IONLOVCHI NURLARNING DOZIMETRIYASI VA XOSSALARI.

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ANNOSTATSIYA.

Maqolada ionlashtiruvchi nurlanishning dozimetriyasi ionlashtiruvchi nurlanishning xossalarini, nurlanish maydonini yoki nurlanishning moddalar bilan o‘zaro ta’sirini tavsiflovchi fizik miqdorlarni, shuningdek, ularni aniqlash tamoyillari va usullarini ko‘rib chiqadi.

Dozimetriya kutilayotgan radiatsiya ta'siri bilan bog'liq bo'lgan jismoniy miqdorlar bilan shug'ullanadi. Bu miqdorlar odatda dozimetrik deb ataladi. O'lchangan jismoniy miqdor va kutilayotgan nurlanish effekti o'rtasidagi o'rnatilgan bog'liqlik dozimetrik miqdorlarning eng muhim xususiyatidir. Bu aloqasiz dozimetrik o'lchovlar o'z ma'nosini yo'qotadi.
Kalit so'zlar: Ionlashtiruvchi nurlanish, nurlanish effekti, dozimetriya, radioaktiv manbadagi nuklid faolligi, EHM dozasi darajasi

ANNOSTATION.

In the article, dosimetry of ionizing radiation considers the properties of ionizing radiation, physical quantities describing the field of radiation or the interaction of radiation with substances, as well as the principles and methods of their determination.

Dosimetry deals with the physical quantities associated with expected radiation exposure. These quantities are usually called dosimetric. The established relationship between the measured physical quantity and the expected radiation effect is the most important feature of dosimetric quantities. Without this connection, dosimetric measurements lose their meaning.

Key words: Ionizing radiation, radiation effect, dosimetry, nuclide activity in a radioactive source, exposure dose rate

Radiatsiya ta'sirining asosiy sababi nurlangan ob'ekt tomonidan ionlashtiruvchi nurlanish energiyasining yutilishi bo'lib, so'rilgan energiya o'lchovi sifatida doza asosiy dozimetrik miqdor bo'lib chiqadi.

Dozimetriyaning eng muhim vazifasi turli muhitlarda va ayniqsa tirik organizm to'qimalarida nurlanish dozasini aniqlashdir. Buning uchun turli xil hisoblash va eksperimental usullar qo'llaniladi.

Tirik organizmga ta'sir qiluvchi nurlanish dozasini miqdoriy aniqlash, birinchi navbatda, odamlar uchun mumkin bo'lgan radiatsiyaviy xavfni aniqlash,

baholash va oldini olish uchun zarurdir. Agar gigienistlar va radiobiologlar biologik xavf nuqtai nazaridan nurlanishning maksimal ruxsat etilgan darajalari qanday degan savolga javob berishlari kerak bo'lsa, dozimetrlar bu darajalarni to'g'ri o'lchashni (aniqlashni) ta'minlashi kerak. Dozimetriyaning rivojlanishi dastlab odamlarni ionlashtiruvchi nurlanishning zararli ta'siridan himoya qilish zarurati bilan to'liq aniqlangan. Rentgen nurlanishi kashf etilgandan so'ng (1895) ko'p o'tmay, uning odamlarga zararli ta'siri aniqlandi va radiatsiyaviy xavflilik darajasini miqdoriy baholash zarurati paydo bo'ldi. Rentgen nurlarining intensivligini o'lchash uchun fotografik effekt, flüoresans, termal effekt, shuningdek kimyoviy usullar. Keyinchalik rentgen nurlanishini tavsiflovchi fizik miqdorlarni o'lchash va uning sfera bilan o'zaro ta'siri mustaqil sohaga aylandi - rentgen nurlarini o'lchash, hozirda ionlashtiruvchi nurlanish dozimetriyasining ajralmas qismi hisoblanadi. Radiometriyada o'lchanadigan asosiy miqdorlar aniqlanib, zamonaviy dozimetriyaning deyarli barcha usullari shakllantirildi.

Dozimetrik asboblar yordamida katta amaliy ahamiyatga ega bo'lgan ikkita asosiy turdagi o'lchovlarni amalga oshirish mumkin. Birinchi turga ta'sir qilishning butun davri davomida olingan va rentgenlarda ifodalangan nurlanishning umumiy dozasini (yoki miqdorini) o'lchash kiradi. Shaxsiy dozimetrlarga misol sifatida ion kameralari, fotografik yassi plyonkali dozimetrlar va kumush fosfat porlash printsipi bo'yicha ishlaydigan teleskopik qurilmalar kiradi. Ikkinchi turga soatiga rentgen (yoki uning fraktsiyalari) bilan ifodalangan nurlanish intensivligini o'lchash kiradi. Radiatsiya intensivligini aniqlash uchun ishlatiladigan dozimetrlarga ion kameralari, Geiger-Myuller hisoblagichlari yoki tegishli elektron va elektr o'lchash asboblari bilan birlashtirilgan sintillyatsion hisoblagichlar kiradi.

ADABIYOTLAR TAHLILI VA METODOLOGIYA

Dozimetriyaning rivojlanishi dastlab odamlarni ionlashtiruvchi nurlanishdan himoya qilish zarurati bilan belgilandi. Rentgen nurlari kashf etilganidan ko'p o'tmay, insonning nurlanishidan kelib chiqadigan biologik ta'sirlar sezildi. Radiatsiyaviy xavflilik darajasini miqdoriy baholash zarurati tug'ildi. Asosiy miqdoriy mezon sifatida rentgen yordamida o'lchangan va havo ionlanishining kattaligi bilan aniqlangan ta'sir qilish dozasi qabul qilindi.

Radiyning kashf etilishi bilan radioaktiv moddalarning nurlanishi ham rentgen nurlari ta'siriga o'xshash biologik ta'sirlarni keltirib chiqarishi aniqlandi. Radioaktiv preparatlarni qazib olish, qayta ishlash va ulardan foydalanish jarayonida radioaktiv moddalarning tanaga kirishi xavfi

mavjud. Radioaktiv manbalarning faolligini (sekundiga yemirilishlar soni) o‘lchash usullari ishlab chiqilgan bo‘lib, bu radiometriyaning asosi hisoblanadi. Radioaktiv moddaning faolligi radioaktiv modda miqdorining xarakteristikasi (vaqt birligidagi parchalanish soni). Faoliyatning tizimli birligi **Bekkerel (Bq)** - radioaktiv manbaning 1 sekundda 1 yemirilish sodir bo'lgan faolligi (1 Bq = 1 yemirilish/s). Tizimsiz birlik - **Kyuri (Ci)** - radioaktiv manbaning faolligi bo'lib, unda1 soniyada $3{,}7 \times 10^{10}$ parchalanish sodir bo'ladi.

1-jadval

Asosiy nurlanish miqdorlari va ularning birliklari

Jismoniy miqdor	*Birlik, uning nomi, nomi (xalqaro, ruscha)*		*Nisbat birliklar orasida*
	tizimdan tashqari	*SI*	
Radioaktiv manbadagi nuklid faolligi	Kyuri (Ci, Ki)	bekkerel (Bq, Bq)	1 Bq = 2,7×10 -11 Ci 1 Ci = 3,7×10 10 Bq
Radiatsiyaning ta'sir qilish dozasi	Rentgen nurlari (R, R)	Bir kg uchun kulon (C/kg, C/kg)	1 K/kg = 3876 R 1 P=2,58×10 4 S/kg
EHM dozasi darajasi	soniyada rentgen (R/s, R/s)	Amper/kg (A/Kg, A/kg)	1 A/kg = 3876 R/s 1 R / s \u003d 2,58×10 -4 A / kg
So'rilgan nurlanish dozasi	Xursand (rad, xursand)	Kulrang (Gy, Gr)	1 Gy = 100 rad 1 rad = 0,01 Gy
So'rilgan doza tezligi	sekundiga rad (rad/s, rad/s)	Kulrang/sekundiga (Gy/s, Gy/s)	1 Gy/s = 100 rad/s 1 rad/s = 0,01 Gy/s
Integral nurlanish dozasi	rad·gram (rad·g, rad·g)	Joul (J, J) *	1 J = 10 5 rad·g 1 rad·g = 10 -5 J
Ekvivalent nurlanish	Rem (rem,	Sievert (Sv, Sv)	1 Sv = 100 rem

dozasi	rem)		1 rem = 0,01 Sv
Dozaning ekvivalent darajasi	Rem/soniya (rem/s, rem/s)	sekundiga sievert (Sv/s, Sv/s)	1 Sv/s = 100 rem/s 1 rem/s = 0,01 Sv/s

∗ 1 Gy, ta'rifiga ko'ra, har bir kilogramm uchun 1 Joul bo'lganligi sababli, integral dozaning SI birligi Grey·kilogramm Joulga aylantiriladi.
(1 Gy·kg = 1 (J/kg)·kg = 1 J).

MUHOKAMA VA NATIJALAR

Radiatsiya terapiyasida radiatsiya xavfsizligining zaruriy sharti - bu xodimlar va radiatsiya ta'siriga uchragan bemorlar tomonidan so'rilgan nurlanish energiyasining aniq miqdoriy hisobidir.

AI miqdorini aniqlash uchun "doza" tushunchasi qo'llaniladi. AI dozasi - bu nurlanish energiyasining nurlangan moddaning massasi yoki hajmiga nisbati. Klinik dozimetriyada quyidagi tushunchalar qo'llaniladi:

Radiatsiyaning ta'sir qilish dozasi - tarqaladigan jismlar bo'lmaganda quruq (erkin) havoda o'lchanadigan nurlanish dozasi. U asosan nurlanish manbasini (uning kuchi, parametrlarining doimiyligi va boshqalar) tavsiflaydi. Ta'sir qilish dozasi faqat energiya 3 MeV dan oshmaydigan ionlashtiruvchi nurlanish uchun qo'llaniladi.

Ta'sir qilish dozasining tizimdan tashqari birligi Rentgen - bu rentgen yoki γ nurlanish dozasi bo'lib, u normal sharoitda (0 ^{0} S va bosim 1 atmosfera) 1 sm ^{3} havoda 1 e ga teng zaryad hosil qiladi. Bilan. e) statik elektr (har bir belgining 2,08 x 10 ^{9} juft ionlari).

SIda ta'sir qilish dozasini o'lchash birligi kg uchun kulon - bu normal sharoitda 1 kg havoda 1 kulonga teng zaryad hosil bo'lgan rentgen yoki γ nurlanish dozasidir.

Xuddi shu dozani turli vaqt oralig'ida berish mumkin. Shuning uchun doza tezligi tushunchasi kiritiladi - vaqt birligi uchun hisoblangan doza. Ionlashtiruvchi nurlanishning biologik ta'siri ham dozaga, ham uning kuchiga bog'liq.

So'rilgan nurlanish dozasi ionlashtiruvchi nurlanishning nurlangan to'qimalarga ta'sirining asosiy miqdoriy ko'rsatkichidir. U nurlanish jarayonida nurlangan moddaning massa birligiga to'g'ri keladigan energiya miqdori bilan aniqlanadi. So'rilgan doz har qanday turdagi ionlashtiruvchi nurlanish uchun

qo'llaniladi. So‘rilgan dozaning SI birligi J/kg. Bu qiymat deyiladi " Grey " (Gr) . 1 Gy - ionlashtiruvchi nurlanish dozasi, bunda 1 kg nurlangan moddada 1 J ga teng energiya yutiladi.. Yutilgan dozaning tizimdan tashqari birligi rad. 1 rad - nurlanish dozasi, bunda 1 g nurlangan moddada 100 ergga teng energiya so'riladi.

Biologik ob'ektlarni nurlantirishda bir xil yutilgan dozada turli xil ionlashtiruvchi nurlanishlar turli xil biologik ta'sirga ega bo'lganligi sababli, "ekvivalent nurlanish dozasi" tushunchasi mavjud. Muayyan turdagi nurlanish natijasida yuzaga keladigan biologik ta'sirlar 200 keV energiyali foton nurlanishi natijasida hosil bo'lgan effekt bilan taqqoslanadi.

Insonning surunkali ta'sirida (past dozalarda) nurlanishning ma'lum bir turi uchun radiatsiya xavfi foton nurlanishiga qaraganda necha marta yuqori ekanligini ko'rsatadigan koeffitsient (teng so'rilgan dozada 200 keV) sifat omili deb ataladi. (QC). Foton nurlanishi uchun KK 200 keV = 1. a-zarralar uchun KK = 20, protonlar va tez neytronlar uchun KK = 10, termal neytronlar uchun KK = 2,5-3. QC qiymati ma'lum turdagi nurlanishning LET ga bog'liq. LET qanchalik baland bo'lsa, hujayraning shikastlanishi shunchalik katta bo'ladi va tiklanish qobiliyati shunchalik past bo'ladi. Shunday qilib, bir xil so'rilgan dozada protonlar bilan nurlanishning zararli (yoki terapevtik) ta'siri foton nurlanishiga qaraganda 10 baravar ko'p bo'ladi.

Ushbu nurlanishning QC ni hisobga olgan holda tirik ob'ekt tomonidan qabul qilingan doza **ekvivalent doza** deb ataladi . Ekvivalent doza so'rilgan dozani va AIning biologik ta'sirini hisobga oladi. "Ekvivalent doza" tushunchasi faqat radiatsiya xavfini baholash uchun ishlatiladi.

Hozirgi vaqtda barcha holatlarda SI birliklarida ifodalangan jismoniy miqdorlardan foydalanish tavsiya etiladi.

Ionlashtiruvchi nurlanishning dozimetriya usullari

AIda hid, ta'm yoki odamga ularni ro'yxatdan o'tkazish imkonini beradigan boshqa xususiyatlar yo'q. AIning miqdoriy va sifat xususiyatlarini o'lchash uchun nurlanishning materiya bilan o'zaro ta'sirining ta'sirini ro'yxatga olish asosida turli usullar qo'llaniladi.

Dozimetrlar AI dozasini yoki doza tezligini o'lchash uchun mo'ljallangan asboblardir. Ushbu qurilmalar AIning materiya bilan o'zaro ta'siridan kelib chiqadigan ionlanish, sintilatsiya, fotografik, kimyoviy va boshqa effektlarni ro'yxatga olish va miqdoriy baholashga asoslangan.

Dozimetrlarning asosiy guruhlari:

Klinik - ishchi nurda AIni o'lchash uchun. Radiatsion terapiyaga tayyorgarlik ko'rishda va nurlanish jarayonida qo'llaniladi.

Himoya nazorati uchun dozimetrlar - ish joylarida tarqalgan nurlanishning doza tezligini o'lchash uchun (radiatsiyaviy xavfsizlik tizimida). Ushbu dozimetrlar to'g'ridan-to'g'ri o'qilishi kerak.

Individual - AI sohasida ishlaydigan shaxslarning ta'sirini nazorat qilish.

Dozimetriya usullari:

Biologik - to'qimalarda II ning ma'lum dozasi (eritemal doza, epilasyon dozasi, o'ldiradigan doz) bilan nurlanganda yuzaga keladigan reaktsiyalarni baholashga asoslangan. Ular indikativ bo'lib, asosan eksperimental radiobiologiyada qo'llaniladi.

Kimyoviy - nurlanish ta'sirida ma'lum moddalarda sodir bo'ladigan qaytarilmas kimyoviy reaktsiyalarni qayd etishdan iborat (radiokimyoviy usul, fotografik usul).

Radiokimyoviy usul - II (Fe^{2+} Fe^{3+}) ta'sirida qora temirning uch valentli oksidlanishiga asoslangan, bu rangning o'zgarishiga (shaffoflik) olib keladi. Ferrosulfat dozimetrlari qo'llaniladi. Ushbu dozimetrlarning diapazoni juda katta (20 dan 400 Gy gacha) bo'lgani uchun ular faqat favqulodda vaziyatlarda qo'llaniladi.

Fotosurat usuli - IQ ta'sirida rentgen plyonkasining qorayishi sodir bo'ladi, uning darajasi nurlarning yutilgan energiyasiga proportsionaldir. Qora rangning zichligi nurlanish dozasini aniqlash uchun ishlatilishi mumkin. Ushbu usulning kamchiliklari dozimetr ko'rsatkichlarining nurlanishning sifatli tarkibiga bog'liqligidir. Dozani aniqlashning aniqligi past. Plyonkali dozimetrlar yordamida radiatsiya terapiyasi asboblarida yorug'lik va nurlanish maydonlari o'rtasidagi muvofiqlikni aniqlash qulay.

Foydalanilgan adabiyotlar:

1. Bobokulova, M. (2024). IN MEDICINE FROM ECHOPHRAPHY USE. Development and innovations in science, 3(1), 94-103.
2. Bobokulova, M. (2024). INTERPRETATION OF QUANTUM THEORY AND ITS ROLE IN NATURE. Models and methods in modern science, 3(1), 94-109.
3. Bobokulova, M. (2024, January). RADIO WAVE SURGERY. In Международная конференция академических наук (Vol. 3, No. 1, pp. 56-66).
4. Bobokulova, M. (2024). UNCERTAINTY IN THE HEISENBERG UNCERTAINTY PRINCIPLE. Академические исследования в современной науке, 3(2), 80-96.
5. Bobokulova, M. (2024). BLOOD ROTATION OF THE SYSTEM PHYSICIST BASICS. Инновационные исследования в науке, 3(1), 64-74.

6. Bobokulova, M. (2024). THE ROLE OF NANOTECHNOLOGY IN MODERN PHYSICS. Development and innovations in science, 3(1), 145-153.
7. Boboqulova, M. X. (2023). STOMATOLOGIK MATERIALLARNING FIZIK-MEXANIK XOSSALARI. Educational Research in Universal Sciences, 2(9), 223-228.
8. Xamroyevna, B. M. (2023). ORGANIZM TO 'QIMALARINING ZICHLIGINI ANIQLASH. GOLDEN BRAIN, 1(34), 50-58.
9. Bobokulova, M. K. (2023). IMPORTANCE OF FIBER OPTIC DEVICES IN MEDICINE. Multidisciplinary Journal of Science and Technology, 3(5), 212-216.
10. Khamroyevna, M. B. (2023). PHYSICO-CHEMICAL PROPERTIES OF BIOLOGICAL MEMBRANES, BIOPHYSICAL MECHANISMS OF MOVEMENT OF SUBSTANCES IN THE MEMBRANE. Multidisciplinary Journal of Science and Technology, 3(5), 217-221.
11. Bobokulova, M. K. (2024). TOLALI OPTIKA ASBOBLARINING TIBBIYOTDAGI AHAMIYATI. GOLDEN BRAIN, 2(1), 517–524.
12. Latipova, S. (2024). YUQORI SINF GEOMETRIYA MAVZUSINI O'QITISHDA YANGI PEDAGOGIK TEXNOLOGIYALAR VA METODLAR. SINKVEYN METODI, VENN DIAGRAMMASI METODLARI HAQIDA. Theoretical aspects in the formation of pedagogical sciences, 3(3), 165-173.
13. Latipova, S. (2024, February). SAVOL-JAVOB METODI, BURCHAKLAR METODI, DEBAT (BAHS) METODLARI YORDAMIDA GEOMETRIYANI O'RGANISH. In Международная конференция академических наук (Vol. 3, No. 2, pp. 25-33).
14. Latipova, S., & Sharipova, M. (2024). KESIK PIRAMIDA MAVZUSIDA FOYDALANILADIGAN YANGI PEDAGOGIK TEXNOLOGIYALAR. 6X6X6 METODI, BBB (BILARDIM, BILMOQCHIMAN, BILIB OLDIM) METODLARI HAQIDA. Current approaches and new research in modern sciences, 3(2), 40-48.
15. Latipova, S. (2024). 10-11 SINFLARDA STEREOMETRIYA OQITISHNING ILMIY VA NAZARIY ASOSLARI. Академические исследования в современной науке, 3(6), 27-35.
16. Latipova, S. (2024). HILFER HOSILASI VA UNI HISOBLASH USULLARI. Центральноазиатский журнал образования и инноваций, 3(2), 122-130.
17. Latipova, S. (2024). HILFER MA'NOSIDA KASR TARTIBLI TENGLAMALAR UCHUN KOSHI MASALASI. Development and innovations in science, 3(2), 58-70.
18. Latipova, S. (2024). KESIK PIRAMIDA TUSHUNCHASI. KESIK PIRAMIDANING YON SIRTINI TOPISH FORMULALARI. Models and methods in modern science, 3(2), 58-71.

19. Shahnoza, L. (2023, March). KASR TARTIBLI TENGLAMALARDA MANBA VA BOSHLANG'ICH FUNKSIYANI ANIQLASH BO'YICHA TESKARI MASALALAR. In " Conference on Universal Science Research 2023" (Vol. 1, No. 3, pp. 8-10).
20. qizi Latipova, S. S. (2024). CAPUTO MA'NOSIDAGI KASR TARTIBLI TENGLAMALARDA MANBA FUNKSIYANI ANIQLASH BO 'YICHA TO 'G 'RI MASALALAR. GOLDEN BRAIN, 2(1), 375-382.
21. Latipova, S. S. (2023). SOLVING THE INVERSE PROBLEM OF FINDING THE SOURCE FUNCTION IN FRACTIONAL ORDER EQUATIONS. Modern Scientific Research International Scientific Journal, 1(10), 13-23.
22. Latipova, S. (2024). GEOMETRIYADA EKSTREMAL MASALALAR. B DEVELOPMENT OF PEDAGOGICAL TECHNOLOGIES IN MODERN SCIENCES (T. 3, Выпуск 3, сс. 163–172).
23. Latipova, S. (2024). EKSTREMUMNING ZARURIY SHARTI. B SOLUTION OF SOCIAL PROBLEMS IN MANAGEMENT AND ECONOMY (T. 3, Выпуск 2, сс. 79–90).
24. Latipova, S. (2024). FUNKSIYANING KESMADAGI ENG KATTA VA ENG KICHIK QIYMATI. B CURRENT APPROACHES AND NEW RESEARCH IN MODERN SCIENCES (T. 3, Выпуск 2, сс. 120–129).
25. Latipova, S. (2024). EKSTREMUMLARNING YUQORI TARTIBLI HOSILA YORDAMIDA TEKSHIRILISHI. IKKINCHI TARTIBLI HOSILA YORDAMIDA EKSTREMUMGA TEKSHIRISH. B SCIENCE AND INNOVATION IN THE EDUCATION SYSTEM (T. 3, Выпуск 3, сс. 122–133).
26. Latipova, S. (2024). BIR NECHA O'ZGARUVCHILI FUNKSIYANING EKSTREMUMLARI. B THEORETICAL ASPECTS IN THE FORMATION OF PEDAGOGICAL SCIENCES (T. 3, Выпуск 4, сс. 14–24).
27. Latipova, S. (2024). SHARTLI EKSTREMUM. B МЕЖДУРОДНАЯ КОНФЕРЕНЦИЯ АКАДЕМИЧЕСКИХ НАУК (T. 3, Выпуск 2, сс. 61–70).
28. Latipova, S. (2024). KASR TARTIBLI HOSILALARGA BO'LGAN ILK QARASHLAR. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 46–51).
29. Latipova, S. (2024). TURLI EKSTREMAL MASALALAR. BAZI QADIMIY EKSTREMAL MASALALAR. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 52–57).
30. Latipova, S. (2024). FUNKSIYA GRAFIGINI YASASHDA EKSTREMUMNING QO'LLANILISHI. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 58–65).

31. Latipova, S. (2024). BIRINCHI TARTIBLI HOSILA YORDAMIDA FUNKSIYANING EKSTREMUMGA TEKSHIRISH, FUNKSIYANING EKSTREMUMLARI. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 66–72).
32. Boboqulova, M. (2024). FIZIKA O`QITISHNING INTERFAOL METODLARI. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 73–82).
33. Murodov, O. (2024). INNOVATIVE INFORMATION TECHNOLOGIES AND NEW METHODS AND TOOLS FOR THEIR APPLICATION IN TODAY'S EDUCATION. B CENTRAL ASIAN JOURNAL OF EDUCATION AND INNOVATION (T. 3, Выпуск 2, сс. 83–92).
34. Sharipova, M., & Latipova, S. (2024). TAKRORIY GRUPPALASHLAR. Development of pedagogical technologies in modern sciences, 3(3), 134-142.
35. Sharipova, M. (2024). TAQQOSLAMA TUSHUNCHASI VA UNING XOSSALARI. Current approaches and new research in modern sciences, 3(2), 68-78.
36. Sharipova, M. (2024). IKKI O'ZGARUVCHILI TENGSIZLIKLAR SISTEMASINI TAQQOSLAMALAR USULI BILAN YECHISH. Development and innovations in science, 3(2), 97-105.
37. Sharipova, M. (2024). BIRINCHI DARAJALI TAQQOSLAMALARNI YECHISH USULLARI. Solution of social problems in management and economy, 3(2), 60-69.
38. Latipova, S., & Sharipova, M. (2024). KESIK PIRAMIDA MAVZUSIDA FOYDALANILADIGAN YANGI PEDAGOGIK TEXNOLOGIYALAR. 6X6X6 METODI, BBB (BILARDIM, BILMOQCHIMAN, BILIB OLDIM) METODLARI HAQIDA. Current approaches and new research in modern sciences, 3(2), 40-48.
39. Sharipova, M. (2024). IN THE FORM OF AN UNBOUNDED PARALLELEPIPED IN THE FIELD NONLOCAL BORDERLINE CONDITIONAL LINEAR THE REVERSE IS THE CASE. Science and innovation in the education system, 3(1), 105-116.
40. Sharipova, M. (2024). FUNCTIONAL SPACES. IN SHORT REFLECTION PRINCIPLE. Current approaches and new research in modern sciences, 3(1), 131-142.
41. Sharipova, M. (2024). A IS CORRECT OF THE INTEGRAL TO THE ECONOMY APPLICATIONS. Solution of social problems in management and economy, 3(1), 116-125.

42. Sharipova, M. (2024). ASYMMETRY AND KURTOSIS COEFFICIENTS. Theoretical aspects in the formation of pedagogical sciences, 3(1), 216-225.
43. Sharipova, M. (2024). TWO MULTIPLE OF THE INTEGRAL APPLICATIONS. Инновационные исследования в науке, 3(1), 135-140.
44. Sharipova, M. P. L. (2023). CAPUTA MA'NOSIDA KASR TARTIBLI HOSILALAR VA UNI HISOBLASH USULLARI. Educational Research in Universal Sciences, 2(9), 360-365.
45. Sharipova, M. P. (2023). MAXSUS SOHALARDA KARLEMAN MATRITSASI. Educational Research in Universal Sciences, 2(10), 137-141.
46. Madina Polatovna Sharipova. (2023). APPROXIMATION OF FUNCTIONS WITH COEFFICIENTS. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 135–138.
47. Madina Polatovna Sharipova. (2023). Applications of the double integral to mechanical problems. International journal of sciearchers,2(2), 101-103.
48. Sharipova, M. P. L. (2023). FINDING THE MAXIMUM AND MINIMUM VALUE OF A FUNCTION ON A SEGMENT. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 245-248.
49. Sharipova, M. P. (2023). FUNKSIYALARNI KOEFFITSIENTLAR ORQALI FUNKSIYALARNI YAKINLASHTIRISH HAQIDA MA'LUMOTLAR. GOLDEN BRAIN, 1(34), 102–110.
50. Sharipova, M. (2023, December). RELATIONSHIPS BETWEEN STRAIGHT LINES AND PLANES IN SPACE. In Международная конференция академических наук (Vol. 2, No. 12, pp. 60-66).
51. Sharipova, M. (2023). FRACTIONAL DERIVATIVES. Академические исследования в современной науке, 2(27), 106-113.
52. Sharipova, M. (2023). CORRECT PLACED AND CORRECT NOT PLACED ISSUES. Models and methods in modern science, 2(13), 115-121.
53. Sharipova, M. (2023). HEAT SPREAD EQUATION. Инновационные исследования в науке, 2(12), 50-56.
54. Madina Polatovna Sharipova. (2023). HIGH MATH SCORE AND INTERVAL ASSESSMENT. American Journal of Public Diplomacy and International Studies (2993-2157), 1(10), 420–424.
55. Madina Polatovna Sharipova. (2023). IN HIGHER MATHEMATICS, THE EXTREMUM OF A MULTIVARIABLE FUNCTION. American Journal of Public Diplomacy and International Studies (2993-2157), 1(10), 425–429.
56. Sharipova, M. P. (2024). ISSIQLIK TARQALISH TENGLAMASI UCHUN KOSHI MASALASI. GOLDEN BRAIN, 2(1), 525–532.

57. Murodov, O. (2024). DEVELOPMENT OF AN AUTOMATED PARAMETER CONTROL SYSTEM ROOMS AND WORKSHOPS BASED ON CLOUD TECHNOLOGIES. Академические исследования в современной науке, 3(2), 16-27.Murodov, O. T. R. (2023). Zamonaviy ta'limda axborot texnologiyalari va ularni qo 'llash usul va vositalari. Educational Research in Universal Sciences, 2(11), 481-486.
58. Муродов, О. Т. (2023). РАЗРАБОТКА АВТОМАТИЗИРОВАННОЙ СИСТЕМЫ УПРАВЛЕНИЯ ТЕМПЕРАТУРЫ И ВЛАЖНОСТИ В ПРОИЗВОДСТВЕННЫХ КОМНАТ. GOLDEN BRAIN, 1(26), 91-95.
59. Murodov, O. T. R. (2023). INFORMATIKA DARSLARINI TASHKIL ETISHDA INNOVATSION USULLARDAN FOYDALANISH. GOLDEN BRAIN, 1(32), 194-201.
60. Murodov, O. T. R. (2023). INFORMATIKA FANINI O 'QITISHDA YANGI INNOVATSION USULLARDAN FOYDALANISH METODIKASI. GOLDEN BRAIN, 1(34), 130-139.
61. Turakulovich, M. O. (2023). DEVELOPMENT AND INSTALLATION OF AN AUTOMATIC TEMPERATURE CONTROL SYSTEM IN ROOMS. International Multidisciplinary Journal for Research & Development, 10(12).
62. MURODOV, O. T. (2023). INNOVATIVE INFORMATION TECHNOLOGIES AND NEW METHODS AND TOOLS FOR THEIR APPLICATION IN TODAY'S EDUCATION. International Multidisciplinary Journal for Research & Development, 10(12).
63. Muradov, O. (2024, January). APPLICATION OF BASIC PRINCIPLES AND RULES OF INNOVATIVE PEDAGOGICAL TECHNOLOGIES TO EDUCATIONAL PROCESSES. In Международная конференция академических наук (Vol. 3, No. 1, pp. 46-55).
64. Muradov, O. (2024). BASIC PRINCIPLES AND RULES OF INNOVATIVE PEDAGOGICAL TECHNOLOGIES IN THE EDUCATIONAL PROCESS. Models and methods in modern science, 3(1), 84-93.
65. Muradov, O. (2024). APPLIED TO THE CURRENT TRAINING PROCESS REQUIREMENTS. Инновационные исследования в науке, 3(1), 54-63.
66. Murodov, O. (2024). DEVELOPMENT OF AN AUTOMATED PARAMETER CONTROL SYSTEM ROOMS AND WORKSHOPS BASED ON CLOUD TECHNOLOGIES. Академические исследования в современной науке, 3(2), 16-27.
67. Behruz Ulug'bek o'g, Q. li.(2023). Mobil ilovalar yaratish va ularni bajarish jarayoni. International journal of scientific researchers, 2(2).

68. Karimov, F. (2022). ANIQ INTEGRALNI TAQRIBIY HISOBLASH. ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu. uz), 14(14).
69. Tursunov, B. J., & Allanazarov, G. O. (2019). Perspektivnye tehnologii proizvodstva po uluchsheniyu kachestva benzina. Theory and practice of contemporary science, 3(45), 305-308.
70. Турсунов, Б. Ж., & Алланазаров, Г. О. (2019). Перспективные технологии производства по улучшению качества бензина. Теория и практика современной науки, (3 (45)), 305-308.
71. Tursunov, B. Z. (2023). Analysis of Concepts About the Effect of an Explosion in Solid Wednesday. American Journal of Public Diplomacy and International Studies (2993-2157), 1(10), 296-304.
72. Tursunov, B. Z. (2023). Methods of Control of Explosion Energy Distribution in Rocks. Intersections of Faith and Culture: American Journal of Religious and Cultural Studies (2993-2599), 1(10), 108-117.
73. Tursunov, B. Z. (2023). WASTE-FREE TECHNOLOGY FOR ENRICHMENT OF PURIFIC COPPER-ZINC ORE. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 288-293.
74. Tursunov, B. Z. (2023). ANALYSIS OF MODERN METHODS FOR OIL SLUDGE PROCESSING. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 280-287.
75. Jumaev, K., & Tursunov, B. (2022, December). Environmentally friendly technology for obtaining fuel briquettes from oil waste. In IOP Conference Series: Earth and Environmental Science (Vol. 1112, No. 1, p. 012005). IOP Publishing.
76. Quvvatov, B. (2024). GLOBAL IN VIRTUAL LEARNING MOBILE APP CREATION INFORMATION SYSTEMS AND TECHNOLOGIES. Science and innovation in the education system, 3(1), 95-104.
77. Quvvatov, B. (2024). SQL DATABASES AND BIG DATA ANALYTICS: NAVIGATING THE DATA MANAGEMENT LANDSCAPE. Development of pedagogical technologies in modern sciences, 3(1), 117-124.
78. Quvvatov, B. (2024). CONSTRUCTION OF SPECIAL MODELS THROUGH DIFFERENTIAL EQUATIONS AND PRACTICAL SOLUTIONS. Solution of social problems in management and economy, 3(1), 108-115.
79. Quvvatov, B. (2024). FINDING SOLUTIONS OF SPECIAL MODELS BY INTEGRATING INTEGRAL EQUATIONS AND MODELS. Current approaches and new research in modern sciences, 3(1), 122-130.

80. Quvvatov, B. (2024). WEB FRONT-END AND BACK-END TECHNOLOGIES IN PROGRAMMING. Theoretical aspects in the formation of pedagogical sciences, 3(1), 208-215.
81. Behruz Ulug'bek o'g, Q. (2023). USE OF ARTIFICIAL NERVOUS SYSTEMS IN MODELING. Multidisciplinary Journal of Science and Technology, 3(5), 269-273.
82. Behruz Ulugbek og, Q. (2023). TECHNOLOGY AND MEDICINE: A DYNAMIC PARTNERSHIP. International Multidisciplinary Journal for Research & Development, 10(11).
83. Quvvatov, B. (2024). DIFFERENTSIAL TENGLAMALAR VA AMALIY ECHIMLAR ORQALI MAXSUS MODELLARNI QURISH. Menejment va iqtisodiyotda ijtimoiy muammolarni hal qilish , 3 (1), 108-115.
84. Behruz Ulug'bek o'g', Q. (2023). SUN'IY NERV TIZIMLARIDAN MODELLASHDA FOYDALANISH. Fan va texnologiyaning ko'p tarmoqli jurnali , 3 (5), 269-273.
85. Behruz Ulug'bek og', Q. (2023). TEXNOLOGIYA VA TIBBIYOT: DİNAMIK HAMKORLIK. Tadqiqot va ishlanmalar bo'yicha xalqaro multidisipliner jurnali , 10 (11).
86. Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. GAUSS KVADRATUR FORMULALARI. Models and methods in modern science, 3(2), 114-125.
87. Quvvatov, B. (2024). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. ORTOGONAL KOPHADLAR. Инновационные исследования в науке, 3(2), 47-59.
88. Quvvatov, B. (2024, February). ALGEBRAIK ANIQLIGI YUQORI BOLGAN KVADRATUR FORMULALAR. REKURSIV TRAPETSIYALAR QOIDASI. In Международная конференция академических наук (Vol. 3, No. 2, pp. 41-51).
89. Axmedova, Z. (2024). KOMPYUTER TESTLARINING MAQSADLARI, MAZMUNI VA TUZILISHI. Theoretical aspects in the formation of pedagogical sciences, 3(3), 211-222.
90. Axmedova, Z. (2024). NODAVLAT O'QUV MARKAZLARI TIZIMI PLATFORMASI UCHUN MOBIL ILOVA YARATISH. Академические исследования в современной науке, 3(6), 162-179.
91. Axmedova, Z. (2024). NODAVLAT O'QUV MARKAZLARI TIZIMI PLATFORMASI UCHUN MA'LUMOTLAR BAZASINI YARATISH. Science and innovation in the education system, 3(3), 83-93.

92. Akhmedova, Z. (2024). STRUCTURES OF SMALL DATABASE MANAGEMENT SYSTEMS. Solution of social problems in management and economy, 3(1), 97-107.
93. Akhmedova, Z. (2024). DATA BY COMBINING MAIL THROUGH TO SEND METHODS. Theoretical aspects in the formation of pedagogical sciences, 3(1), 198-207.
94. Akhmedova, Z., & Rahmatova, N. (2024). LMS (LEARNING MANAGEMENT SYSTEM) LEARNING MANAGEMENT SYSTEM FEATURES. Science and innovation in the education system, 3(1), 85-94.
95. Akhmedova, Z. (2024). CREATION OF A DATABASE FOR THE SYSTEM PLATFORM OF NON-GOVERNMENT EDUCATIONAL CENTERS. Development of pedagogical technologies in modern sciences, 3(1), 106-116.
96. Akhmedova, Z. (2024). IPHONE OPERATIONAL IN THE SYSTEM MOBILE APPLICATIONS TO CREATE INTENDED PROGRAMMING ENVIRONMENTS. Current approaches and new research in modern sciences, 3(1), 111-121.
97. Axmedova, Z. I. (2024). LEARNING MANAGEMENT SYSTEM IMKONIYATLARI. GOLDEN BRAIN, 2(1), 509-516.
98. Axmedova, Z. I. (2023). MA'LUMOTLAR BAZASI BOSHQARISH TIZIMLARI. GOLDEN BRAIN, 1(34), 40-49.
99. Akhmedova, Z. (2023). CREATION AND PLACEMENT OF INTERACTIVE ELEMENTS. Solution of social problems in management and economy, 2(13), 120-128.
100. Ikromovna, A. Z. (2023). Programming Environments for Creating Mobile Applications on the Android Operating System. American Journal of Public Diplomacy and International Studies (2993-2157), 1(10), 305-309.
101. Akhmedova, Z. (2023). EDUCATIONAL MANAGEMENT SYSTEMS, ELECTRONIC EDUCATION: TASKS AND OPPORTUNITIES. Theoretical aspects in the formation of pedagogical sciences, 2(21), 171-177.
102. qizi Sharopova, M. M. (2023). RSA VA EL-GAMAL OCHIQ KALITLI SHIFRLASH ALGORITMI ASOSIDA ELEKTRON RAQMLI IMZOLARI. RSA OCHIQ KALITLI SHIFRLASH ALGORITMI ASOSIDAGI ELEKTRON RAQAMLI IMZO. Educational Research in Universal Sciences, 2(10), 316-319.
103. Sharopova, M. M. qizi . (2023). JAVA TILI YORDAMIDA OB'EKTGA YUNALTIRILGAN DASTURLASH ASOSLARI BILAN TANISHISH. GOLDEN BRAIN, 1(34), 111–119.
104. Sharopova, M. (2023). CHOOSE: COMPOSITION OR INHERITANCE. Science and innovation in the education system, 2(13), 96-102.

105. Sharopova, M. (2023). JAVA PROGRAMMING IN THE LANGUAGE HERITAGE TO DO SYNTAX. Current approaches and new research in modern sciences, 2(12), 82-87.
106. Sharopova, M. (2023). ARRAY AND ARRAYS INSTALLATION. Development of pedagogical technologies in modern sciences, 2(12), 102-107.
107. Sharopova, M. (2023). CLASSES AGAIN APPLY. Solution of social problems in management and economy, 2(13), 106-111.
108. qizi Sharopova, M. M. (2023). INTRODUCING" PROGRAM CONTROL OPERATORS" IN THE JAVA PROGRAMMING LANGUAGE. Multidisciplinary Journal of Science and Technology, 3(5), 222-231.
109. qizi Sharopova, M. M. (2023). Working with folders in the JAVA programming language. Multidisciplinary Journal of Science and Technology, 3(5), 232-236.
110. Sharopova, M. (2024). CREATION OF A DATABASE FOR THE SYSTEM PLATFORM OF NON-GOVERNMENT EDUCATIONAL CENTERS. Current approaches and new research in modern sciences, 3(1), 185-191.
111. Sharopova, M. (2024). DSA ERI STANDARD. ELECTRONIC DIGITAL SIGNATURE OF GOST R 34.10-94. Theoretical aspects in the formation of pedagogical sciences, 3(1), 169-178.
112. Sharopova, M. (2024). COLLECTORS.(OBJECT CONTAINERS). Development of pedagogical technologies in modern sciences, 3(1), 93-101.
113. Sharopova, M. (2024). JAVA PROGRAMMING IN THE LANGUAGE FLOWING INPUT AND RELEASE. Solution of social problems in management and economy, 3(1), 84-93.
114. Ikromovna, A. Z. (2023). SQL (STRUCTURED QUERY LANGUAGE) CAPABILITIES OF THE STATISTICAL DATABASE LANGUAGE. Multidisciplinary Journal of Science and Technology, 3(5), 274-280.
115. Ikromovna, A. Z. (2023). SQL (STRUCTURED QUERY LANGUAGE) STATISTICAL PACKAGES OF CAPABILITIES. Best Journal of Innovation in Science, Research and Development, 2(12), 781-787.
116. Zulxumor, A. (2022). IMPLEMENTATION OF INTERACTIVE COURSES IN THE EDUCATIONAL PROCESS. ILMIY TADQIQOT VA INNOVATSIYA, 1(6), 128-132.
117. Axmedova, Z. (2023). MOODLE TIZIMI VA UNING IMKONIYATLARI. Development and innovations in science, 2(11), 29-35.

118. Ikromovna, A. Z. (2023). USING THE USEFUL ASPECTS OF THE MOODLE SYSTEM AND ITS POSSIBILITIES. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 201-205.
119. Ikromovna, A. Z. (2023). USING THE USEFUL ASPECTS OF THE MOODLE SYSTEM AND ITS POSSIBILITIES. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 201-205.
120. Axmedova, Z. I. (2023). LMS TIZIMIDA INTERAKTIV ELEMENTLARNI YARATISH TEXNOLOGIYASI. Educational Research in Universal Sciences, 2(11), 368-372.