QURILISH KONSTRUKSIYALARIDA BAZALT FIBRABETONLARNI XUSUSIYATLARI VA QO‘LLANILISHI

Raximov Rasuljon Ravshanbek o‘g‘li
r.r.rakhimov@ferpi.uz (ORCID 0000-0003-2864-5735
Axmedov Axadjon O‘rmonjonovich,
Farg’ona politexnika instituti, t.f.f.d (PhD)
axadjon03ahmedov03@gmail.com Tel. +998945567522
Mamadaliyev Mirzaahmad Muzaffarjon o‘g‘li
Ферганский политехнический институт, assistant
mirzaahmadmamadaliyev@gmail.com (ORCID 0009-0009-9921-4191)
Nazirov Ayubxon Sultonjon o‘g‘li,
tayanch doktorant (FarPi),
(Farg‘ona Politexnika instituti)

Dilmuhammad G'ulomov
ORCID (0009-0002-3636-8993) (Farg’ona politexnika instituti)
tel:+998906344330 gulomovdilmuhammad990@gmail.com).

Annotatsiya: *Ushbu maqolada, bazalt, shisha, uglerod va poliamid tolalari odatda beton uchun armatura sifatida qo‘llanilishi keltirilgan. Fibra ishlab chiqarish texnologiyasining so‘nggi rivojlanishi bazalt toshidan tayyorlangan bazalt tolalarini tayyorlash imkonini berishi ko‘rsatilgan. Bazalt tolasi yaxshi issiqlik ko‘rsatkichlari, tebranish va zarba yukiga qarshilik ko‘rsatishi aytib o‘tilgan.*

Kalit so‘zlar: *Bazalt tosh, bazalt tolalari, fibra, shisha tola, dispers armatura, kompozit tola.*

Hozirgi vaqtda dunyoda turli xil xususiyatlarga ega bo‘lgan turli maqsadlar uchun betonlarning keng assortimenti ishlab chiqarilmoqda. Zamonaviy shaharsozlik rivojlanishi va ob’ektlar turlarining kengayishi bilan

(koʻpriklar, tunnellar, himoya inshootlari, koʻp qavatli yoʻllar, tezyurar temir yoʻllar, uchish-qoʻnish yoʻlaklari) yangi takomillashtirilgan ishlash xususiyatlariga ega maxsus betonlarga ehtiyoj paydo boʻlmoqdi va tez sur'atlar bilan oʻsib bormoqda. Betonni qurilishda qoʻllash sohalari undan yasalgan konstruktsiyalar uchun ish sharoitlarini kuchaytirish uning fizik-mexanik xususiyatlarini doimiy ravishda yaxshilashni talab qiladi - egilish, siqilish, yorilishga chidamliligi, zarba va dinamik ta'sirlarga chidamliligi va boshqalar. Hozirgi vaqtda bazalt tolalari qoʻshilgan betondan foydalanish orqali beton konstruktsiyalarning ishlashi va xizmat muddatini sezilarli darajada oshirish usullari tobora koʻproq qoʻllanilmoqda.

Bazalt tolalari betonning butun hajmi boʻylab tartibsiz joylashgan kompozitsion material. Bunday beton yuqori ishlash xususiyatlari bilan ajralib turadi, ayniqsa, egiluvchanlik va tortishish kuchi, zarba kuchi va yorilishga chidamliligi.

Bazalt tolasining metall, shisha va polipropilen tolalaridan afzalliklari:

• Metall toladan foydalanish konstruksiyalarning xavfsizligi bilan bogʻliq, chunki eroziya paytida tolalar chiqib ketishi mumkin, bundan tashqari, metall tolalar salbiy katod ta'siriga ega, korroziyaga moyil, betonda aralashtirish muammolari mavjud, sifat jihatidan ham juda katta farq bor.

• Shisha tolaning ishqorga chidamliligi pastligi sababli foydalanish cheklangan. Natijada, mustahkamlovchi tolalar kuchining pasayishi butun kompozitsiyaning mustahkamligining pasayishiga olib keladi;

• Polipropilen tolasi yuqoridagi kamchiliklarga ega emas, lekin bazalt tolasi bilan solishtirganda bogʻlovchiga nisbatan pastroq yopishish darajasiga ega.

Zamonaviy qurilishda materiallarning yongʻinga chidamliligiga yuqori talablar qoʻyiladi va polipropilen tolasining erish nuqtasi bazalt tolasiga qaraganda ancha past. Betonning mustahkamligiga ta'sir qiluvchi muhim koʻrsatkichlardan biri bu tolaning chiziqli choʻzilish koeffitsienti boʻlib, uning koʻrsatkichi propilen tolasi uchun bazalt tolasidan bir necha baravar past (propilen tolasi uchun nisbiy choʻzilish 150-200%, va bazalt tolasi uchun 3,1% ni tashkil

etadi, shuningdek va kuchlanish quvvati ko‘rsatkichlari (0,77 ga qarshi 2,85 MPa * 103), valentlik moduli (0,8 ga qarshi 21,0 MPa * 103).

Bazalt tolasi paydo bo‘lishi bilan dispers mustahkamlashga ishonchsizlik asta-sekin yo‘qolib bormoqda.

Fibraning mustahkamlovchi xususiyatlariga uning quruq va foydalanishga tayyor bo‘lgan qurilish aralashmalarini ishlab chiqarishda qo‘llanilishi ham asoslanadi. Turli xil qurilish ishlarini (gidroizolyatsiya, pardozlash) ishlab chiqarishdagi asosiy muammolardan biri bu ohaklarning poydevorga past yopishishi va quritish va qotish paytida ularning yorilishi. Bazalt tolalari bo‘lgan yuqori mustahkamlovchi kuchga ega mustahkamlovchi qo‘shimchalarni kiritish bu muammoni hal qilishi mumkin.

Bazaltofibrobetonning afzalliklari:

Betonning qattiqlashishi jarayonida mikroplastik qisqarish va yorilishni kamaytiradi:

Betonning kritik davrda buzilmasdan deformatsiya qilish qobiliyatini oshiradi-qisqarishdan keyin 2-6 soat, shu bilan yoriqlar hajmi va sonini kamaytiradi, bu esa betonning ichki mustahkamligini saqlashga yordam beradi. Keyingi bosqichda, beton qattiqlashganda va qisqarishni boshlaganda, bazalt tolasi uni ishonchli tarzda mustahkamlaydi va sinish xavfini kamaytiradi. Gidratsiyani samarali nazorat qilish orqali suv chiqarilishini kamaytiradi va shu bilan ichki yuklarni kamaytiradi. Suvning yuzaga chiqishini nazorat qilish tufayli plastik cho‘kma paytida yoriqlar paydo bo‘lishi kamayadi. Aralashmaning delaminatsiyasini oldini oladi.

Betonning muzlash va erishga chidamliligi:

Fibra betonga oz miqdordagi havoni kiritadi, bu esa muzlash va erish davrida erkin suvning kengayishiga va qisqarishiga imkon beradi. Fibra betondagi suv kanallari sonini kamaytiradi va o‘tkazuvchanlikning pasayishi natijasida muzlashga ko‘proq qarshilik ko‘rsatadi. Bazalt tolasi betonda suvning harakatini boshqaradi, sementning yanada samarali namlanishini ta’minlaydi va birinchi kuni bosim kuchini oshiradi. Sement va qumning yuzasiga ko‘tarilishining oldini

oladi, betonning past va chuqur o‘tkazuvchanligini hisobga olgan holda muzlashga qarshi tuzlarning ta’siriga chidamliligini oshiradi.

Betonning zarbaga chidamliligi:

Bazalt tolasini o‘z ichiga olgan beton an’anaviy betonga nisbatan sezilarli darajada ko‘proq zarba qarshiligi va bo‘linish qarshiligiga ega, sinovlar ushbu omil bo‘yicha 5 baravar oshganligini ko‘rsatadi.

Bazalt tolasi po‘lat to‘rga iqtisodiy alternativ hisoblanadi:

Bazalt tolasi yoriqlar hosil bo‘lishini nazorat qiluvchi po‘lat to‘rga iqtisodiy alternativa sifatida qaralishi mumkin. Fibra betonning egilish kuchini oshiradi. Metall to‘r cho‘zilib ketadi va faqat beton yorilib ketganidan keyin qandaydir qiymatga ega bo‘ladi. Shu bilan bir qatorda, fibra plastik holatda betonda hosil bo‘lgan mikro yoriqlarning oldini olishga yordam beradi. Loyiha xususiyatlarini saqlab, beton konstruktsiyaning hajmini 20% gacha kamaytirishga imkon beradi **.**

Qo‘llash sohalari:

- Fuqarolik qurilishi obektlarini qurish;

- Omborlar va bank seyflarini rekonstruksiya qilish;

- Ko‘priklar, aerodromlarning uchish-qo‘nish yo‘laklari, gidrotexnik inshootlar (qirg‘oq to‘g‘onlari, qulflar va daryo kanallari)qurilishi;

- Atom elektr stantsiyalarining reaktor bo‘linmalarini, radioaktiv chiqindilarni yo‘q qilish uchun konteynerlarni ishlab chiqarish;

- Har xil turdagi yo‘l qoplamalari, prefabrik va monolit plitalar, chegaralar, ajratuvchi chiziqlar va yulka plitalarini yaratish.

Adabiyotlar ro‘yhati.

1. Ravshanbek o‘g‘li, R. R. (2023). BAZALT FIBRALARI ORQALI BETON TARKIBNI OPTIMALLASHTIRISH. SO ‘NGI ILMIY TADQIQOTLAR NAZARIYASI, 6(7), 37-44.

2. Ravshanbek o‘g‘li, R. R., & Zuxriddinovna, M. S. (2023). TO ‘RT QAVATLI BINONI SEYSMIK KUCHLAR TA’SIRIGA LIRA 9.6 DASTUR YORDAMIDA HISOBLASH.: TO ‘RT QAVATLI BINONI SEYSMIK KUCHLAR TA’SIRIGA LIRA 9.6 DASTUR YORDAMIDA HISOBLASH.

3. Nabiyev, M., Salimov, O., Khotamov, A., Akhmedov, T., Nasriddinov, K., Abdurakhmanov, U., ... & Abobakirov, A. (2024). Effect of external air temperature on buildings and structures and monuments. In E3S Web of Conferences (Vol. 474, p. 03011). EDP Sciences.

4. Umarov, S. A. O. (2023). UCH QAVATLI BINONI SEYSMIK KUCHLAR TA'SIRIGA LIRA 9.6 DASTUR YORDAMIDA HISOBLASH. GOLDEN BRAIN, 1(1), 224-230.

5. Ashurov, M., & Ravshanbek o'g'li, R. R. (2023). RESEARCH OF PHYSICAL AND MECHANICAL PROPERTIES OF BASALT FIBER CONCRETE. European Journal of Interdisciplinary Research and Development, 17, 12-18.

6. Numanovich, A. I., & Ravshanbek o'g'li, R. R. (2022). BASALT FIBER CONCRETE PROPERTIES AND APPLICATIONS. Spectrum Journal of Innovation, Reforms and Development, 9, 188-195.

7. Abobakirova, Z., Umarov, S., & Raximov, R. (2023). Enclosing structures of a porous structure with polymeric reagents. In E3S Web of Conferences (Vol. 452, p. 06027). EDP Sciences.

8.Dusmatov, A., Nabiyev, M., Baxromov, M., & Azamjonov, A. (2023). Influence of two-layer axisymmetric cylindrical shells on their physical and mechanical characteristics. In E3S Web of Conferences (Vol. 452, p. 06010). EDP Sciences.

9.Azamjonov Asadbek Tursunali o'g'li,. "COMPUTER PROGRAMS FOR DESIGNING BUILDING STRUCTURES." Spectrum Journal of Innovation, Reforms and Development 21 (2023): 178-184.

10. Abdukarimov, B. A., Tillaboyeva F. Sh, and A. T. Azamjonov. "CALCULATION OF HYDRAULIC PROCESSES IN SOLAR WATER HEATER COLLECTOR HEAT PIPES." Экономика и социум 4-1 (107) (2023): 4-10.

11. Onorboyev Shavkat, and Azamjonov Asadbek Tursunali o'g'li. "IMPACT OF THE CONSTRUCTION INDUSTRY ON ECOLOGY." Miasto Przyszłości 44 (2024): 394-399.

12.Сотволдиев, Ф., & Азамжонов, А. (2023). Анализ солнечных водонагревателей. Тенденции и перспективы развития городов, 1(1), 320-323.

13. Davlyatov , S. M., & Solijonov , F. S. o‘g‘li. (2023). O‘ZBEKISTONDA YETISHTIRILAYOTGAN MAHALLIY YOG‘OCH MATERIALLARINING XUSUSIYATLARI. *GOLDEN BRAIN*, *1*(1), 263–265. Retrieved from https://researchedu.org/index.php/goldenbrain/article/view/4568

14. Абобакирова, З. А., Эркабоев, А. А. У., & Солижонов, Ф. С. У. (2022). ИССЛЕДОВАНИЕ СОСТОЯНИЯ ДЕФОРМАЦИИ ПРИ РАСТЯЖЕНИИ С ИСПОЛЬЗОВАНИЕМ СТЕКЛОВОЛОКОННОЙ АРМАТУРЫ В БАЛКАХ. *Talqin va tadqiqotlar ilmiy-uslubiy jurnali*, *4*(4), 47-55.

15. Asrorovna, A. Z., Abdug‘ofurovich, U. S., & Sodiqjon o‘g‘li, S. F. (2022). ISSUES OF IMPROVING THE ECONOMY OF BUILDING MATERIAL-WOOD PRODUCTION. *Spectrum Journal of Innovation, Reforms and Development*, *8*, 336-340.

16. Abdug‘Ofurovich, U. S., O‘G‘Li, S. F. S., & O‘G‘Li, E. A. A. (2022). KOMPOZIT ARMATURALI EGILUVCHI BETON ELEMENTLARNING KUCHLANIB-DEFORMATSIYALANGANLIK HOLATINI EKSPERIMENTAL TADQIQ ETISH. *Talqin va tadqiqotlar ilmiy-uslubiy jurnali*, *4*(4), 41-46.

17. Abdukarimov B. A., Sh T. F., Azamjonov A. T. CALCULATION OF HYDRAULIC PROCESSES IN SOLAR WATER HEATER COLLECTOR HEAT PIPES //Экономика и социум. – 2023. – №. 4-1 (107). – С. 4-10.

18. Azamjonov Asadbek Tursunali o‘g‘li, Use of Solar Battery Batteries Research Parks Publishing LLC (2023) C. 76-83.

19. Obidovich A. T. Architecture And Urban Planning In Uzbekistan //Texas Journal of Engineering and Technology. – 2022. – Т. 9. – С. 62-64.

20. Muxammadovich A. A. et al. IMPROVING SUPPORT FOR THE PROCESS OF THE THERMAL CONVECTION PROCESS BY INSTALLING REFLECTIVE PANELS IN EXISTING RADIATORS IN PLACES

//CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND COMPUTER SCIENCES. – 2022. – Т. 3. – №. 12. – С. 179-183.

21. Obidovich A. T. et al. ROMAN STYLE QUALITY CHANGES IN EUROPEAN ARCHITECTURE IN X-XII CENTURIES //Spectrum Journal of Innovation, Reforms and Development. – 2022. – Т. 10. – С. 121-126.

22. BEAMS, D. I. B. R. C. Spectrum Journal of Innovation, Reforms and Development Volume 22, December, 2023 ISSN (E): 2751-1731 Website: www. sjird. journalspark. org DEVELOPMENT OF COMPOSITE REINFORCEMENTS AND CONCRETE DEFORMATIONS IN BASALT REINFORCED CONCRETE BEAMS.

23. Солижонов, Ф., & Курбонов, К. (2023). Расчет бетонных конструкций с композитной арматурой методом предельных состояний. *Тенденции и перспективы развития городов*, *1*(1), 481-485.

24. Sodiqjon o‘g‘li, S. F. (2023). BAZALT KOMPOZIT ARMATURALI BETON TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA MUSTAHKAMLIGINI TADQIQ ETISH.: BAZALT KOMPOZIT ARMATURALI BETON TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA MUSTAHKAMLIGINI TADQIQ ETISH.

25. Solijonov, F. S. (2023). BAZALT KOMPOZIT ARMATURALI TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA TADQIQ ETISH.: BAZALT KOMPOZIT ARMATURALI TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA TADQIQ ETISH.

26. Davlyatov , S. M., & Solijonov , F. S. o‘g‘li. (2023). O‘ZBEKISTONDA YETISHTIRILAYOTGAN MAHALLIY YOG‘OCH MATERIALLARINING XUSUSIYATLARI. *GOLDEN BRAIN*, *1*(1), 263–265. Retrieved from https://researchedu.org/index.php/goldenbrain/article/view/4568

27. Абобакирова, З. А., Эркабоев, А. А. У., & Солижонов, Ф. С. У. (2022). ИССЛЕДОВАНИЕ СОСТОЯНИЯ ДЕФОРМАЦИИ ПРИ РАСТЯЖЕНИИ С ИСПОЛЬЗОВАНИЕМ СТЕКЛОВОЛОКОННОЙ АРМАТУРЫ В БАЛКАХ. *Talqin va tadqiqotlar ilmiy-uslubiy jurnali*, *4*(4), 47-55.

28. Asrorovna, A. Z., Abdug‘ofurovich, U. S., & Sodiqjon o‘g‘li, S. F. (2022). ISSUES OF IMPROVING THE ECONOMY OF BUILDING MATERIAL-WOOD PRODUCTION. *Spectrum Journal of Innovation, Reforms and Development*, *8*, 336-340.

29. Abdug‘Ofurovich, U. S., O‘G‘Li, S. F. S., & O‘G‘Li, E. A. A. (2022). KOMPOZIT ARMATURALI EGILUVCHI BETON ELEMENTLARNING KUCHLANIB-DEFORMATSIYALANGANLIK HOLATINI EKSPERIMENTAL TADQIQ ETISH. *Talqin va tadqiqotlar ilmiy-uslubiy jurnali*, *4*(4), 41-46.

30. Abdukarimov B. A., Sh T. F., Azamjonov A. T. CALCULATION OF HYDRAULIC PROCESSES IN SOLAR WATER HEATER COLLECTOR HEAT PIPES //Экономика и социум. – 2023. – №. 4-1 (107). – С. 4-10.

31. Azamjonov Asadbek Tursunali o‘g‘li, Use of Solar Battery Batteries Research Parks Publishing LLC (2023) C. 76-83.

32. Obidovich A. T. Architecture And Urban Planning In Uzbekistan //Texas Journal of Engineering and Technology. – 2022. – Т. 9. – С. 62-64.

33. Muxammadovich A. A. et al. IMPROVING SUPPORT FOR THE PROCESS OF THE THERMAL CONVECTION PROCESS BY INSTALLING REFLECTIVE PANELS IN EXISTING RADIATORS IN PLACES //CENTRAL ASIAN JOURNAL OF MATHEMATICAL THEORY AND COMPUTER SCIENCES. – 2022. – Т. 3. – №. 12. – С. 179-183.

34. Obidovich A. T. et al. ROMAN STYLE QUALITY CHANGES IN EUROPEAN ARCHITECTURE IN X-XII CENTURIES //Spectrum Journal of Innovation, Reforms and Development. – 2022. – Т. 10. – С. 121-126.

35. BEAMS, D. I. B. R. C. Spectrum Journal of Innovation, Reforms and Development Volume 22, December, 2023 ISSN (E): 2751-1731 Website: www. sjird. journalspark. org DEVELOPMENT OF COMPOSITE REINFORCEMENTS AND CONCRETE DEFORMATIONS IN BASALT REINFORCED CONCRETE BEAMS.

36. Солижонов, Ф., & Курбонов, К. (2023). Расчет бетонных конструкций с композитной арматурой методом предельных состояний. *Тенденции и перспективы развития городов*, *1*(1), 481-485.

37. Sodiqjon o‘g‘li, S. F. (2023). BAZALT KOMPOZIT ARMATURALI BETON TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA MUSTAHKAMLIGINI TADQIQ ETISH.: BAZALT KOMPOZIT ARMATURALI BETON TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA MUSTAHKAMLIGINI TADQIQ ETISH.

38. Solijonov, F. S. (2023). BAZALT KOMPOZIT ARMATURALI TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA TADQIQ ETISH.: BAZALT KOMPOZIT ARMATURALI TO ‘SINLARNI NORMAL KESIMLAR BO ‘YICHA TADQIQ ETISH.

39. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуататsionные Свойства Наружные Стен. *Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali*, *1*(6), 44-47.

40. Shavkatovich, N. K. (2022). SYSTEMS OF ARTIFICIAL REGULATION OF THE AIR ENVIRONMENT OF APARTMENTS AND HOUSES. *Spectrum Journal of Innovation, Reforms and Development*, *9*, 169-174.

41. Nabiyev, M., Salimov, O., Khotamov, A., Akhmedov, T., Nasriddinov, K., Abdurakhmanov, U., ... & Abobakirov, A. (2024). Effect of external air temperature on buildings and structures and monuments. In *E3S Web of Conferences* (Vol. 474, p. 03011). EDP Sciences.

42. Khasan, N. (2024). Calculation of Cast Reinforced Concrete Frames of Multi-Story Buildings Taking into Account Dry-Hot Climate Conditions. *Miasto Przyszłości*, *49*, 1215-1219.

43. Shavkatovich, N. X. (2022). ESTABLISHMENT OF TEMPERATURE AND HUMIDITY IN APARTMENTS AND HOUSES WITH THE HELP OF ARTIFICIAL PHASE ARTIFICIAL REGULATORY SYSTEMS. *Spectrum Journal of Innovation, Reforms and Development*, *10*, 107-114.

44. Akramov Kh.A, Davlyatov Sh.M, Kimsanov B.I, Nazirov A.S “APPLICATION AND CLASSIFICATION OF COMPOSITE

REINFORCEMENT IN CONSTRUCTION" Spectrum Journal of Innovation, Reforms and Development Volume 09, Nov., 2022 Page 95-100

45. Akramov Kh.A, Davlyatov Sh.M, Kimsanov B.I, Nazirov A.S "CONSTRUCTION FEATURES OF PERFORMING EXTERNAL REINFORCEMENT FROM COMPOSITE MATERIALS" Spectrum Journal of Innovation, Reforms and Development Volume 09, Nov., 2022 Page 110-115

46. Akramov Kh.A, Davlyatov Sh.M, Kimsanov B.I, Nazirov A.S "THE ROLE OF ROD STAYED-SHELL SYSTEMS IN STUDIES OF INNOVATIVE STRUCTURES IN CONSTRUCTION" Spectrum Journal of Innovation, Reforms and Development Volume 09, Nov., 2022 Page 116-123

47. Бахромов, М. М. (2020). Исследование сил негативного трения оттаивающих грунтов в полевых условиях. Молодой ученый, (38), 24-34.

48. Бахромов, М. М., Отакулов, Б. А., & Рахимов, Э. Х. У. (2019). Определение сил негативного трения при оттаивании околосвайного грунта. European science, (1 (43)), 22-25.

49. Бахромов, М. М., & Раҳманов, У. Ж. (2020). Проблемы строительства на просадочных лессовых и слабых грунтах и их решение. Интернаука, (37-1), 5-7.

50. Бахромов, М., & Хасанов, Д. (2022). ТЎКМА ГРУНТЛАРДА ЗАМИН ВА ПОЙДЕВОРЛАР ҚУРИЛИШИ. Евразийский журнал академических исследований, 2(6), 353-360.

51. Бахромов, М. М., & Рахмонов, У. Ж. (2019). Дефекты при проектировании и строительстве оснований и фундаментов. Проблемы современной науки и образования, (3 (136)), 76-79.

52. Бахромов, М. М., & Рахмонов, У. Ж. (2019). Закономерности воздействия сил негативного трения по боковой поверхности сваи. Проблемы современной науки и образования, (12-2 (145)), 62-65.

53. Бахромов, М. М., Рахмонов, У. Ж., & Отабоев, А. Б. У. (2019). Воздействие сил негативного трения на сваю при просадке грунтов. Проблемы современной науки и образования, (12-2 (145)), 24-35.

54. Бахромов, М. М. (2022). Механические характеристики грунта и погноз закономерности воздействия сил негативного трения по боковой поверхности сваи. PEDAGOGS jurnali, 10(3), 162-167.

55. Mamatkhanovich, B. M., & Malikov, S. S. (2022). Strength And Deformability Of Metal GlassPlastic Shells Taking Into Account Shear Rigidity. The Peerian Journal, 12, 79-86.

56. Dusmatov, A., Bakhramov, M., & Malikov, S. (2023). Interlaminar shifts of two-layer aggressive-resistant combined plates based on metal and fiberglass. In E3S Web of Conferences (Vol. 389, p. 01030). EDP Sciences.

57. Mamatkhanovich, B. M. (2022). CONSTRUCTION OF FOUNDATIONS IN GRUNTS WITH VARIABLE STRUCTURES. Spectrum Journal of Innovation, Reforms and Development, 10, 115-120.

58. Mamathanovich, B. M. (2023). CONSTRUCTION OF FOUNDATIONS ON DRY SOILS. Spectrum Journal of Innovation, Reforms and Development, 21, 294-297.

59. Mamatkhanovich, B. M. (2022). Construction of Grounds and Foundations on Bulk Soil. Miasto Przyszłości, 201-205.

60. Bakhromov, M. M., Rakmanov, U. J., & Otaboev, A. B. U. (2021). Problems of construction on insulated forest and weak soils and their solution. Asian Journal of Multidimensional Research, 10(10), 604-607.

61. Dusmatov, A., Nabiyev, M., Baxromov, M., & Azamjonov, A. (2023). Influence of two-layer axisymmetric cylindrical shells on their physical and mechanical characteristics. In E3S Web of Conferences (Vol. 452, p. 06010). EDP Sciences.

62. Дилшоджон оглы, З. Н. (2023). ПРИМЕНЕНИЕ КОМПОЗИТНЫХ МАТЕРИАЛОВ ДЛЯ УСИЛЕНИЯ ЖЕЛЕЗОБЕТОННЫХ КОНСТРУКЦИЙ. Журнал «Спектр» об инновациях, реформах и развитии, 22, 148-154.

63. BASALT FIBER REINFORCEMENT AND GLASS COMPOSITE ROD UNDER SHORT-TERM DYNAMIC LOADING" (Spectrum Journal of

Innovation, Reforms and Development Volume 21, Nov., 2023) https://sjird.journalspark.org/index.php/sjird/article/view/855/821

64. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние Водорастворимых Солей На Эксплуататsionные Свойства Наружные Стен. *Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali*, *1*(6), 44-47.

65. Shavkatovich, N. K. (2022). SYSTEMS OF ARTIFICIAL REGULATION OF THE AIR ENVIRONMENT OF APARTMENTS AND HOUSES. *Spectrum Journal of Innovation, Reforms and Development*, *9*, 169-174.

66. Nabiyev, M., Salimov, O., Khotamov, A., Akhmedov, T., Nasriddinov, K., Abdurakhmanov, U., ... & Abobakirov, A. (2024). Effect of external air temperature on buildings and structures and monuments. In *E3S Web of Conferences* (Vol. 474, p. 03011). EDP Sciences.

67. Khasan, N. (2024). Calculation of Cast Reinforced Concrete Frames of Multi-Story Buildings Taking into Account Dry-Hot Climate Conditions. *Miasto Przyszłości*, *49*, 1215-1219.

68. Shavkatovich, N. X. (2022). ESTABLISHMENT OF TEMPERATURE AND HUMIDITY IN APARTMENTS AND HOUSES WITH THE HELP OF ARTIFICIAL PHASE ARTIFICIAL REGULATORY SYSTEMS. *Spectrum Journal of Innovation, Reforms and Development*, *10*, 107-114.

69. Қодиров, Ғ. М., & Мирзабабаева, С. М. (2022). Бетон ва темирбетон конструкциялар бузилишининг турлари ва уларнинг олдини олиш. *INTERNATIONAL CONFERENCE ON LEARNING AND TEACHING*, *1*(6), 91-95.

70. Mirzajonovich, Q. G., & ToychiboyQizi, J. X. (2021). The determination of condensation precipitation on the inner surfaces of the limitation during the action of aerosols. *Asian Journal of Multidimensional Research*, *10*(10), 132-137.

71. Sagdiev, K. S., Yuvmitov, A. S., & Qodirov, G. M. (2020). Assessment Of Seismic Resistance Of Existing Preschool Educational Institutions And Recommendations For Their Provision Seismic Safety. *The American Journal of Applied sciences*, *2*(12), 90-99.

72. Mirzajonovich, Q. G., & Qizi, J. X. T. Y. (2021). Influence Of Hydrophobizing Additives On Thermal Properties Of Ceramzito Concrete In Agressive Environment. *The American Journal of Engineering and Technology*, *3*(12), 26-33.

73. Mirzajonovich, Q. G., & Qizi, M. Z. A. (2021). Determination Of Condensation On The Inner Surface Of The Walls Of Canoe Buildings Under The Influence Of Aerosols. *The American Journal of Engineering and Technology*, *3*(12), 14-19.

74. Қодиров, Ғ. М., & Мирзабабаева, С. М. (2022). Бетон ва темирбетон конструкциялар бузилишининг турлари ва уларнинг олдини олиш. *INTERNATIONAL CONFERENCE ON LEARNING AND TEACHING*, *1*(6), 91-95.

75. Ogli, A. U. A., Ogli, X. A. M., & Mirzajonovich, Q. G. (2020). Hazrati Imam Architecture The Complex Is A Holiday Of Our People. *The American Journal of Engineering and Technology*, *2*(11), 46-49.

76. Gayradjonovich, G. S., Mirzajonovich, Q. G., Tursunalievich, S. B., & Ogli, X. A. M. (2021). Corrosion State Of Reinforced Concrete Structures. *The American Journal of Engineering and Technology*, *3*(06), 88-91.

77. Momin, N., Mirzajonovich, Q. G., Tursunalievich, S. B., & Gayradjonovich, G. S. (2021). Reception of improving the microclimate in the houses of the fergana valley. *The American Journal of Engineering and Technology*, *3*(06), 92-96.

78. Ogli, X. A. M., Ogli, A. U. A., & Mirzajonovich, Q. G. (2020). Ways Of Implementation Of Environmental Emergency Situations In Engineering Preparation Works In Cities. *The American Journal of Engineering and Technology*, *2*(11), 108-112.

79. Мирзабабаева, С. М., & Қодиров, Ғ. М. (2022). Биноларни ўровчи конструкцияларини тузлар таъсиридаги сорбцион хусусиятини яхшилаш. *INTERNATIONAL CONFERENCE ON LEARNING AND TEACHING*, *1*(6), 86-90.

80. Mirzajonovich, Q. G., Ogli, A. U. A., & Ogli, X. AM (2020). Influence Of Hydro Phobizing Additives On Thermophysical Properties And Long-Term Life Of Keramzit0betona In An Aggressive Medium. *The American Journal of Engineering and Technology*, *2*(11), 101-107.

81. Кодиров, Г. М., Набиев, М. Н., & Умаров, Ш. А. (2021). Микроклимат В Помещениях Общественных Зданиях. *TA'LIM VA RIVOJLANISH TAHLILI ONLAYN ILMIY JURNALI*, *1*(6), 36-39.

82. BINO TOM QISMIGA VERTALYOT QO‘NISHI NATIJASIDA BINONING KONSTRUKSIYALARIDAGI O‘ZGARISHLARI” 2023/10/5, "SCIENTIFIC BASIS OF APPLICATION OF INNOVATION AND ENERGY-SAVING TECHNOLOGIES IN THE CONSTRUCTION OF ENGINEERING COMMUNICATIONS" Authors: D.G‘. G‘ulomov, A.R. G‘ulomov

83. Xasanjon, X. R. (2024). Review and Analysis of the Operation of Monolithic Biaxial Ceilings With Void Generators in Dry and Hot Climates. *Miasto Przyszłości*, *49*, 896-901.

84. Goncharova, N., Abobakirova, Z., Davlyatov, S., Umarov, S., & Mirzababayeva, S. (2023, September). Capillary permeability of concrete in aggressive dry hot climate. In E3S Web of Conferences (Vol. 452, p. 06021).

85. Y Karimov, I Musaev, S Mirzababayeva, Z Abobakirova, S Umarov, Land use and land cover change dynamics of Uzbekistan: a review, E3S Web of Conferences 421, 03007

86. Akramov, X., Davlyatov, S., Umarov, S., & Abobakirova, Z. (2023). Method of experimental research of concrete beams with fiberglass reinforcement for bending. In E3S Web of Conferences (Vol. 365, p. 02021). EDP Sciences.

87. Mirzababayeva, S., Abobakirova, Z., Umarov, S. Crack resistance of bent concrete structures with fiberglass reinforcement, E3S Web of Conferences, 2023, 452, 06023.

88. Strength and uniformity of composite reinforced columns, Akramov, K., Davlyatov, S., Kimsanov, B.E3S Web of Conferences, 2023, 452, 06012.

89.Comparison of current and expired norms for the development of methods for checking and monitoring the seismic resistance of buildings.Shodiljon Umarov,

Khusnitdin Akramov, Zebuniso Abobakirova and Saxiba Mirzababayeva, E3S Web Conf., 474 (2024) 01020, DOI: https://doi.org/10.1051/e3sconf/202447401020.

90. Analytical calculation of bending elements with basalt fiber and glass composite rod reinforcement under short-term dynamic loading, Akramov, K., Davlyatov, S., Nazirov, A., E3S Web of Conferences, 2023, 452, 06006.

91. Abdulkhaev, Z., Madraximov, M., Abdujalilova, S., Mirzababayeva, S., Otakulov, B., Sattorov, A., & Umirzakov, Z. (2023, September). Flow trajectory analysis and velocity coefficients for fluid dynamics in tubes and holes. In E3S Web of Conferences (Vol. 452, p. 02010).

92. Goncharova N. I., Abobakirova Z. A., Mukhamedzanov A. R. Capillary permeability of concrete in salt media in dry hot climate //AIP Conference Proceedings. – AIP Publishing LLC, 2020. – Т. 2281. – №. 1. – С. 020028.

93. Comparability of estimates of the impact of gunpowder and gas-dynamic explosions on the stability of buildings and structures, Tojiev, R., Yunusaliev, E., Abdullaev, I.,E3S Web of Conferences, 2021, 264, 02044

94. The Significant Technical Mantle of AI in the Field of Secular Engineering: An Innovative Design Akhmedov, J., Jurayev, U., Kosimova, S., Tursunov, Q.,Kosimov, L.2024 4th International Conference on Advance Computing and Innovative Technologies in Engineering, ICACITE 2024, 2024, страницы 601–606.

95. Aerodynamic study of the characteristics of the nest one skyscraper under wind load Akhmedov, J., Madaliev, M., Yunusova, M., Kurbonova, N.,Fayziyev, A. E3S Web of Conferences, 2023, 452, 06018.

96. Metodology for checking the seismic strength of buildings based on existing norms Abobakirova, Z., Umarov, S., Davlyatov, S., Nasriddinov, H., Mahmudov, A. BIO Web of Conferences, 2024, 105, 05014.

Improving the thermal properties of lightweight concrete exterior walls.

97. Improving the thermal properties of lightweight concrete exterior walls Goncharova, N., Ababakirova, Z., Davlyatov, S., Umarov, S., Mirzababayeva, S. E3S Web of Conferences, 2024, 508, 05002.

98. Operation of reinforced concrete beams along an inclined section under conditions of one-sided heating, Umarov, S., Mirzababayeva, S., Abobakirova, Z., Goncharova, N., Davlyatov, S. E3S Web of Conferences, 2024, 508, 05001.

99. Mirzaakbarovna, M. S. (2023). INTEGRATION IS THE BASIS OF QUALIFIED PERSONNEL TRAINING. *Journal of Innovation in Education and Social Research*, *1*(4), 233-239.

100. Mirzababaeva, S. (2023). OPERATIONAL RELIABILITY OF RECONSTRUCTED BUILDINGS-STRUCTURES. *Spectrum Journal of Innovation, Reforms and Development*, *21*, 235-239.