAT-INSULATING COMPOSITE GYPSUM FOR ENERGY EFFICIENT CONSTRUCTIO. Science and Innovation, 1(8), 1058-1064.
19. Khamidov, A., Akhmedov, I., Kholmirzayev, S., Qodirova, F., Nomonova, S., Sharopov, B., & Kazadayev, A. (2022). INVESTIGATION OF THE PROPERTIES OF CONCRETE BASED ON NON-FIRING ALKALINE BINDERS. Science and innovation, 1(A8), 1065-1073.
20. Khamidov, A., Akhmedov, I., Rizayev, B., Kholmirzayev, S., Jalalov, Z., Kazadayev, A., & Sharopov, B. (2022). THERMAL INSULATION MATERIALS BASED ON GYPSUM AND AGRICULTURAL WASTE. Science and innovation, 1(A8), 1074-1080.

21. Khamidov, A., Akhmedov, I., Kholmirzayev, S., Qodirova, F., Nomonova, S., Sharopov, B., & Kazadayev, A. (2022). INVESTIGATION OF THE PROPERTIES OF CONCRETE BASED ON NON-FIRING ALKALINE BINDERS. Science and innovation, 1(A8), 1065-1073.
22. Абдуназаров, А., Хакимов, С., Умаров, И., Мухторалиева, М., Дедаханов, Ф., & Шаропов, Б. (2022). МЕРОПРИЯТИЯ ПО ПОВЫШЕНИЮ ЭНЕРГОЭФФЕКТИВНОСТИ СОВРЕМЕННЫХ И РЕКОНСТРУИРУЕМЫХ ЗДАНИЙ. Journal of new century innovations, 18(1), 130-134.
23. Hakimov, S., Sharopov, B., Umarov, I., Muxtoraliyeva, M., Dadaxanov, F., & Abdunazarov, A. (2022). URILISH MATERIALLARI SANOATIDA INNOVATSION MATERIALLAR ISHLAB CHIQARISHNING ISTIQBOLLI TOMONLARI. Journal of new century innovations, 18(1), 149-156.
24. Sharopov, B., Hakimov, S., Umarov, I., Muxtoraliyeva, M., Dadaxanov, F., & Abdunazarov, A. (2022). QUYOSH ENERGIYASIDAN FOYDALANIB TURAR JOY BINOLARI QURISHNING ISTIQBOLI TOMONLARI. Journal of new century innovations, 18(1), 135-141.
25. Kazadayev, A., Sharopov, B., Hakimov, S., Umarov, I., Muxtoraliyeva, M., Dadaxanov, F., & Abdunazarov, A. (2022). MAMLAKATIMIZDA NEMIS TA'LIM TIZIMINI JORIY QILISHNING SAMARADORLIGI TAHLILI. Journal of new century innovations, 18(1), 124-129.
26. Sodiqjon, K., Begyor, S., Aleksandr, K., Farrukh, D., Mukhtasar, M., & Akbarjon, A. (2022). PROSPECTIVE ASPECTS OF USING SOLAR ENERGY. Journal of new century innovations, 18(1), 142-148.
27. Mukhtasar, M., Begyor, S., Aleksandr, K., Farrukh, D., Isroil, U., Sodiqjon, K., & Akbarjon, A. (2022). ANALYSIS OF THE EFFECTIVENESS OF THE DEVELOPMENT OF THE GERMAN EDUCATION SYSTEM IN OUR COUNTRY. Journal of new century innovations, 18(1), 168-173.
28. Dadakhanov, F., Sharopov, B., Umarov, I., Mukhtoraliyeva, M., Hakimov, S., Abdunazarov, A., & Kazadayev, A. (2022). PROSPECTS OF INNOVATIVE MATERIALS PRODUCTION IN THE BUILDING MATERIALS INDUSTRY. Journal of new century innovations, 18(1), 162-167.
29. Begyor, S., Isroil, U., Aleksandr, K., Farrukh, D., Mukhtasar, M., Sodiqjon, K., & Akbarjon, A. (2022). MEASURES TO IMPROVE THE ENERGY EFFICIENCY OF MODERN AND RECONSTRUCTED BUILDINGS. Journal of new century innovations, 18(1), 157-161.
30. Fathulloev A.M., Eshev S.S., Samiev L.N., Ahmedov I.G'., Jumaboyev X., Arifjanov S. Boglanmagan gruntlardan tashkil topgan uzanlarda yuvilmaslik tezliklarini aniklash [To the determination of non-effective speed in the beds containing from unconnected soils] //Journal "Irrigatsiya va melioratsiya". Tashkent. – 2019. – С. 27-32.
31. Arifjanov A., Akmalov Sh., Akhmedov I., Atakulov D. Evaluation of deformation procedure in waterbed of rivers //IOP Conference Series: Earth and Environmental Science. – IOP Publishing, 2019. – Т. 403. – №. 1. – С. 012155.

32. Arifjanov A., Samiyev L., Akhmedov I., Atakulov D. Innovative Technologies In The Assessment Of Accumulation And Erosion Processes In The Channels //Turkish Journal of Computer and Mathematics Education (TURCOMAT). – 2021. – Т. 12. – №. 4. – Pp. 110-114.
33. G'ulomjonovich, A. I., Abdurahmonovich, O. I., & Isoqjon o'g'li, U. I. (2021). EFFECTS OF WATER FLOW ON THE EROSION PROCESSES IN THE CHANNEL OF GIS TECHNOLOGY. Journal of Advanced Scientific Research (ISSN: 0976-9595), 1(1).
34. Axmedov, I., Muxitdinov, M., Umarov, I., & Ibragimova, Z. (2020). Assessment of the effect of sedibles from sokhsoy river to kokand hydroelectric power station. InterConf.
35. Arifjanov, A. M., & Ibragimova, Z. (2020). Analysis Of Natural Field Research In The Assessment Of Processes In The Foothills. The American Journal of Applied sciences, 2(09), 293-298.
36. Арифжанов А.М., Самиев, Л.Н., Абдураимова, Д.А., Ахмедов, И.Г. Ирригационное значение речных наносов [Irrigation value of river sediments] //Актуальные проблемы гуманитарных и естественных наук. – 2013. – №. 6.
37. Ахмедов И.Ғ., Ортиқов И.А., Умаров И.И. Дарё ўзанидаги деформацион жараёнлаарни баҳолашда инновацион технологиялар [Innovative technologies in the assessment of deformation processes in the riverbed] // Фарғона политехника институти илмий-техника журнали. – Фарғона. – 2021. – Т.25, №.1. – С. 139-142.
38. Tadjiboyev S., Qurbonov X., Akhmedov I., Voxidova U., Babajanov F., Tursunova E., Xodjakulova D. Selection of Electric Motors Power for Lifting a Flat Survey in Hydraulic Structures // AIP Conference Proceedings 2432, 030114 (2022); https://doi.org/10.1063/5.0089643
39. Abduraimova D., Rakhmonov R., Akhmedov I., Xoshimov S., Eshmatova B. Efficiency of use of resource-saving technology in reducing irrigation erosion // AIP Conference Proceedings 2432, 040001 (2022); https://doi.org/10.1063/5.0089645
40. Холмирзаев С. А., Комилова Н. Х. Влияние сухого жаркого климата на ширину раскрытия трещин внецентренно-сжатых железобетонных элементов //Приволжский научный вестник. – 2015. – №. 4-1 (44).
41. Холмирзаев С. А. Температурные изменения в керамзитобетонных колоннах в условиях сухого жаркого климата //Журнал «Бетон и железобетон. – 2001. – №. 2.
42. Хамидов А. И. и др. Использование теплоизоляционного композиционного гипса в энергоэффективном строительстве. – 2021.
43. Хамидов А. И., Нуманова С. Э., Жураев Д. П. У. Прочность бетона на основе безобжиговых щёлочных вяжущих, твердеющего в условиях сухого и жаркого климата //Символ науки. – 2016. – №. 1-2. – С. 107-109.
44. Нуманова С. Э. Хамидов Адхамжон Иномжонович //ISSN 2410-700X. – С. 107.
45. Хамидов, А. И., Ахмедов, И., & Кузибаев, Ш. (2020). ТЕПЛОИЗОЛЯЦИОННЫЕ МАТЕРИАЛЫ НА ОСНОВЕ ГИПСА И ОТХОДОВ СЕЛЬСКОГО ХОЗЯЙСТВА.
46. Хамидов А. И. Использование теплоизоляционных материалов для крыш в энергоэффективном строительстве //Научно–технический журнал ФерПИ. Спец. – №. 2018.

47. Хамидов А. И., Мухитдинов М. Б., Юсупов Ш. Р. Физико-механические свойства бетона на основе безобжиговых щелочных вяжущих, твердеющих в условиях сухого и жаркого климата. – 2020.
48. Нуриддинов, А. О., Ахмедов, И., & Хамидов, А. И. (2022). АВТОМОБИЛ ЙЎЛЛАРИНИ ҚУРИЛИШИДА ИННОВАЦИЯЛАР. Academic research in educational sciences, 3(TSTU Conference 1), 211-215.
49. Нуманова С.Э. Хамидов Адхамжон Иномжонович //ISSN 2410-700X. – С. 107.
50. Ризаев Б.Ш. Прочность, деформативность и трещиностойкость внецентренно-сжатых железобетонных элементов в условиях сухого жаркого климата. – 1993.
51. Yuvmitov A., Hakimov S. R. Influence of seismic isolation on the stress-strain state of buildings //Acta of Turin Polytechnic University in Tashkent. – 2021. – Т. 11. – №. 1. – С. 71-79.
52. Ювмитов А., Хакимов С. Исследование влияния сейсмоизоляции на динамические характеристики ЗДАНИЯ //Acta of Turin Polytechnic University in Tashkent. – 2020. – Т. 10. – №. 2. – С. 14.
53. Abdunazarov A., Soliev N. tudy of the performance of frameless construction structures under the influence of vertical stresses of ultra-submerged the lyoss soils //Студенческий вестник. – 2020. – Т. 28. – №. 126 часть 3. – С. 39.
54. Хошимов С. Н. У., Казадаев А. М. УСТАНОВКА ДООЧИСТКИ СТОЧНЫХ ВОД ОТ НЕФТЕПРОДУКТОВ //Вестник Науки и Творчества. – 2017. – №. 3 (15). – С. 147-150.
55. Ювмитов А. С., Казадаев А. М. ИССЛЕДОВАНИЕ РАСПРОСТРАНЕННЫХ ОШИБОК, ДОПУСКАЕМЫХ В ПРОЦЕССЕ СТРОИТЕЛСТВА ЗДАНИЙ И СООРУЖЕНИЙ, МЕРЫ ПО ИХ НЕДОПУЩЕНИЮ И УЛУЧШЕНИЮ КАЧЕСТВА СТРОИТЕЛЬСТВА //Central Asian Research Journal for Interdisciplinary Studies (CARJIS). – 2022. – №. Special issue. – С. 140-145.
56. Казадаев А. М., Обидинова Г.Ш., РОЛЬ МАЛОГО БИЗНЕСА И ЧАСТНОГО ПРЕДПРИНИМАТЕЛЬСТВА В РЕСПУБЛИКЕ УЗБЕКИСТАН // Теория и практика современной науки. – 2017. – №. 5 (23). – С. 1005-1008.
57. Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. Asian Journal of Multidimensional Research, 10(9), 511-517.
58. Умаров, Ш. А. (2021). Исследование Деформационного Состояния Композиционных Арматурных Балок. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 60-64.
59. Davlyatov, S. M., & Kimsanov, B. I. U. (2021). Prospects For Application Of Non-Metal Composite Valves As Working Without Stress In Compressed Elements. The American Journal of Interdisciplinary Innovations Research, 3(09), 16-23.
60. Умаров, Ш. А., Мирзабабаева, С. М., & Абобакирова, З. А. (2021). Бетон Тўсинларда Шиша Толали Арматураларни Қўллаш Орқали Мустаҳкамлик Ва Бузилиш Ҳолатлари Аниқлаш. TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI, 1(6), 56-5