AMERICAN JOURNAL OF SOCIAL AND HUMANITARIAN RESEARCH

ISSN: 2690-9626
Vol.3, No 6, 2022

Stress Deformation of Flexible Beams with Composite Reinforcement under Load

Ahmadaliyev Abdulxafiz Hasanboy o'g'li
Assistant of Fergana Polytechnic Institute

ANNOTATION: This article describes the work done to determine the deformations of composite reinforced flexible beams in concrete and reinforcement, measuring the slope of the beam, the location and width of cracks formed in the beam.

KEYWORD: stress, deformation, deformation state, strength and deformation indicators, elongation and compression reinforcement, deformation of concrete compression and elongation areas.

From the middle of the twentieth century, in many countries, experts in the field of construction began to show interest in composite fittings. There were a number of reasons for this: exploitation in different climates and operating conditions, corrosion of steel, magnetic attraction, electrical conductivity, mass size, high cost, and so on.

Composite fittings have the following advantages: lightweight, long-term durability, high tensile strength, high durability in abrasive environments. However, composite reinforcement has the following disadvantages: the modulus of elasticity is about 4 times smaller than that of steel reinforcement, an increase in temperature up to 6000 C leads to a softening of the fiber-binding composite and complete loss of elasticity, which is an additional measure for thermal insulation. requires viewing; composite fittings cannot be welded, in which case steel pipes are fitted to the armature rods in factories, through which welding is carried out[6-14].

Composite fittings cannot be bent directly at the construction site, for which the fittings must be given the shapes provided in the project under factory conditions.

Beams equipped with composite fittings with a cross-sectional area of 16x30 cm and a length of 240 cm were prepared for experimental studies. The beams were made in wooden molds. The inner surface of the molds was covered with metal sheets. 2Ø12ASK as working reinforcement, 2Ø10SASK as compressive area, Ø6 ASK as clamps were installed in 15 cm increments. The composite fittings were woven together with soft steel wires. Fittings were installed and fixed to the molds at the project site. The beam samples were made of B20 grade heavy concrete. Along with the sample beams, the cubic samples measuring 10x10x10cm were also made of the same concrete at the same time.

The beam samples were removed from the molds after the cubes were kept in the mold for 5-7 days and stored in the laboratory. The first cubes were tested 28 days after molding. Then, even before

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

testing the beams directly, their cubic strength was determined[9-44]. The tests were performed on a hydraulic press.

For concrete, quartz sand from the Akbarabad quarry with a fraction of 5-10 mm, Quartz granite shale, gravel modulus M2.5, and Portland cement of the Quvasoy cement plant with a grade of M400 were used. The concrete was prepared in a concrete mixer with a volume of 0.5 m^3 and compacted by placing it in molds.

Table 1.

Concrete type	Freezing conditions	Concrete age, per day	R, MPa	R_b, MPa	R_{bt} MPa	E_b*10^3, MPa	ε_{bn}	γ_{bn}	W, %
Normal heavy	Under natural conditions	28	25	19	2,4	20	205	0,82	3,6

Initially, the cubes were tested 28 days after molding, and the test results determined that the concrete of the sample beams was compatible with concrete B20-B22.5. Table 1 shows the performance of ordinary heavy concrete used for the samples.

The strength and deformation characteristics of the composite reinforcement samples used for the beam samples were also determined.

A graph representing the performance of the armature is shown in Figure 1.

The sample beams were tested for bending on a power stand. The stand is specially crafted, which allows you to test the pure bending by loading the beams through two accumulated forces.

The beams were mounted on 2 hinges of the stand designed to test the samples. The distance between the forces was 800 mm and the distances from the supports to the load were 750 mm. The distance from the base to the edge of the beams is 100 mm. The load was delivered by a 40-ton hydraulic jack. For this, a distributing traverse was used.

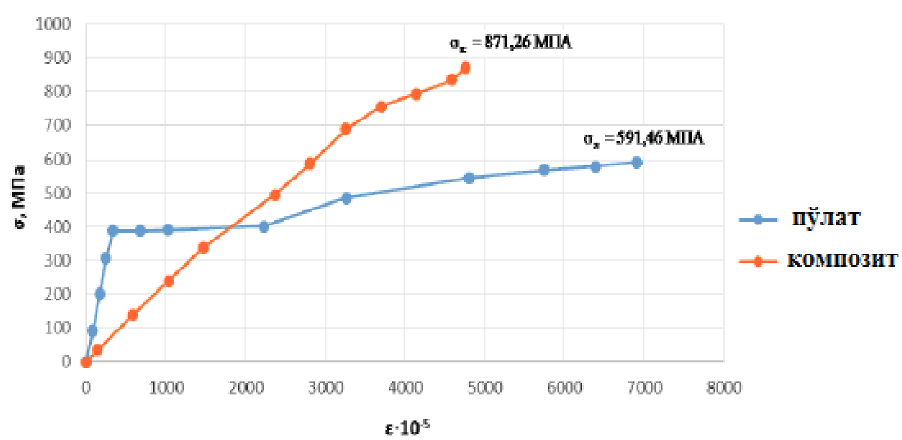

Figure 1. Elongation diagram of steel and composite reinforcement

The download was given in several stages slowly. The phase load accounted for approximately 10% of the calculated disruptive load. After stabilization at each stage, its stabilization was expected. After

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

each phase load was given and at the end of the phase, the readings on the measuring instruments were recorded.

The deformations of the concrete and reinforcement, the coolness of the beams were measured until the specimens were broken. The value of the load was recorded from the jack manometer. When the load reached the set value, the jack valve was closed and held at this value for 15-20 minutes. After the readings were recorded by the instruments, the next stage load was given. In this way the tests were continued and the samples were carried out until they were broken.

During the test, the deformations of the concrete and reinforcement, the slope of the beam were measured and recorded[12-34].

Deformations were measured at 300 mm base using clock-type indicators with an accuracy of 0.01 mm, and the deflections were measured at three points of the beam - between the gaps and at the supports. Deformations of tensile and compressive reinforcement, as well as concrete compressive and tensile areas, were also measured at a 100 mm base at three predetermined points.

During the experiment, the violation of the samples occurred at values close to the rated loads, in all cases it was noted that the experimental load was 10-18% higher than the rated load.

In cases where the fracture started from the elongated reinforcement, the crushing fracture of the concrete of the compressible area was detected. When the distortion occurred along the sloping sections, a situation occurred that was close to the distortion even in the area of pure bending.

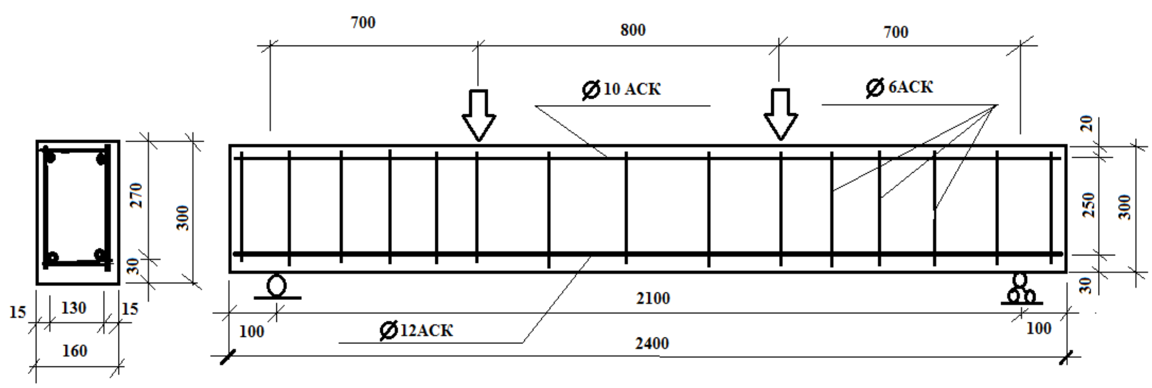

Figure 2. Reinforcement, loading schemes and basic dimensions of sample beams

Experiments have shown that the nature of crack formation, development, and specimen failure in the test models occurred as in steel reinforcement structures.

Initially, before the cracks appeared, the deformations and sags increased almost proportionally to the load increase. With the appearance of the first cracks, this proportionality was broken and the curvature of the graph increased. This became apparent as the value of the cargo increased.

In particular, when the value of the load was 70% of the breaking load and above, the cracks widened sharply, the slopes increased sharply.

Deformations in concrete and reinforcement also changed similarly, and a very rapid increase was observed as the boundary condition approached. In the boundary condition, the deformations in the concrete reached their maximum value, while the deformations in the reinforcement were close to their limit values.

In the boundary condition, the maximum opening width of hazardous cracks was 1mm or more.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

The beams were able to withstand loads in excess of 5-20% of the calculated breaking loads. This situation can be explained by the fact that the nominal value of the calculated resistance of reinforcement and concrete is obtained with a certain stock. There was also a sharp increase in the slope of the beams in the boundary conditions. We think it would be correct to assume that the "leakage" of the armature at high voltages was the cause.

Experiments have shown that, depending on the type and class of reinforcement, a reasonable concrete type and class should be obtained. This, on the one hand, saves on reinforcement and, on the other hand, ensures the reliability of the structure. In the future, it would be expedient to pay special attention to this situation, to conduct special experiments[26-44]..

Figures 3-5 below show the testing of the sample beams under the influence of two accumulated loads, the formation of initial cracks in them, their opening with increasing load, the development of cracks and the breaking of the boundary condition.

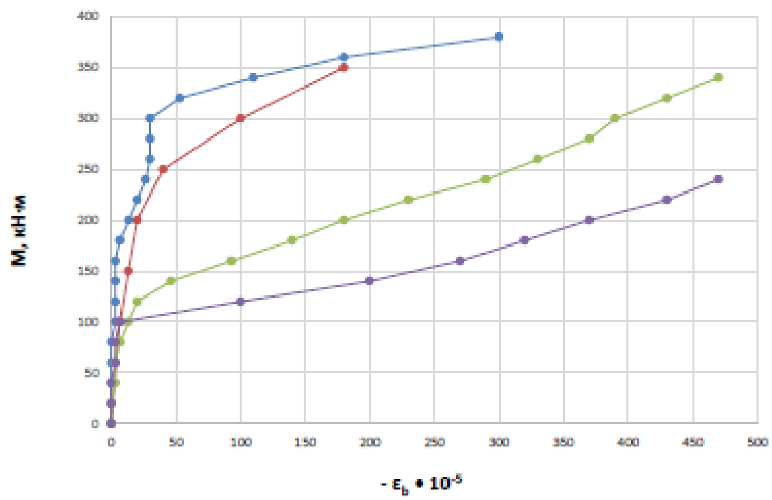

Figure 3. Graph of changes in deformations in the area of concrete compression in composite reinforced beam samples

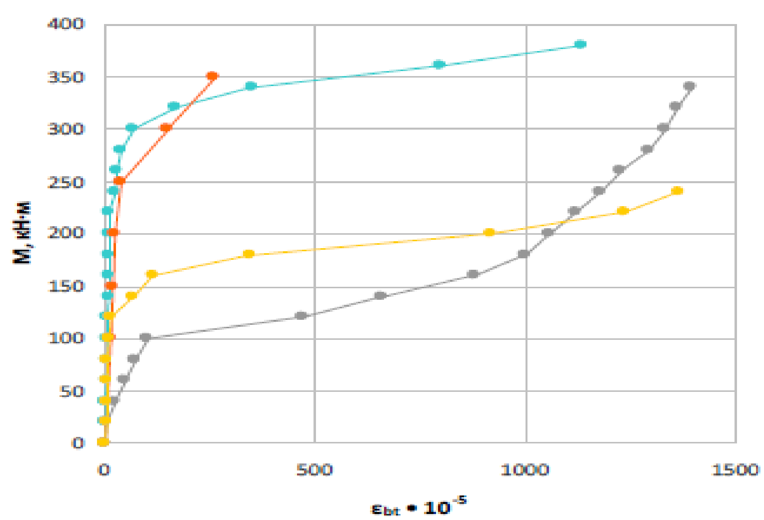

Figure 4. Graph of changes in deformations in the area of concrete elongation in composite reinforced beam samples

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

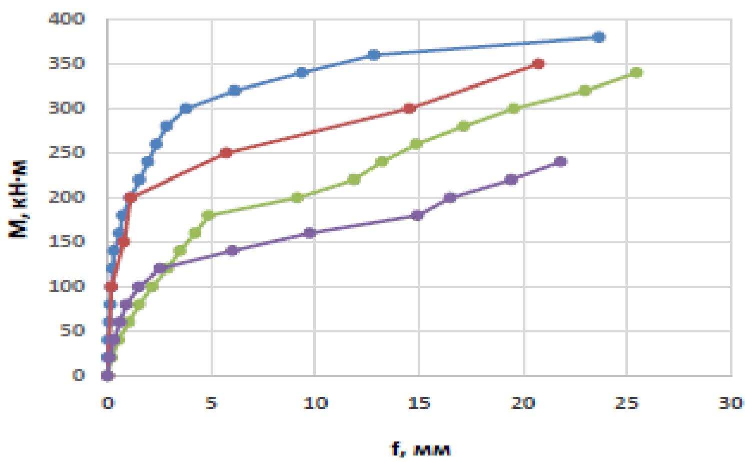

Figure 5. Graph of bending moment (M-f) of composite reinforcement pattern beams

Bibliography:

1. Davlyatov S. M., Makhsudov B. A. Technologies for producing high-strength gypsum from gypsum-containing wastes of sulfur production-flotation tailings //ACADEMICIA: An International Multidisciplinary Research Journal. – 2020. – Т. 10. – №. 10. – С. 724-728.
2. Ахмедов Ж. Д. Оптимизация преднапряженных перекрестных ферменных систем //Промислове будівництво та інженерні споруди. К.: ВАТ "Укрдніпроектстальконструкція ім. ВМ Шимановського. – 2010. – Т. 4.
3. Akhrarovich A. K., Muradovich D. S. Calculation of cylindrical shells of tower type, reinforced along the generatrix by circular panels //European science review. – 2016. – №. 3-4. – С. 283-286.
4. Muratovich D. S. Study of functioning of reservoirs in the form of cylindrical shells //European science review. – 2016. – №. 9-10.
5. Adilhodzhaev A. et al. The study of the interaction of adhesive with the substrate surface in a new composite material based on modified gypsum and treated rice straw //European Journal of Molecular & Clinical Medicine. – 2020. – Т. 7. – №. 2. – С. 683-689.
6. Акрамов Х. А., Давлятов Ш. М., Хазраткулов У. У. Методы расчета общей устойчивости цилиндрических оболочек, подкрепленных в продольном направлении цилиндрическими панелями //Молодой ученый. – 2016. – №. 7-2. – С. 29-34.
7. Egamberdiyev B. O. et al. A Practical Method For Calculating Cylindrical Shells //The American Journal of Engineering and Technology. – 2020. – Т. 2. – №. 09. – С. 149-158.
8. Davlyatov S. M., Kimsanov B. I. U. Prospects For Application Of Non-Metal Composite Valves As Working Without Stress In Compressed Elements //The American Journal of Interdisciplinary Innovations Research. – 2021. – Т. 3. – №. 09. – С. 16-23.
9. Mirzaraximov M. A. O., Davlyatov S. M. APPLICATION OF FILLED LIQUID GLASS IN THE TECHNOLOGY OF OBTAINING A HEAT RESISTANT MATERIAL //Scientific progress. – 2021. – Т. 2. – №. 8. – С. 4-7.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

10. Мамажонов А. У., Юнусалиев Э. М., Давлятов Ш. М. БЕТОН С МИНЕРАЛЬНЫМ НАПОЛНИТЕЛЕМ-ГЛИЕЖЕМ, ЭЛЕКТРОТЕРМОФОСФОРЫМ ШЛАКОМ И ДОБАВКОЙ АЦФ-3М //Энерго-ресурсосберегающие технологии и оборудование в дорожной и строительной отраслях. – 2020. – С. 220-226.
11. Абдуллаев И. Н. и др. СОВЕРШЕНСТВОВАНИЕ ТЕХНОЛОГИЧЕСКИХ МЕТОДОВ ПРИ УСТРОЙСТВЕ ФУНДАМЕНТОВ ГЛУБОКОГО ЗАЛОЖЕНИЯ //Scientific progress. – 2022. – Т. 3. – №. 1. – С. 526-532.
12. Гончарова Н. И., Абобакирова З. А. БИТУМИНИРОВАННЫЙ БЕТОН ДЛЯ ПОДЗЕМНЫХ КОНСТРУКЦИЙ ЗДАНИЙ //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 6. – С. 122-125.
13. Абобакирова З. А., Бобофозилов О. ИСПОЛЗОВАНИЕ ШЛАКОВЫХ ВЯЖУЩИХ В КОНСТРУКЦИОННЫХ СОЛЕСТОЙКИХ БЕТОНАХ //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 6.
14. Абобакирова З. А., кизи Мирзаева З. А. СЕЙСМИК ҲУДУДЛАРДА БИНОЛАРНИ ЭКСПЛУАТАЦИЯ ҚИЛИШНИНГ ЎЗИГА ХОС ХУСУСИЯТЛАРИ //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 6. – С. 147-151.
15. Абобакирова З. А., угли Содиков С. С. СВОЙСТВА ЦЕМЕНТНОГО КАМНЯ ОПТИМАЛЬНОГО СОСТАВА С ДОБАВКАМИ В УСЛОВИЯХ СУХОГО ЖАРКОГО КЛИМАТА //INTERNATIONAL CONFERENCES ON LEARNING AND TEACHING. – 2022. – Т. 1. – №. 6. – С. 81-85.
16. 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.
17. Гончарова Н. И. и др. Применение Шлаковых Вяжущих В Конструкционных Солестойких Бетонах //Таълим ва Ривожланиш Таҳлили онлайн илмий журнали. – 2021. – Т. 1. – №. 6. – С. 32-35.
18. Ivanovna G. N., Asrorovna A. Z., Ravilovich M. A. The Choice of Configuration of Buildings When Designing in Seismic Areas //CENTRAL ASIAN JOURNAL OF ARTS AND DESIGN. – 2021. – Т. 2. – №. 11. – С. 32-39.
19. Гончарова Н. И., Абобакирова З. А., Мухаммедзиянов А. Р. Сейсмостойкость Малоэтажных Зданий Из Низкопрочных Материалов //CENTRAL ASIAN JOURNAL OF THEORETICAL & APPLIED SCIENCES. – 2021. – Т. 2. – №. 11. – С. 209-217.
20. Умаров Ш. А., Мирзабабаева С. М., Абобакирова З. А. Бетон Тўсинларда Шиша Толали Арматураларни Қўллаш Орқали Мустаҳкамлик Ва Бузилиш Ҳолатлари Аниқлаш //Таълим ва Ривожланиш Таҳлили онлайн илмий журнали. – 2021. – Т. 1. – №. 6. – С. 56-59.
21. Мамажонов А. У., Юнусалиев Э. М., Абобакирова З. А. Об опыте применения добавки ацф-3м при производстве сборных железобетонных изделий //Энерго-ресурсосберегающие технологии и оборудование в дорожной и строительной отраслях. – 2020. – С. 216-220.
22. Мирзаахмедова У. А. и др. Надежности И Долговечности Энергоэффективные Строительные Конструкций //Таълим ва Ривожланиш Таҳлили онлайн илмий журнали. – 2021. – Т. 1. – №. 6. – С. 48-51.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

23. Кодиров, Г. М., Набиев, М. Н., & Умаров, Ш. А. (2021). Микроклимат В Помещениях Общественных Зданиях. *Таълим ва Ривожланиш Таҳлили онлайн илмий журнали*, *1*(6), 36-39.

24. Umarov, S. A. (2021). Development of deformations in the reinforcement of beams with composite reinforcement. *Asian Journal of Multidimensional Research*, *10*(9), 511-517.

25. Akhrarovich, A. X., Mamajonovich, M. Y., & Abdugofurovich, U. S. (2021). Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement. *The American Journal Of Applied Sciences*, *3*(05), 196-202.

26. Гончарова Н. И., Абобакирова З. А., Мухамедзянов А. Р. Энергосбережение в технологии ограждающих конструкций //Энерго-ресурсосберегающие технологии и оборудование в дорожной и строительной отраслях. – 2020. – С. 107-112.

27. Гончарова Н. И. и др. Разработка солестойкого бетона для конструкций с большим модулем открытой поверхности //Молодой ученый. – 2016. – №. 7-2. – С. 53-57.

28. Abobakirova Z. A. Reasonable design of cement compositionfor refactory concrete //Asian Journal of Multidimensional Research. – 2021. – Т. 10. – №. 9. – С. 556-563.

29. Goncharova N. I., Abobakirova Z. A. Reception mixed knitting with microadditive and gelpolimer the additive //Scientific-technical journal. – 2021. – Т. 4. – №. 2. – С. 87-91.

30. Goncharova N. I., Abobakirova Z. A., Kimsanov Z. Technological Features of Magnetic Activation of Cement Paste" Advanced Research in Science //Engineering and Technology. – 2019. – Т. 6. – №. 5. – С. 12.

31. 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.

32. Asrorovna A. Z. Effects Of A Dry Hot Climate And Salt Aggression On The Permeability Of Concrete //The American Journal of Engineering and Technology. – 2021. – Т. 3. – №. 06. – С. 6-10.

33. Abobakirova Z. A. Regulation Of The Resistance Of Cement Concrete With Polymer Additive And Activated Liquid Medium //The American Journal of Applied sciences. – 2021. – Т. 3. – №. 04. – С. 172-177.

34. Мирзажонович Қ. Ғ., Мирзабабаева С. М. БИНОЛАРНИ ЎРОВЧИ КОНСТРУКЦИЯЛАРИНИ ТУЗЛАР ТАЪСИРИДАГИ СОРБЦИОН ХУСУСИЯТИНИ ЯХШИЛАШ //RESEARCH AND EDUCATION. – 2022. – С. 86.

35. Мирзабабаева С. М., Мирзажонович Қ. Ғ. БЕТОН ВА ТЕМИРБЕТОН КОНСТРУКЦИЯЛАР БУЗИЛИШИНИНГ ТУРЛАРИ ВА УЛАРНИНГ ОЛДИНИ ОЛИШ //RESEARCH AND EDUCATION. – 2022. – С. 91.

36. Abdukhalimjohnovna M. U. Failure Mechanism Of Bending Reinforced Concrete Elements Under The Action Of Transverse Forces //The American Journal of Applied sciences. – 2020. – Т. 2. – №. 12. – С. 36-43.

37. Abdukhalimjohnovna M. U. Technology Of Elimination Damage And Deformation In Construction Structures //The American Journal of Applied sciences. – 2021. – Т. 3. – №. 05. – С. 224-228.

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR

38. Akhrarovich A. X., Mamajonovich M. Y., Abdugofurovich U. S. Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement //The American Journal of Applied sciences. – 2021. – Т. 3. – №. 5. – С. 196-202

39. Акрамов, Х. А. "Прочность, жесткость и трещиностойкость изгибаемых железобетонных трехслойных конструкцій." PhD diss., ступеня д-ра. техн. наук/ХА Акрамов.–Ташкент: ТАСИ, 2002.–38 с, 2002.

40. Akhrarovich A. X., Mamajonovich M. Y., Abdugofurovich U. S. Development Of Deformations In The Reinforcement Of Beams With Composite Reinforcement //The American Journal of Applied sciences. – 2021. – Т. 3. – №. 5. – С. 196-202.

41. Egamberdiyev, B. O. "A Practical Method For Calculating Cylindrical Shells." The American Journal of Engineering and Technology 2.09 (2020): 149-158.

42. Egamberdiyev B. O. et al. A Practical Method For Calculating Cylindrical Shells //The American Journal of Engineering and Technology. – 2020. – Т. 2. – №. 09. – С. 149-158.

43. Makhkamov Y. M., Mirzababaeva S. M. RIGIDITY OF BENT REINFORCED CONCRETE ELEMENTS UNDER THE ACTION OF SHEAR FORCES AND HIGH TEMPERATURES //Scientific-technical journal. – 2021. – Т. 4. – №. 3. – С. 93-97.

44. Махкамов Й. М., Мирзабабаева С. М. Прогибы изгибаемых железобетонных элементов при действии поперечных сил и технологических температур //Проблемы современной науки и образования. – 2019. – №. 12-2 (145).

ISSN 2690-9626 (online), Published by "Global Research Network LLC"
under Volume: 3 Issue: 6 in Jun-2022 https://grnjournals.us/index.php/AJSHR