

**SEYSMIK HIMOYANI TA'MINLASHDA VISCOELASTIK
DAMPERLAR O'RNI: ISHLASH PRINSIPLARI VA
QO'LLANILISHI**

Azamjonov Asadbek Tursunali o'g'li

Fergana Polytechnic Institute, assistant

Tel. +998904059792

[*a.azamjonov@ferpi.uz*](mailto:a.azamjonov@ferpi.uz)

Abduraxmanov Ulug'bek Arabdjon o'g'li

Fergana Polytechnic Institute, Senior teacher

(ORCID 0000-0001-9502-9380), Tel. +998916721007

[*u.abduraxmonov@ferpi.uz*](mailto:u.abduraxmonov@ferpi.uz)

Solijonov Foziljon Sodiqjon ugli

Fergana Polytechnic Institute, assistant

(ORCID 0000-0003-4627-7905), Tel. +998905897038

[*f.s.solijonov@ferpi.uz*](mailto:f.s.solijonov@ferpi.uz)

Ass. Xamitov Rasuljon Xasanjon o'g'li

Farg'ona politexnika instituti, Assistent

(ORCID 0009-0002-8891-4722)¹ Tel: +998916315404

[*rasuljon3245@gmail.com*](mailto:rasuljon3245@gmail.com)

Baxromov Maxmud Mamatxanovich

Farg'ona politexnika instituti

Tel: +998 91 206 47 37

[*baxromovmahmud393@gmail.com*](mailto:baxromovmahmud393@gmail.com)

Akhmedov Tolqin

Fergana Polytechnic Institute,

[*ahmedovtolqin55@gmail.com*](mailto:ahmedovtolqin55@gmail.com)

Annotatsiya: *Viscoelastik damperlar (VE dampers) binolar va inshootlarning seysmik chidamliligini oshirishda samarali vosita sifatida keng qo'llanilmoqda. Ushbu qurilmalar, o'zining viskoz va elastik xususiyatlari tufayli,*

tebranish energiyasini yutish va yoyish orqali inshootlarning seysmik ta'sirlarga qarshiligini sezilarli darajada oshiradi. Ushbu maqola viscoelastik damperlarning ishlash prinsiplari, ularning seysmik himoyadagi roli va ularni turli binolarda qo'llash amaliyotini o'rganishga bag'ishlangan.

Kalit so'zlar: viskoelastik damperlar, suyuq VE qurilmalar, qattiq VE damperlar, suyuq viskoz damperlar, elastomerik prujinali damperlar.

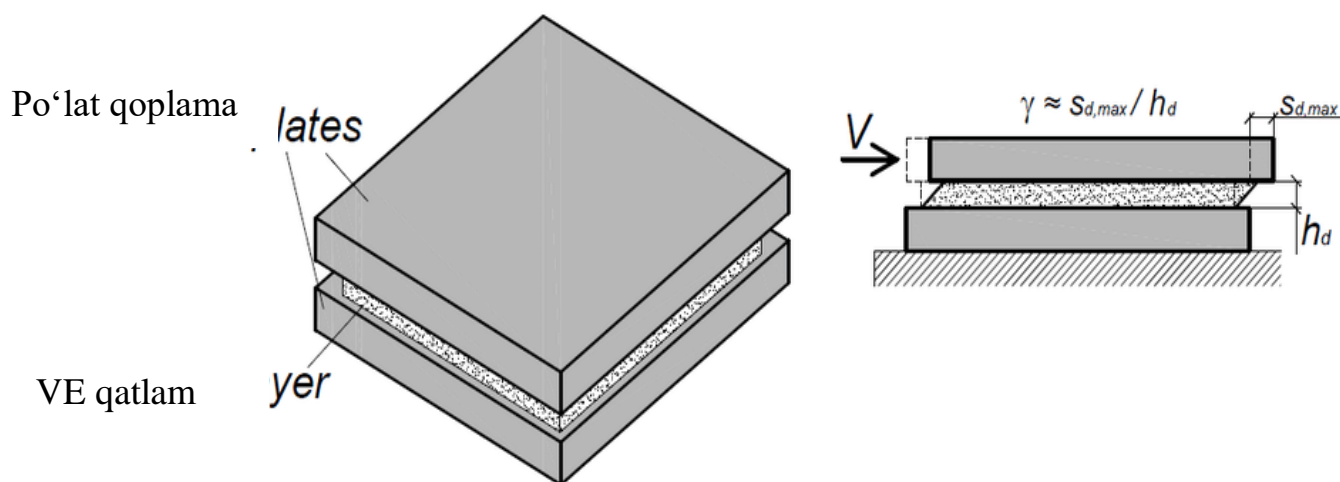
Viscoelastik damperlarning ishlash prinsipi

Viscoelastik damperlar o'zining elastik va viskoz xususiyatlari orqali tebranishlarni samarali boshqaradi. Viskoz xususiyatlari tufayli, ular yuqori tezlikda tebranish energiyasini yutadi, elastik komponent esa inshootga ta'sir etgan kuchni elastik tarzda boshqaradi. Bu qurilmalar harakatlanish chastotasiga bog'liq holda qattqlik va damping koeffitsientiga ega bo'lib, ularning samaradorligi ushbu parametrlarga asoslangan.

Viscoelastik damperlarning turlari

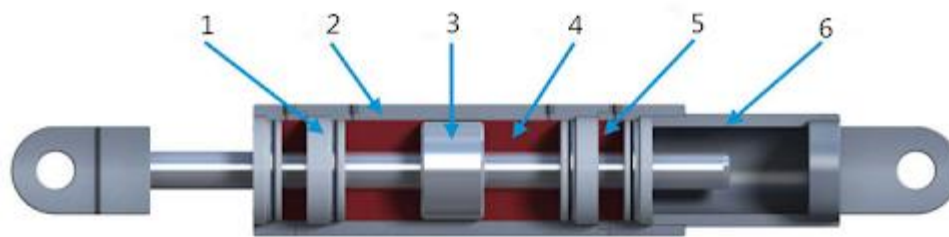
Viscoelastik damperlarning turli turlari mavjud:

1. **Qattiq VE damperlar:** Ushbu damperlar polimerlar yoki akril kopolimerlar qatlamlaridan tashkil topgan bo'lib, tebranish kuchlarini kesish deformatsiyalari orqali yutadi.



1-rasm. Qattiq viscoelastik damper

2. **Suyuq VE qurilmalar:** Viskozi suyuqliklar orqali ishlaydigan damperlar, ular kesish orqali energiya yutish qobiliyatiga ega va past chastotali yuklamalarda sezilarli qattiqlikka ega emas.



2-rasm. Suyuq viscoelastik damper

1 -Old qopqoq, 2 - Tsilindr bloki, 3 – Porshen, 4 - Damping vositasi, 5 - Yog' yetkazib berish tanki, 6 - Ulagich

3. **Suyuq viskoz damperlar:** Suv oqimi orqali ishlaydigan bu damperlar keng chastotali yuklamalarda katta miqdorda energiya yutadi.

4. **Elastomerik prujinali damperlar:** Ushbu damperlar prujinali elastik komponentlar orqali ishlaydi va yuqori chastotali yuklamalarda samarali hisoblanadi.

Viscoelastik damperlarni qo'llash

Viscoelastik damperlar ko'pincha kesish deformatsiyasiga ta'sir etuvchi inshootlarda qo'llaniladi. Ular po'lat va beton konstruksiyalarni tebranishlardan himoya qilishda keng qo'llaniladi. Misol uchun, Showa va Shimizu korporatsiyasi tomonidan ishlab chiqilgan bitumli kauchukdan tayyorlangan damperlar juda katta kesish deformatsiyalarini yutishga qodir bo'lib, inshootning seysmik javobini 50% ga kamaytirgan. Kumagai-Gumi korporatsiyasi tomonidan sinovdan o'tgan superplastik silikon kauchuk damperlari esa javobni 60% gacha kamaytirgan.

Afzalliklari va kamchiliklari

Viscoelastik damperlarning asosiy afzalliklari quyidagilardan iborat:

- **Yuqori energiya yutish qobiliyati:** Bu damperlar inshootning seysmik yuklamalariga chidamliligini oshiradi.
- **Turli sohalarda qo'llash imkoniyatlari:** Ular turli xil konstruksiyalar va yuklash sharoitlarida samarali qo'llanilishi mumkin.

Kamchiliklari esa murakkab dizayn va oʻrnatish talablarini oʻz ichiga oladi. Masalan, suyuq viskoz damperlar katta kuchlar bilan ishlashda qiyinchiliklarga duch kelishi mumkin, va bu konstruksiyalarning barqarorligini taʼminlashni qiyinlashtiradi.

Xulosa: Viscoelastik damperlar zamonaviy seysmik himoya texnologiyalari qatorida muhim oʻrin tutadi. Ularning yuqori samaradorligi va turli inshootlarda qoʻllash imkoniyatlari ularni zamonaviy qurilishda samarali vositaga aylantiradi. Shu bilan birga, dizayn va oʻrnatishdagi murakkabliklar texnologiyaning qoʻllanish imkoniyatlarini cheklashi mumkin.

Foydalanilgan adabiyotlar

1. 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.
2. Azamjonov Asadbek Tursunali oʻgʻli,. "COMPUTER PROGRAMS FOR DESIGNING BUILDING STRUCTURES." Spectrum Journal of Innovation, Reforms and Development 21 (2023): 178-184.
3. 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.
4. Onorboyev Shavkat, and Azamjonov Asadbek Tursunali oʻgʻli. "IMPACT OF THE CONSTRUCTION INDUSTRY ON ECOLOGY." Miasto Przyszłości 44 (2024): 394-399.
5. Сотволдиев, Ф., & Азамжонов, А. (2023). Анализ солнечных водонагревателей. Тенденции и перспективы развития городов, 1(1), 320-323.
6. Davlyatov , S. M., & Solijonov , F. S. oʻgʻli. (2023). OʻZBEKISTONDA YETISHTIRILAYOTGAN MAHALLIY YOGʻOCH MATERIALLARINING XUSUSIYATLARI. *GOLDEN BRAIN*, 1(1), 263–265. Retrieved from

<https://researchedu.org/index.php/goldenbrain/article/view/4568>

7. 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.
8. 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.
9. 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.
10. 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.
11. Azamjonov Asadbek Tursunali o'g'li, Use of Solar Battery Batteries Research Parks Publishing LLC (2023) С. 76-83.
12. Obidovich A. T. Architecture And Urban Planning In Uzbekistan //Texas Journal of Engineering and Technology. – 2022. – Т. 9. – С. 62-64.
13. 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.
14. 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.
15. 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.

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

17. 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.

18. 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.

19. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние водорастворимых солей на эксплуатационные свойства наружные стен. *Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali*, 1(6), 44-47.

20. 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.

21. 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.

22. 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.

23. 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.

24. 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

25. 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

26. 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

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

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

29. Nabiyeu, 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.

30. Umarov, S. A. O. (2023). UCH QAVATLI BINONI SEYSMIK KUHLAR TA’SIRIGA LIRA 9.6 DASTUR YORDAMIDA HISOBLASH. *GOLDEN BRAIN*, 1(1), 224-230.

31. 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.

32. 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.

33. 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.

34. 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.

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

36. 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.

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

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

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

40. 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.

41. 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.
42. Бахромов, М. М. (2022). Механические характеристики грунта и прогноз закономерности воздействия сил негативного трения по боковой поверхности сваи. PEDAGOGS journali, 10(3), 162-167.
43. 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.
44. 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.
45. Mamatkhanovich, B. M. (2022). CONSTRUCTION OF FOUNDATIONS IN GRUNTS WITH VARIABLE STRUCTURES. Spectrum Journal of Innovation, Reforms and Development, 10, 115-120.
46. Mamathanovich, B. M. (2023). CONSTRUCTION OF FOUNDATIONS ON DRY SOILS. Spectrum Journal of Innovation, Reforms and Development, 21, 294-297.
47. Mamatkhanovich, B. M. (2022). Construction of Grounds and Foundations on Bulk Soil. Miasto Przyszłości, 201-205.
48. 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.
49. 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.
50. Дилшоджон оглы, З. Н. (2023). ПРИМЕНЕНИЕ КОМПОЗИТНЫХ МАТЕРИАЛОВ ДЛЯ УСИЛЕНИЯ ЖЕЛЕЗОБЕТОННЫХ КОНСТРУКЦИЙ. Журнал «Спектр» об инновациях, реформах и развитии, 22, 148-154.

51. 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>
52. Набиев, М. Н., Насриддинов, Х. Ш., & Кодиров, Г. М. (2021). Влияние водорастворимых солей на эксплуатационные свойства наружные стен. *Ta'lim va rivojlanish tahlili onlayn ilmiy jurnali*, 1(6), 44-47.
53. 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.
54. Nabiyeu, 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.
55. 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.
56. 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.
57. Қодиров, Г. 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.
58. 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.
59. 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.

60. 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.

61. 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.

62. Қодиров, Ф. 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.

63. 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.

64. 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.

65. 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.

66. 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.

67. Мирзабабаева, С. М., & Қодиров, Ф. М. (2022). Биноларни ўровчи конструкцияларини тузлар таъсиридаги сорбцион хусусиятини

яхшилаш. *INTERNATIONAL CONFERENCE ON LEARNING AND TEACHING*, 1(6), 86-90.

68. 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.

69. 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.

70. 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

71. 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.

72. Abduxodi o'g'li, A. A. (2024). TEMIRBETON KARKAS TIZIMLI XIZMAT KO 'RSATISH BINOSINI SEYSMIK KUCHLAR TA'SIRIGA HISOBLASH VA ULARNI SOLISHTIRMA TAHLILI. *Miasto Przyszłości*, 49, 627-630.

73. Davlyatov, S., Jakhongirov, I., Abdurakhmonov, A., Solijonov, F., & Abobakirova, Z. (2024, November). Determination of the stress-strain state of models of steel cylindrical tanks using the "ANSYS" program. In *E3S Web of Conferences* (Vol. 508, p. 04002). EDP Sciences.

74. Abdukholiq, A., & Golibjon, A. (2023). CALCULATION OF REINFORCED CONCRETE SLAB STRUCTURE UNPROTECTED FROM SUNLIGHT IN NATURAL CLIMATE IN LIRA PK PROGRAM. *Spectrum Journal of Innovation, Reforms and Development*, 21, 245-250.

75. 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).
76. 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
77. 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.
78. Mirzababayeva, S., Abobakirova, Z., Umarov, S. Crack resistance of bent concrete structures with fiberglass reinforcement, E3S Web of Conferences, 2023, 452, 06023.
79. Strength and uniformity of composite reinforced columns, Akramov, K., Davlyatov, S., Kimsanov, B. E3S Web of Conferences, 2023, 452, 06012.
80. 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>.
81. 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.
82. Abdulkhaev, Z., Madraximov, M., Abdugalilova, 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).
83. 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. – T. 2281. – №. 1. – C. 020028.

84. 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

85. 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.

86. 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.

87. 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.

88. 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.

89. 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.

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

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

92. Mirzababaeva, S. M. (2021). The influence of elevated and high temperatures on the deformability of concrete. *Anal. Educ. Dev*, 1(6), 40-43.v

93. Mirzababayeva, S. M. (2023). DETERMINATION OF STRENGTH CHARACTERISTICS OF HEAT-RESISTANT CONCRETE ON ALUMINA CEMENT. *Web of Scholars: Multidimensional Research Journal*, 2(11), 34-38.
94. Asrorovna, A. Z., & Abdug'ofurovich, U. S. (2023). ISSUES OF RATIONAL USE OF WASTE IN THE PRODUCTION OF BUILDING MATERIALS. *Spectrum Journal of Innovation, Reforms and Development*, 22, 94-100.
95. Abdug'ofurovich, U. S. (2023). INVESTIGATION OF CROSSBARS WITH REINFORCED CONCRETE AND COMPOSITE REINFORCEMENT. *Spectrum Journal of Innovation, Reforms and Development*, 22, 77-84.
96. Abdug'ofurovich, U. S., & Asrorovna, A. Z. (2023). THE ROLE OF BINDERS AND FILLERS IN THE STUDY OF CONCRETE PROPERTIES. *Spectrum Journal of Innovation, Reforms and Development*, 22, 101-109.
97. Madraximov, M., Abdulkhaev, Z., Ibrokhimov, A., & Mirababaeva, S. (2024, June). Numerical simulation of laminar symmetric flow of viscous fluids. In *AIP Conference Proceedings* (Vol. 3119, No. 1). AIP Publishing.
98. Ayupov, G. A. T. X., & Abobakirova, Z. A. (2023). ZILZILAGA CHIDAMLI QURILISHNING ASOSIY TAMOYILLARI. *GOLDEN BRAIN*, 1(1), 244-245.
99. Абобакирова, З. А. (2023). ПРОЕКТИРОВАНИЕ ФУНДАМЕНТОВ ЗДАНИЙ И СООРУЖЕНИЙ В СЕЙСМИЧЕСКИХ РАЙОНАХ С РАЗЛИЧНЫМИ КОНСТРУКТИВНЫМИ РЕШЕНИЯМИ. *GOLDEN BRAIN*, 1(1), 152-154.
100. UMAROV, S. A. (2021). STRENGTHENING AND DEFORMATION OF GLASS COMPOSITE ARMATURES MANUFACTURED IN UZBEKISTAN. *THEORETICAL & APPLIED SCIENCE Учредители: Теоретическая и прикладная наука*, (11), 829-835.