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SOME SECOND ORDER DIFFERENTIAL EQUATIONS FUNCTIONALLY INVARIANT SOLUTIONS

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ABSTRACT
This article is devoted to the search for functionally invariant solutions of some second-order differential equations .
The search for functionally invariant solutions of differential equations is one of the main methods for constructing solutions. The problem of finding a functionally invariant solution of second-order linear differential equations was studied in the works of I. Jacobi, A. R. Forit, W. Burnside, and others in the middle of the 19th century.
In 1932, V.I. Smirnov and S.L. Sobolev were the first to apply the functionally invariant solution of wave equations to solve a specific problem of mathematical physics.
Further development of the functionally invariant solution method is associated with the name of N.P. Erugin and M.M. Smirnov. Necessary and sufficient conditions for the existence of a functionally invariant solution of differential equations of the second and fourth order with two independent variables are obtained.
second order in a finite one-link field D of the plane xOy

$$a_{11}u_{xx} + 2a_{12}u_{xy} + a_{22}u_{yy} + a_{13}u_x + a_{23}u_y = 0 \quad (1)$$

Let's look at the equation. here $a_{11},\ a_{12}, a_{22} \in C^2(D), \quad a_{13}, a_{23} \in C^1(D)$ - given functions.

$u(x, y) \in C^2(D)$ the function is a solution to equation (1) and is arbitrary
a function with a continuous derivative up to the 2nd order $F(u)$ also satisfies equation (1), then such a $u(x, y)$ function is called a functionally invariant solution of equation (1).

If $u(x, y)$ (1) is a functionally invariant solution, then

$$a_{11}u_x^2 - 2a_{12}u_x u_y + a_{22}u_y^2 = 0 \quad (2)$$

is also a solution to the characteristic equation. Conversely, if it $u(x)$ satisfies equations (1) and (2), then this is a functionally invariant solution of equation (1). Thus, the problem of finding a functionally invariant solution to equation (1) is reduced to solving the system of equations (1) and (2).

Below we will deal with finding functionally invariant solutions of some differential equations.

one.

$$(\sin^2 y)u_{xx} - u_{yy} + \lambda u_x = 0 \quad (3)$$

find a functionally invariant solution of the equation. Here λ is an arbitrary constant. According to the definition of functionally invariant solutions, equation (3) and its corresponding

$$(\sin^2 y)u_x^2 - u_y^2 = 0 \quad (4)$$

it is necessary to find a joint solution of the characteristic equation.

(4) equation

$$(\sin y)u_x - u_y = 0, \qquad (\sin y)u_x + u_y = 0 \tag{5}$$

can be divided into equalities.
(5) complete integrals of the equations, respectively

$$u = x - \cos y, u = x + \cos y$$

have a form that satisfies (3).
Using these

$$u = F_1(x - \cos y),\ u = F_2(x + \cos y) \tag{6}$$

we are building functions. Functions (6) include all solutions of equation (5).
found equations (6) twice in x and y

$u_x = F_1^{'}(x - \cos y)$,

$u_{xx} = F_1^{"}(x - \cos y)$,

$u_y = F_1^{'}(x - \cos y)\sin y$,

$u_{yy} = F_1^{"}(x - \cos y)\sin^2 y + F_1^{'}(x - \cos y)$.

$u_x = F_2^{'}(x + \cos y)$,

$u_{xx} = F_2^{"}(x + \cos y)$,

$u_y = -F_2^{'}(x + \cos y)\sin y$,

$u_{yy} = F_2^{"}(x + \cos y)\sin^2 y - F_2^{'}(x + \cos y)\cos y$.

Substituting the found expressions into derivative equations (3),

$$\lambda_1 = -\cos y, \qquad \lambda_2 = \cos y \tag{8}$$

we will produce
Thus, when equality (8) is satisfied, formula (6) gives the general solution of the system of equations (3) and (4).
$\lambda = \pm\cos y$ the function satisfies (3) at Therefore $u = F(x \pm \cos y)$, the function is a $u = x \pm \cos y$ functionally $(\sin^2 y)u_{xx} - u_{yy} \pm (\cos y)u_x = 0$ invariant solution of the equation.

2.

$$(\sin^2 y)u_{xx} - (\cos^2 x)u_{yy} + \alpha(\sin x)u_x + \alpha(\cos y)u_y = 0 \tag{9}$$

(9) find a functionally invariant solution of the equation.

In this equation, α also does not change arbitrarily. (9) - characteristic equation

$$(\sin^2 y)u_x^2 - (\cos^2 x)u_y^2 = 0 \tag{10}$$

looks like Divide also (10) into two equalities, as above:

$$(\sin y)u_x - (\cos x)u_y = 0, \qquad (\sin y)u_x + (\cos x)u_y = 0 \tag{11}$$

Complete integrals (11).

$$u = \sin x + \cos y$$

will have an appearance.
As above, we get the following function from this equation

$$u = F(\sin x + \cos y) \tag{12}$$

the last equation we can multiply x and y twice.

$u_x = F'(\sin x + \cos y)\cos x$,

$u_{xx} = F''(\sin x + \cos y)\cos^2 x - F'(\sin x + \cos y)\sin x$,

$u_y = -F'(\sin x + \cos y)\sin y$,

$u_{yy} = F''(\sin x + \cos y)\sin^2 y - F'(\sin x + \cos y)\cos y$.

Substituting the found expressions into derivative equations (9),

$$\alpha = \frac{\sin^2 y \sin x + \cos^2 x \cos y}{\sin x \cos x - \cos y \sin y}, \tag{13}$$

find the value. When the last equality is satisfied, (12) is a general solution of (9) and (10).

So $u = \sin x + \cos y$ function

$$(\sin^2 y)u_{xx} - (\cos^2 x)u_{yy} + \frac{\sin^2 y \sin x + \cos^2 x \cos y}{\sin x \cos x - \cos y \sin y}(\sin x)u_x + \frac{\sin^2 y \sin x + \cos^2 x \cos y}{\sin x \cos x - \cos y \sin y}(\cos y)u_y = 0$$

functionally - invariant solution of the equation.

References

1. Salakhdinov M.S., Nasriddinov G.N. Ordinary differential equations. Tashkent. Teacher, 1982.
2. Erugin.N.P., Smirnov.M.M. Functionally invariant solutions of differential equations // Differ. Equation 17 :5, 1981 , 853-865.
3. Smirnov.M.M. Functionally invariant solutions of equations of hyperbolic-parabolic type with three independent variables //Prikl. mat. fur. 17:4, 1953, 509-513.
4. Smirnov.M.M. Functionally invariant solutions and non-uniqueness of the solution of the Darboux problem for degenerate hyperbolic equations // Diff. equations. 12 :5, 1976 , 937-939.
5. Smirnov.M.M. Functionally invariant solutions of the wave equation. Reports of the Academy of Sciences of the USSR. 67:6, 1949, 977-980.
6. Halolen.L.M. On functionally invariant solutions of the wave equation in the n - dimensional domain. // Izv Academy of Sciences of the USSR. Ser. math. 21:1, 1957, 53-72
7. Шамотова, О. Ш. (2022, July). ВЛИЯНИЕ МОТИВАЦИИ НА СТУДЕНТОВ В ПРОЦЕССЕ УРОКА. In INTERNATIONAL CONFERENCE: PROBLEMS AND SCIENTIFIC SOLUTIONS. (Vol. 1, No. 2, pp. 277-280).
8. SHUKURDINOVNA, S. O., & KIZI, K. D. I. Pedagogical Problems of Creating English Textbooks. JournalNX, 7(1), 109-112.
9. Sh, S. O., & Kazakbayeva, D. I. Pedgogical problems of creating English textbooks. Journal NX, 7(1).
10. Sh, Shamatova O., and D. I. Kazakbayeva. "Pedgogical problems of creating English textbooks." Journal NX 7.1.
11. Tukhtasinova, D. T. (2022, September). HOW TO TEACH ENGLISH LANGUAGE MEDICAL ENGINEERING SPECIALTY STUDENTS. In INTERNATIONAL SCIENTIFIC CONFERENCE" INNOVATIVE TRENDS IN SCIENCE, PRACTICE AND EDUCATION" (Vol. 1, No. 2, pp. 157-162).
12. Nozimjon O'g'li, S. S. (2022). CAUSES OF THE ORIGIN OF OSTEOCHONDROSIS, SYMPTOMS, DIAGNOSIS AND TREATMENT METHODS. Conferencea, 76-77
13. Abdikarimov , R. A., Mansurov, M. M., & Akbarov, U. Y. (2019). Numerical study of the flutter of a viscoelastic rigidly clamped rod taking into account the physical and aerodynamic nonlinearities.

Bulletin of the Russian State University for the Humanities. Series: Informatics. Information Security. Mathematics, (3), 94-107.

14. Abdikarimov R. _ A., Mansurov M . M . , & Akbarov Yu . Y. _ (2019). Numerical study of the flutter of a viscoelastic rigidly clamped rod, taking into account the physical and aerodynamic nonlinearities. VESTNIK RGGU, 3 , 95.
15. Mansurov , M., & Akbarov , U. (2021). FLATTER OF VISCOELASTIC FREE OPEROUS ROD AT THE END. Scientific Bulletin of Namangan State University , 3 (3), 36-42.
16. Zhumakulov , Kh . K ., & Salimov , M . (2016). ABOUT THE METHODS OF CARRYING OUT AND THE STRUCTURE OF THE PEDAGOGICAL EXPERIMENT. Chief Editor , 80.
17. Esonov , M. M. (2013). Methodical techniques of a creative approach in teaching the theory of images. Vestnik KRAUNTS. Physical and Mathematical Sciences , 7 (2), 78-83.
18. Esonov , M. M., & Zunnunova , D. T. (2020). The development of mathematical thinking in geometry lessons through tasks for the study of image parameters. Vestnik KRAUNTS. Physical and Mathematical Sciences , 32 (3), 197-209.
19. Zharov, V. K., & Esonov , M. M. (2019). TRAINING STUDENTS OF MATHEMATICS IN SCIENTIFIC RESEARCH METHODS ON THE BASIS OF SOLVING A COMPLEX OF GEOMETRIC PROBLEMS. Continuum . Maths. Computer science. Education , (4), 10-16.
20. Esonov , M. M., & Esonov , A. M. (2016). Implementation of the methodology of creative approach in the classroom of a special course on the theory of images. Vestnik KRAUNTS. Physical and Mathematical Sciences , (1 (12)), 107-111.
21. Esonov , M. M. (2017). Constructing a line perpendicular to a given line. Vestnik KRAUNTS. Physical and Mathematical Sciences , (2 (18)), 111-116.
22. Esonov , M. M. (2016). PRACTICAL BASES OF TEACHING IMAGE METHODS TO SOLVING PROBLEMS IN THE COURSE OF GEOMETRY. In Theory and Practice of Modern Humanities and Natural Sciences (pp . 155-159).
23. Esonov , M. M. (2014). Designing the study of "Image Techniques" in the context of a creative approach to problem solving. In Theory and Practice of Modern Humanities and Natural Sciences (pp . 259-265).
24. Ergasheva , HM, Mahmudova , OY, & Ahmedova , GA (2020). GEOMETRIC SOLUTION OF ALGEBRAIC PROBLEMS. Scientific Bulletin of Namangan State University , 2 (4), 3-8.
25. Marasulova Z.A., Rasulova G.A. (2014). Information resources as a factor of integration of models and methodologies. Vestnik KRAUNTS. Physical and mathematical science , (1), 75-80.
26. Mamslievich , T.A. (2022). ABOUT ONE NONLOCAL PROBLEM FOR A THIRD ORDER EQUATION WITH MULTIPLE CHARACTERISTICS. INTERNATIONAL JOURNAL OF SOCIAL SCIENCES AND INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429 , 11 (06), 66-73.
27. Mamslievich , T.A. (2022). ON ONE PROBLEM FOR A THIRD ORDER EQUATION WITH A NONLOCAL CONDITION. INTERNATIONAL JOURNAL OF SOCIAL SCIENCES AND INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7,429 , 11 (06), 74-79.
28. Muydinzhanov , D.R. (2019). Holmgren 's problem for the Helmholtz equation with three singular coefficients. Electronic magazine analysis and applied mathematics , 2019 (1), 15-30.
29. Letter, B. M. (1994). Get the best results from your loved one
30. Ergashev , A. A., & Tolibzhonova , Sh. A. (2020). The main components of the professional education of a teacher of mathematics. Vestnik KRAUNTS. Physical and Mathematical Sciences , 32 (3), 180-196.

31. Zunnunov , R. T., & Ergashev , A. A. (2021). Bitsadze-Samarsky type problem for mixed type equation of the second kind in a domain whose elliptic part is a quarter of the plane. In Fundamental and Applied Problems of Mathematics and Informatics (pp . 117-20).
32. Zunnunov , R. T., & Ergashev , A. A. (2016). A problem with a shift for a mixed-type equation of the second kind in an unbounded domain. Vestnik KRAUNTS. Physical and Mathematical Sciences , (1 (12)), 26-31.
33. Zunnunov , R. T., & Ergashev , A. A. (2017). Boundary value problem with a shift for a mixed type equation in an unbounded domain. In Actual Problems of Applied Mathematics and Physics (pp . 92-93).
34. Zunnunov , R. T., & Ergashev , A. A. (2016). A problem with a shift for a mixed-type equation of the second kind in an unbounded domain. Vestnik KRAUNTS. Physical and Mathematical Sciences , (1 (12)), 26-31.
35. Zunnunov , R.T., & Ergashev , A.A. (2016). PROBLEM WITH A SHIFT FOR A MIXED-TYPE EQUATION OF THE SECOND KIND IN AN UNBOUNDED DOMAIN. Bulletin KRASEC. Physical and Mathematical Sciences , 12 (1), 21-26.
36. Ergashev , A. A., & Talibzhanova , Sh. A. (2015). Technique for solving the Bitsadze-Samarsky problem for an elliptic type equation in a half -strip . In Theory and Practice of Modern Humanities and Natural Sciences (pp . 160-162).
37. Alyaviya , O., Yakovenko, V., Ergasheva , D., Usmanova, Sh., & Zunnunov , H. (2014). Evaluation of the intensity and structure of dental caries in students with normal and reduced function of the salivary glands. Stomatologiya , 1 (3-4 (57-58)), 34-38.
38. Marasulova , Z. A., & Rasulova, G. A. (2014). Information resource as a factor of integration of models and methods. Vestnik KRAUNTS. Physical and Mathematical Sciences , (1(8)), 75-80.
39. Rasulova, G. A., Akhmedova Z. S., Normatov M. (2016). METHODS OF STUDYING MATHEMATICAL TERMS AND ENGLISH IN THE PROCESS OF LEARNING. Student of the XXI century , 65 years old.
40. Rasulova, G. A., Akhmedova Z. S., Normatov M. (2016). ISSUES OF EDUCATION STUDYING ENGLISH IN THE SPHERE OF PROCESSES. Teachings for the 21st Century , (6-2(19)), 62-65.
41. Rasulova , G. (2022). CASE AND TECHNOLOGY OF USING NON-STANDARD TESTS IN THE TRAINING MODULE ON GEOMETRY. Eurasian Journal of Mathematical Theory and Computer Science , 2 (5), 40-43.
42. Ergasheva Kh.M., Makhmudova O.Yu. and Akhmedova G.A. (2020). GEOMETRIC SOLUTION OF ALGEBRAIC PROBLEMS. Scientific Bulletin of Namangan State University , 2 (4), 3-8.
43. Muidinjonov Z. and Muidinjonov D. (2022). INFORMATION, COMMUNICATION AND TECHNOLOGY (ICT) IS FOR THE TEACHER AND THE STUDENT.
44. Muidinjonov Z. and Muidinjonov D. (2022). VIRTUAL LABORATORIES. Eurasian Journal of Academic Research , 2 (6), 1031-1034.
45. Muydinzhanov , D.R. (2019). Holmgren 's problem for the Helmholtz equation with three singular coefficients. Electronic magazine analysis and applied mathematics , 2019 (1), 15-30.
46. Rakhmatullaev , M.M., Rafikov , F.K., & Azamov , S. (2021). On a constructive description of the Gibbs measures for the Potts model on tree Cayley . Ukrainian Mathematical Journal , 73 (7), 1092-1106.
47. Rakhmatulaev , M. , Rafikov , F.K. , & Azamov , SK (2021). On constructive descriptions of Gibbs measures for the Pots model on a Kelly tree. Ukraines ' kyi Mathematical Journal , 73 (7), 938-950.
48. Petrosyan V.A., Rafikov F.M. (1980). Polarographic study aliphatic nitro compounds . Bulletin of the Academy of Sciences of the USSR, Department of Chemical Sciences , 29 (9), 1429-1431.

49. Formanov S.K., Juraev S. (2021). On transient phenomena in branching random processes with discrete time. Lobachevsky Journal of Mathematics , 42 (12), 2777-2784.
50. Хонбобоев, Хакимжон Октамович, Фозилжон Усибхонович Полатов, and Мухаммад-Анасхон Хакимжонович Икромов. "Tasviriy san'atni oqitishda interfaol metodlardan foydalanish." Молодой ученый 3-1 (2016): 22-23.
51. Хонбобоев, Хакимжон Икромович, and Дилшод Улугбекович Султанов. "РУКОВОДСТВО НАУЧНО-ИССЛЕДОВАТЕЛЬСКОЙ ДЕЯТЕЛЬНОСТЬЮ СТУДЕНТОВ ПРИ ОБУЧЕНИИ ПРЕДМЕТАМ ИНФОРМАТИКИ И ИНФОРМАЦИОННЫХ ТЕХНОЛОГИЙ." Актуальные научные исследования в современном мире 12-1 (2016): 63-65.
52. Хонбобоев, Хакимжон Октамович, Мубина Хакимжоновна Икромова, and Мухаммад-Анасхон Хакимжонович Икромов. "Ta'limda axborot texnologiyalarni qollashning oziga xos xususiyatlari." Молодой ученый 3-1 (2016): 21-22.
53. Usmonova, M., & Mo'Minova, M. (2022). O'QUVCHILARNING BIOLOGIYA FANIDAN KREATIV FIKRLASH QOBILIYATINI RIVOJLANTIRISHDA XALQARO PISA DASTURINING AHAMIYATI. Science and innovation, 1(B7), 1254-1257.
54. Turdaliev, A., Usmonova, M., & Matholiqov, R. (2022). ОЛИЙ ТАЪЛИМ ТИЗИМИДА ЎҚИТУВЧИНИНГ МЕТОДИК КОМПЕТЕНТЛИГИНИ МОҲИЯТИ. Science and innovation, 1(B6), 450-455.
55. Turdaliev, A., Usmonova, M., & Matholiqov, R. (2022). THE ESSENCE OF THE TEACHER'S METHODOLOGICAL COMPETENCE IN THE HIGHER EDUCATION SYSTEM. Science and Innovation, 1(6), 450-455.
56. Usmonova, M. (2022). SPECIFITY OF INTERACTIVE METHODS IN LANGUAGE LESSONS. Science and innovation, 1(B5), 165-168.
57. Юсупова, Д. Ш., & Исабаев, М. М. (2022). ОТНОШЕНИЕ УЧИТЕЛЕЙ К ИНКЛЮЗИВНОМУ ОБРАЗОВАНИЮ В КАЗАХСТАНЕ: КЕЙС ОБЩЕОБРАЗОВАТЕЛЬНЫХ ШКОЛ ГОРОДА АЛМАТЫ. Central Asian Economic Review, (5), 76-89.
58. Исабаева, М. М. (2014). ПРОБЛЕМЫ ПРОФОРИЕНТАЦИОННОЙ РАБОТЫ В СОВРЕМЕННОЙ ШКОЛЕ. In Научный потенциал молодежи в решении задач модернизации России (pp. 345-346).
59. Исабаева, М. М. (2012). Наркомания–общий враг человечества. Молодой ученый, (2), 265-267.
60. Сейтказиева, А. М., Исабаев, М. М., & Раушанов, Е. М. (2019). ПОВЫШЕНИЕ КОНКУРЕНТОСПОСОБНОСТИ ФИРМЫ В РАМКАХ ИНДУСТРИАЛЬНОЙ ПОЛИТИКИ: ЛИТЕРАТУРНЫЙ ОБЗОР. Economics: the strategy and practice, 14(4), 43-52.
61. O'ZBEKISTON RESPUBLIKASI, O. V. O. (2021). RTA MAXSUS TA'LIM VAZIRLIGI Yusupov Ibragim Mirsaydalievich UMUMIY MIKROBIOLOGIYA 5110400-Biologiya o'qitish metodikasi DARSLIK Toshkent-2020 138-139 бетлар. Мувофиқлаштирувчи кенгашнинг ўқув-услубий бирлашма ва комиссиялари томонидан ижобий хулоса берилган. Ўз Р. Олий ва ўрта махсус таълим вазирлигининг.
62. Yusupov, I. (2021, July). METHODS OF DETERMINING THE MINERALIZATION OF THE SOIL. In Конференции.
63. Yusupov, I. (2021, August). METHODS OF DETERMINING THE MINERALIZATION OF THE SOIL: https://doi. org/10.47100/conferences. v1i1. 1393. In RESEARCH SUPPORT CENTER CONFERENCES (No. 18.06).

64. Mirsaydalievich, Y. I. (2022). SCIENTIFIC AND METHODOLOGICAL BASES OF ECOLOGICAL EDUCATION OF SCHOOLCHILDREN. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429, 11(06), 102-106.
65. Mirsaydaliyevich, Y. I. (2022). HISTORY OF BIOINFORMATICS. INTERNATIONAL JOURNAL OF SOCIAL SCIENCE & INTERDISCIPLINARY RESEARCH ISSN: 2277-3630 Impact factor: 7.429, 11(07), 72-76.
66. **Т**ошматова, Ш. Р. (2016). Показатели достоверности и нарушения подразделений экологических ниш тлей. Молодой ученый, (20), 50-53.
67. Toshmatova, S. R., & Usmonov, S. O. (2021). Biological aspects of human adaptation to environmental conditions. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2185-2188.
68. Kalonova, M., Tashmatova, R. V., & Mukhamadiev, N. K. (2020). Preparation of melanin from silkworm wastes and studying its physical and chemical characteristics. CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES, 1(2), 8-12.
69. Muminova, R. N., & Tashmatova, R. S. (2021). Bioecological features and significance of higher aquatic plants of the syr darya basin. ASIAN JOURNAL OF MULTIDIMENSIONAL RESEARCH, 10(4), 939-943.
70. Toshmatova, S. R., & Ernazarov, I. (2021). THE IMPORTANCE OF THE PROBLEM OF BIOREMEDIATION AS AN IMPORTANT SCIENTIFIC AND PRACTICAL PROBLEM IN THE FIELD OF HUMAN ACTIVITY. Экономика и социум, (1-1), 274-276.
71. ТОШМАТОВА, Ш. Р., ЭРНАЗАРОВ, З. М., & ИБРАГИМОВА, Д. А. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК Учредители: Андижанский государственный университет им. ЗМ Бабура, (4), 48-55.
72. Toshmatova, S. R., Ernazarov, Z. M., & Ibragimova, D. A. RESULTS OF ANALYSIS OF AN APPLE OF RED BLOOD APHID (ERIOSOMA LANIGERIUM) IN THE RESEARCH AREA. ILMIY XABARNOMA, 54.
73. Тошматова, Ш. Р. (2016). Показатели достоверности и нарушения подразделений экологических ниш тлей. Молодой ученый, (20), 50-53.
74. Toshmatova, S. R., & Usmonov, S. O. (2021). Biological aspects of human adaptation to environmental conditions. ACADEMICIA: An International Multidisciplinary Research Journal, 11(3), 2185-2188.
75. Kalonova, M., Tashmatova, R. V., & Mukhamadiev, N. K. (2020). Preparation of melanin from silkworm wastes and studying its physical and chemical characteristics. CENTRAL ASIAN JOURNAL OF MEDICAL AND NATURAL SCIENCES, 1(2), 8-12.
76. Muminova, R. N., & Tashmatova, R. S. (2021). Bioecological features and significance of higher aquatic plants of the syr darya basin. ASIAN JOURNAL OF MULTIDIMENSIONAL RESEARCH, 10(4), 939-943.
77. Toshmatova, S. R., & Ernazarov, I. (2021). THE IMPORTANCE OF THE PROBLEM OF BIOREMEDIATION AS AN IMPORTANT SCIENTIFIC AND PRACTICAL PROBLEM IN THE FIELD OF HUMAN ACTIVITY. Экономика и социум, (1-1), 274-276.
78. ТОШМАТОВА, Ш. Р., ЭРНАЗАРОВ, З. М., & ИБРАГИМОВА, Д. А. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК. ILMIY XABARNOMA. НАУЧНЫЙ ВЕСТНИК Учредители: Андижанский государственный университет им. ЗМ Бабура, (4), 48-55.
79. Toshmatova, S. R., Ernazarov, Z. M., & Ibragimova, D. A. RESULTS OF ANALYSIS OF AN APPLE OF RED BLOOD APHID (ERIOSOMA LANIGERIUM) IN THE RESEARCH AREA. ILMIY XABARNOMA, 54.

80. Mahmudovna, A. M., & Isaboeva, M. M. (2022). Forms of organizing the cognitive activity of students in the process of solving problems and exercises in biology. Web of Scientist: International Scientific Research Journal, 3(7), 68-76.
81. Mahmudovna, A. M., & Isaboeva, M. M. (2022). Forms of organizing the cognitive activity of students in the process of solving problems and exercises in biology. Web of Scientist: International Scientific Research Journal, 3(7), 68-76.
82. Юсупова, М. Н., & Ахмедова, М. М. (2020). МЕВАЛИ ДАРАХТЛАРНИ ЗАРАРКУНАНДАЛАРИГА УЙҒУНЛАШГАН КУРАШ ЧОРАЛАРИ. ЖУРНАЛ АГРО ПРОЦЕССИНГ, 2(8).
83. ТУРДИЕВА, О. М., ТОЖИБОЕВА, С. Х., & ТУРСУНОВА, Ш. А. (2015). О ПРЕДОТВРАЩЕНИИ УСТАЛОСТИ У ШКОЛЬНИКОВ. In БУДУЩЕЕ НАУКИ-2015 (pp. 422-426).
84. Tursunova, S. A., & Mamasoliev, S. T. ALGOFLORA OF TYPICAL GRAY SOILS FOR CONTINUOUS TILLAGE. Chief Editor.
85. Рузиматов, Р. Я., Махкамов, Г. М., Отажонова, С. Р., & Турсунова, Ш. А. (2017). Промышленное развитие в Коканде, причины экологических проблем (1956-1975гг.). Высшая школа, (6), 77-78.