AJPDIS GLOBAL RESEARCH NETWORK

**AMERICAN Journal of Public Diplomacy and International Studies**
*Volume 01, Issue 10, 2023 ISSN (E): 2993-2157*

# Analysis of Concepts About the Effect of an Explosion in Solid Wednesday

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**General characteristics of the current state of the theory of the effect of an explosion on the environment**

Controlling the explosion energy during short-delay explosion (SDE) of charges is impossible without a clear and precise understanding of the process of rock destruction during the explosion of a single charge. Therefore, it is necessary to critically review previously conducted studies on the effects of explosions, taking into account existing achievements in related fields of science, and on this basis, outline ways to further solve the problem of controlling the crushing of rocks with multi-row KZV charges.

The mechanism of rock destruction by explosion has been studied by many Soviet and foreign scientists, who have developed a number of theoretical directions, which, based on the share of participation of detonation products and stress waves in the destruction process, can be divided into the following main groups.

1. The destruction of rocks by explosion is caused by the piston action of detonation products.

Representatives of this trend believe that the dynamic impact of explosion gases does not produce rock separation, but only reduces the resistance to destruction by static gas pressure.

According to the basic principles of this direction, the destruction of rocks by explosion occurs from the charge to the free surface. The main work is performed by the piston action of the detonation products, which destroy the rock and impart translational motion to it.

Since the direction under consideration does not take into account the properties of rocks and the action of stress waves that arise in the medium during the explosion of a charge, which is its main disadvantage, it is advisable to limit the scope of its application. This theory is more suitable for the destruction of weak rocks, which have a high absorption capacity of stress wave energy, resulting in insignificant destruction under their influence. With increasing rock strength, the share of stress wave energy in the destruction process increases due to a decrease in the absorbing properties of rocks. Therefore, the hypothesis put forward is acceptable only for a certain type of rock that needs to be determined.

2. As experimental data accumulated, a theory of explosion action was developed, according to which the destruction of rocks is caused by the action of stress waves.

A number of researchers believe that the destruction of any rock occurs due to the action of a reflected wave. This point of view indicates that the role of the reflected stress wave in the destruction process increases with increasing rock strength.

There are arguments in favor of the incident wave as the main factor destroying the array. Others believe that in industrial conditions reflected waves do not play a decisive role in the process of rock destruction.

It should be noted that the hypotheses put forward about the mechanism of destruction of rocks by the action of stress waves are mainly based on the results of experimental studies obtained in laboratory conditions. Due to the fact that the physical and mechanical properties of models and rock masses, as well as the conditions for conducting experimental studies in laboratory and industrial conditions, differ significantly, the hypothesis put forward is not always confirmed by data from industrial experiments. In addition , there is no data on the nature of the formation and propagation of stress waves when blasting borehole charges in production conditions, without which it is impossible to make final conclusions about the role of stress waves in the process of destruction of various rocks.

The formation and propagation of stress waves, in addition to the physical and mechanical properties of rocks, is predetermined by the form of the applied explosive load. These factors have not yet been sufficiently studied, and therefore it is not possible to judge on a scientific basis with full right the role of stress waves in the destruction process. Although it can be assumed that with a decrease in the absorbing properties of rocks, the share of stress wave energy in the destruction process increases.

3. The destruction of rocks by explosion is caused by the combined action of stress waves and pressure of detonation products. Representatives of this direction, N.V. Melnikov, F.A. Baum, L.I. Baron, V.N. Rodionov et al. , based on the results of modern means of experimental study of the processes of rock destruction by explosion, came to the conclusion that the destruction of rocks is associated both with the action of stress waves and with the pressure of explosion gases.

However, the role of these factors in the destruction process depends on the shape of the explosive pulse and the physical and mechanical properties of the rocks, and until now it has not been fully clarified, which is holding back the development and creation of new methods for controlling the explosion energy with multi-row SCB charges.

Due to the lack of consensus on the causes of destruction, difficulties arise as to what factors should be strengthened to increase the efficiency of rock destruction during CVD charges.

There are a number of theoretical and experimental studies that explain the improvement in rock crushing during KZV. At the same time, the consideration of the mechanism of rock destruction during CVD is not carried out in isolation from the theory of explosion of a single charge, but from the standpoint of the above-mentioned general directions in the theory of explosion. As a result of the theoretical analysis lagging behind production requests, there were cases when the QZV did not give the required result. In most cases, this is explained by the fact that the slowdown interval and well pattern were chosen incorrectly. In the case of CVD charges, there is an overlap of processes occurring in the rock at the time of the explosion and their interaction at different stages of development, which depends on the magnitude of the deceleration interval. Depending on the magnitude of the deceleration, the nature of the interaction and, as a consequence, the results of the explosion will change.

The study of these dependencies represents the basis on which methods for controlling the explosion energy during SCR should be developed. This will make it possible to actively intervene in the process of rock destruction by explosion and control it to obtain the desired results.

among domestic and foreign researchers about the process of rock destruction during CVD. The prevailing ideas, depending on the use of factors that determine the process of destruction of rocks during CVD, can be reduced mainly to the following: the interaction of processes occurring before the destruction of the massif and after the destruction.

1. Interaction of incident stress waves and quasi-static stress state. To use these factors, the deceleration interval must be less than the time of formation of an additional free surface. Until the formation of a free surface or cracks, the massif remains in a complex state of stress. This condition is caused by the action of dynamic and quasi-static stresses. Dynamic stresses arise

as a result of the propagation of stress waves, and quasi-static stresses arise as a result of the piston action of detonation products. By changing the deceleration interval within certain limits, you can enhance the effect of one or another factor. As a result, the explosion will have a different effect on the environment.

It should be noted that at small deceleration intervals commensurate with the action of the positive phase of the wave, interaction of stress waves is observed, resulting in an increase in maximum stresses and an increase in the duration of action of the incident wave, which leads to an improvement in the quality of rock crushing, due to an increase in the energy flux density of the resulting pulse propagating wave.

The representative of this direction G.P. Pokrovsky [ 89] believes that during short-circuit explosion there is an interaction of stress waves from the explosion of neighboring charges, due to which in certain places of the massif an increase in the stressed state and, accordingly, an improvement in crushing is observed. The deceleration interval is calculated using the formula

$$t_3 = \frac{\sqrt{a^2 + 4W^2}}{C_p},$$

where a is the distance between wells;

W – LNS value;

Wed is the speed of wave propagation and for borehole charges it is 5-10 ms.

F.I. Galadzhiy and I.V. Bobrov [ 27], studying the process of destruction during short-circuit explosion, found that when charges explode with a millisecond delay, interference of stress waves occurs. The authors propose that in order to maximize the use of explosion energy for crushing the medium, subsequent charges should be detonated after a period of time during which rock vibrations caused by the previous explosion could intensify. The deceleration interval proposed by the authors is 3 -5 ms.

E.G. Baranov and Kota [ 7, 5], studying the interaction of stress waves during short-circuit explosions, determined the condition for their maximum interaction at various distances from the exploding charges. However, the authors do not indicate in which breeds it is advisable to use this method.

ON THE. Evstropov [ 40, 41] proposes to calculate deceleration intervals based on the theory of vibration destruction, using the formula

$$t_3 = \frac{2W}{C_p}.$$

The deceleration interval he recommends is in the range of 3-7 ms.

As the deceleration interval increases, the share of the energy of the quasi-static component of the wave increases, and the energy from the interaction of the dynamic components decreases. So, N.L. Rosinsky [98] believes that when the deceleration interval exceeds the time of action of the positive phase of the wave, interference of voltage waves is not observed and the charges act as independent. However, the author does not take into account that after the passage of the wave until the moment of crack formation, a quasi-static stress state exists in a given area, caused by the static action of detonation products. Therefore, when charges explode with deceleration intervals greater than the time of action of the positive phase of the wave and less than the time of arrival of the destruction front in a given area, the voltage wave from the explosion of the subsequent charge will propagate in a quasi-statically stressed mass.

G.P. Demidyuk, E.G. Baranov, U. Langefors and White [31, 7, 61, 106] believe that in the case of SCV, the stressed state of the destroyed, but not yet separated, medium in the area of action of the first row is also used. S.H. Johanson and U. Langefors [ 61], based on practical experience, recommend determining the deceleration interval using the formula

$$t_3 = KW,$$

where K =3.3÷6.6 is an empirical coefficient, the value of which decreases with increasing rock strength.

The magnitude of the deceleration interval , determined by the formulas of these authors, is within 20-30 ms when blasting borehole charges.

Our numerical comparisons of the time of action of the positive phase of stress waves and the deceleration intervals used in practice show that, given the drilling and blasting parameters existing in quarries, the time of action of the positive phase is less than or equal to the applied deceleration intervals, i.e. interaction of stress waves or the use of a quasi-static stress state is possible . However, to determine the conditions that ensure the maximum possible interaction of stress wave energy, it is necessary to carry out further studies of the parameters of stress waves in industrial conditions. At the same time , it is necessary to determine the area of effective use of these factors during CZV, depending on the properties of rocks and charge parameters.

2. The action of reflected waves from an additional free surface and the impact of a moving rock mass. Usage of these factors is possible at deceleration intervals exceeding the time of formation of an additional free surface.

According to this direction, an improvement in the quality of rock mass crushing during KZV charges is achieved due to the formation of additional free surfaces during the explosion of previous charges and due to additional crushing by the collision of moving rock masses.

When the subsequent charge explodes during a short-circuit explosion, the stress wave, reaching the newly formed free surface, is reflected from it, transforming into a tension wave. The reflected wave , interfering with the direct wave, contributes to the destruction of the massif.

Representatives of this direction A.N. Khanukaev, M.F. Drukovany, F.I. Kucheryavyi, Yu.V. Gaek, N.G. Petrov et al. [ 118, 58 , 39, 83, 84] believe that the most effective scheme is the alternate explosion of charges at a deceleration interval that would correspond to the formation of new additional exposed surfaces. They consider the impact of a moving mass of rocks as an additional crushing factor. It should be noted that the efficiency of the reflected wave would increase if a more powerful incident wave were reflected from the free surface. This can be achieved by choosing a deceleration interval based on the condition of maximum interaction of stress waves incident on the free surface.

To determine the deceleration interval A.N. Khanukaev [118] offers an analytical expression

$$t_3 = t_1 + t_2 + t_3 \,,$$

where $t_1$ is the time it takes for the voltage wave to travel from the charging chamber to the free surface and back;

$t_2$ – time of development of cracks from the exposed surface to the charging chamber;

$t_3$ – time of rock movement at a distance of 0.8-1.0 cm from the pillar. A similar formula for determining the deceleration interval is proposed by F.I. Curly and M.F. Drukovany [58].

The formula under consideration is not sufficiently theoretically and experimentally substantiated. This especially applies to determining and justifying the time of movement of rock over a specified distance.

Ultimately, the authors recommend a deceleration interval for borehole charges of 20-30 ms, and for blasthole charges - 15 ms. N.G. Petrov proposes to determine the deceleration interval based on the condition of the formation of an additional free surface, according to the formula [84]

$$t_3 = \frac{31,5}{\sqrt[4]{\rho C_p}} W - 6\sqrt[4]{\rho C_p} + 9,6.$$

The formula was established empirically when blasting blasthole charges under certain conditions and therefore has a limited scope of application.

N.L. Rosinsky, G.M. Kitach, N. Taichman, Hancock [98, 16, 131] and others believe that the improvement in the quality of crushing during KZV is achieved mainly due to the collision of moving rock masses.

N.L. Rosinsky [ 98] believes that at the moment of explosion of the charges of the second stage, the mass of rock from the action of the explosion of the first stage is in a state of movement at some distance from the newly formed outcrop surfaces. Due to the explosion of the first-stage charges, a large number of cracks are formed in the array, which act as additional free surfaces. In this case, the rock mass acquires translational motion and is subjected to the action of an explosion of charges of subsequent decelerations. Thus, the interaction of rock masses occurs , which allows for additional crushing and makes it possible to control the movement and displacement of the blasted mass.

G.M. Kitach [ 47] argued that the impact of the blasted rock masses should occur at the moment of the presence of maximum internal stress in the rock, resulting from the passage of stress waves from the previous explosion. English researchers Teichman and Hancock [131] believe that the collision of rock occurs when it moves in the opposite direction at the expanding end of the ejecta. The collision of pieces in flight causes their additional crushing . In this case, the deceleration interval is selected taking into account the collision of the maximum number of pieces of blasted rock mass at their highest speeds.

It should be noted that the effect of the collision of moving masses in the current period of development of the KZV is considered as a non-main factor, but an additional factor contributing to the crushing of rocks.

Based on the analysis , we can conclude that none of the areas discussed above separately can fully explain the physical essence of increasing the efficiency of using explosion energy during short-circuit explosive charges. This is explained by the transience and complexity of processes over time. In addition, the hypotheses put forward are not able to provide a complete physical justification for the picture of the interaction of stress waves during short circuits, and, therefore, it is not surprising that the resulting formulas for determining rational deceleration intervals, in order to use the same factor, do not always give the same values and often differ significantly.

The scope of application of the developed methods for increasing the efficiency of using explosion energy to fragment the environment, depending on the properties of rocks and the parameters of the initial impulse, has not been sufficiently studied.

Not all proposed formulas for determining the deceleration interval take into account the charge parameters, and the influence of explosion schemes on the deceleration interval is not considered at all.

Considering that the nature of the propagation of stress waves and the process of destruction of rocks by explosion depend on the physical and mechanical properties of rocks and the shape of the initial pulse, the parameters of the charge and its distance from the free surface, it can be assumed that the effectiveness of using factors that cause an increase in crushing depending on the deceleration interval , will determine the quality of crushing.

Using modern advances in the field of recording fast processes, at the present time it seems possible to record the process of development of stress fields and the destruction of media by explosion. This will make it possible to more fully reveal the mechanism of rock destruction by explosion and, on this basis, improve existing and develop new effective methods for controlling explosion energy.

As a conclusion , it should be noted that, despite the inconsistency of theoretical views, the range of knowledge of the physical foundations of rock destruction by explosion has expanded significantly. Soviet scientists made a particularly large contribution to the development of the theory of rock destruction by explosion. However, it is necessary to persistently conduct further research into the nature of rock destruction by explosion during single explosion of charges and short-circuit explosion of a series of charges, to study the patterns of propagation and interaction of stress waves, to study the influence of charge parameters on the final results of the explosion, to study the change in the stressed state of the medium over time and with distance, as well as the laws of development of the destruction process.

Knowledge of these laws and their comprehensive application in appropriate combination will allow us to outline ways to solve a large and important problem - obtaining a rock mass of a given lumpiness during explosive breaking.

**References:**


1. Jurakulov, S. Z. (2023). NUCLEAR ENERGY. *Educational Research in Universal Sciences*, *2*(10), 514-518.
2. Oghly, J. S. Z. (2023). PHYSICO-CHEMICAL PROPERTIES OF POLYMER COMPOSITES. *American Journal of Applied Science and Technology, 3*(10), 25-33.
3. Oghly, J. S. Z. (2023). THE RELATIONSHIP OF PHYSICS AND ART IN ARISTOTLE'S SYSTEM. *International Journal of Pedagogics, 3*(11), 67-73.
4. Oghly, J. S. Z. (2023). BASIC PHILOSOPHICAL AND METHODOLOGICAL IDEAS IN THE EVOLUTION OF PHYSICAL SCIENCES. *Gospodarka i Innowacje.*, *41*, 233-241.
5. ugli Jurakulov, S. Z. (2023). FIZIKA TA’LIMI MUVAFFAQIYATLI OLISH UCHUN STRATEGIYALAR. *Educational Research in Universal Sciences*, *2*(14), 46-48.
6. Oghly, J. S. Z. (2023). A Japanese approach to in-service training and professional development of science and physics teachers in Japan. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(9), 167-173.
7. Tursunbek Sadriddinovich Jalolov. (2023). ARTIFICIAL INTELLIGENCE PYTHON (PYTORCH). Oriental Journal of Academic and Multidisciplinary Research , 1(3), 123-126.
8. Jurakulov, S. Z. O., & Turdiboyev, X. (2023). TA'LIM SOHASIDA FIZIKANING SAN'AT BILAN ALOQALARI. GOLDEN BRAIN, 1(33), 144–147.
9. Jurakulov, S. Z. O., & Turdiboyev, K. (2023). STUDYING PHYSICS USING A COMPUTER. GOLDEN BRAIN, 1(33), 148–151.
10. Jurakulov, S. Z. O., & Nurboyev, O. (2023). IN THE EDUCATIONAL FIELD OF PHYSICS LEVEL AND POSITION. GOLDEN BRAIN, 1(33), 157–161.
11. Tursunbek Sadriddinovich Jalolov. (2023). ADVANTAGES OF DJANGO FEMWORKER. International Multidisciplinary Journal for Research & Development, 10(12).
12. Jurakulov, S. Z. O., & Nurboyev, O. (2023). RELATIONSHIPS BETWEEN THE DIRECTIONS OF FINANCE AND PHYSICAL SCIENCE. GOLDEN BRAIN, 1(33), 168–172.

13. Jurakulov, S. Z. O., & Hamidov, E. (2023). YADRO ENERGIYASINING XOSSA VA XUSUSIYATLARI. GOLDEN BRAIN, 1(33), 182–186.
14. Jurakulov, S. Z. O., & Turdiboyev, X. (2023). FIZIKA FANINI O'RGANISHNING YUQORI DARAJADAGI STRATEGIYALAR. GOLDEN BRAIN, 1(33), 152–156.
15. Муродов, О. Т. (2023). РАЗРАБОТКА АВТОМАТИЗИРОВАННОЙ СИСТЕМЫ УПРАВЛЕНИЯ ТЕМПЕРАТУРЫ И ВЛАЖНОСТИ В ПРОИЗВОДСТВЕННЫХ КОМНАТ. *GOLDEN BRAIN*, *1*(26), 91-95.
16. Murodov, O. T. R. (2023). ZAMONAVIY TA'LIMDA AXBOROT TEXNOLOGIYALARI VA ULARNI QO 'LLASH USUL VA VOSITALARI. *Educational Research in Universal Sciences*, *2*(10), 481-486.
17. Jalolov, T. S. (2023). PEDAGOGICAL-PSYCHOLOGICAL FOUNDATIONS OF DATA PROCESSING USING THE SPSS PROGRAM. INNOVATIVE DEVELOPMENTS AND RESEARCH IN EDUCATION, 2(23), 220-223.
18. Junaydullaevich, T. B. (2023). ANALYSIS OF OIL SLUDGE PROCESSING METHODS. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 139-146.
19. Junaydullaevich, T. B. (2023). BITUMENS AND BITUMEN COMPOSITIONS BASED ON OIL-CONTAINING WASTES. American Journal of Public Diplomacy and International Studies (2993-2157), 1(9), 147-152.
20. Sadriddinovich, J. T. (2023, November). IDENTIFYING THE POSITIVE EFFECTS OF PSYCHOLOGICAL AND SOCIAL WORK FACTORS BETWEEN INDIVIDUALS AND DEPARTMENTS THROUGH SPSS SOFTWARE. In INTERNATIONAL SCIENTIFIC RESEARCH CONFERENCE (Vol. 2, No. 18, pp. 150-153).
21. Bakhodir, T., Bakhtiyor, G., & Makhfuza, O. (2021). Oil sludge and their impact on the environment. Universum: технические науки, (6-5 (87)), 69-71.
22. Турсунов, Б. Ж. (2021). АНАЛИЗ МЕТОДОВ УТИЛИЗАЦИИ ОТХОДОВ НЕФТЕПЕРЕРАБАТЫВАЮЩЕЙ ПРОМЫШЛЕННОСТИ. Scientific progress, 2(4), 669-674.
23. ТУРСУНОВ, Б., & ТАШПУЛАТОВ, Д. (2018). ЭФФЕКТИВНОСТЬ ПРИМЕНЕНИЯ ПРЕДВАРИТЕЛЬНОГО ОБОГАЩЕНИЯ РУД В КАРЬЕРЕ КАЛЬМАКИР. In Инновационные геотехнологии при разработке рудных и нерудных месторождений (pp. 165-168).
24. Турсунов, Б. Д., & Суннатов, Ж. Б. (2017). Совершенствование технологии вторичного дробления безвзрывным методом. Молодой ученый, (13), 97-100.
25. Турсунов, Б. Ж., Ботиров, Т. В., Ташпулатов, Д. К., & Хайруллаев, Б. И. (2018). ПЕРСПЕКТИВА ПРИМЕНЕНИЯ ОПТИМАЛЬНОГО ПРОЦЕССА РУДООТДЕЛЕНИЯ В КАРЬЕРЕ МУРУНТАУ. In Инновационные геотехнологии при разработке рудных и нерудных месторождений (pp. 160-164).
26. Tursunov, B. J. (2021). ANALYZ METHODOV UTILIZATsII OTXHODOV NEFTEPERERABATYVAYushchey PROMYSHLENNOSTI. Scientific progress, 2(4), 669-674.
27. Tursunov, B. J., & Shomurodov, A. Y. (2021). Perspektivnyi method utilizatsii otkhodov neftepererabatyvayushchey promyshlennosti. ONLINE SCIENTIFIC JOURNAL OF EDUCATION AND DEVELOPMENT ANALYSIS, 1(6), 239-243.
28. Tursunov, B. Z., & Gadoev, B. S. (2021). PROMISING METHOD OF OIL WASTE DISPOSAL. Academic research in educational sciences, 2(4), 874-880.

29. Jumaev, Q. K., Tursunov, B. J., Shomurodov, A. Y., & Maqsudov, M. M. (2021). ANALYSIS OF THE ASSEMBLY OF OIL SLAMES IN WAREHOUSES. Science and Education, 2(2).
30. Tursunov, B. J., Botirov, T. V., Tashpulatov, D. K., & Khairullaev, B. I. (2018). PERSPECTIVE PRIMENENIYA OPTIMAL PROCESS RUDOOTDELENIYA V KARERE MURUNTAU. Innovative geotechnologies pri razrabotke rudnykh i non-rudnykh mestorojdenii, 160-164.
31. Boboqulova, M. X. (2023). STOMATOLOGIK MATERIALLARNING FIZIK-MEXANIK XOSSALARI. *Educational Research in Universal Sciences*, *2*(9), 223-228.
32. 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
33. Sharipova, M. P. L. (2023). CAPUTA MA'NOSIDA KASR TARTIBLI HOSILALAR VA UNI HISOBLASH USULLARI. *Educational Research in Universal Sciences*, *2*(9), 360-365.
34. Sharipova, M. P. (2023). MAXSUS SOHALARDA KARLEMAN MATRITSASI. *Educational Research in Universal Sciences*, *2*(10), 137-141.
35. Madina Polatovna Sharipova. (2023). APPROXIMATION OF FUNCTIONS WITH COEFFICIENTS. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(9), 135–138.
36. Madina Polatovna Sharipova. (2023). Applications of the double integral to mechanical problems. International journal of sciearchers,2(2), 101-103.
37. 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.
38. Quvvatov Behruz Ulug`bek o`g`li. (2023). Mobil ilovalar yaratish va ularni bajarish jarayoni. International journal of scientific researchers, 2(2).
39. Behruz Ulugbek og, Q. (2023). TECHNOLOGY AND MEDICINE: A DYNAMIC PARTNERSHIP. *International Multidisciplinary Journal for Research & Development*, *10*(11).
40. Jurakulov Sanjar Zafarjon Oghly. (2023). A Current Perspective on the Relationship between Economics and Physics. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(10), 154–159.
41. Jurakulov Sanjar Zafarjon Oghly. (2023). New Computer-Assisted Approaches to Teaching Physics. *American Journal of Public Diplomacy and International Studies (2993-2157)*, *1*(10), 173–177.
42. qizi Latipova, S. S. (2023). KASR TARTIBLI HOSILA TUSHUNCHASI. *SCHOLAR*, *1*(31), 263-269.
43. qizi Latipova, S. S. (2023). RIMAN-LUIVILL KASR TARTIBLI INTEGRALI VA HOSILASIGA OID AYRIM MASALALARNING ISHLANISHI. *Educational Research in Universal Sciences*, *2*(12), 216-220.
44. qizi Latipova, S. S. (2023). MITTAG–LIFFLER FUNKSIYASI VA UNI HISOBLASH USULLARI. *Educational Research in Universal Sciences*, *2*(9), 238-244.
45. 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).

46. Axmedova, Z. I. (2023). LMS TIZIMIDA INTERAKTIV ELEMENTLARNI YARATISH TEXNOLOGIYASI. *Educational Research in Universal Sciences*, *2*(10), 368-372.
47. Jalolov, T. S. (2023). Solving Complex Problems in Python. American Journal of Language, Literacy and Learning in STEM Education (2993-2769), 1(9), 481-484.
48. Azamat Orunbayev. (2023). USING TECHNOLOGY IN A SPORTS ENVIRONMENT. American Journal Of Social Sciences And Humanity Research, 3(11), 39–49. https://doi.org/10.37547/ajsshr/Volume03Issue11-07
49. Azamat Orunbayev. (2023). FITNES VA SOG’LOMLASHTIRISH BO’YICHA MURABBIYLIK YO`NALISHIGA KONTSEPTUAL YONDASHUV. Research Focus International Scientific Journal, 2(8), 23–28. Retrieved from https://refocus.uz/index.php/1/article/view/431
50. Azamat Orunbayev. (2023). PANDEMIYA DAVRIDA MOBIL SOG’LIQNI SAQLASH VA FITNES DASTURLARI (PROGRAM). Research Focus International Scientific Journal, 2(7), 37–42. Retrieved from https://refocus.uz/index.php/1/article/view/414
51. Azamat Orunbayev. (2023). APPROACHES, BEHAVIORAL CHARACTERISTICS, PRINCIPLES AND METHODS OF WORK OF COACHES AND MANAGERS IN SPORTS. American Journal Of Social Sciences And Humanity Research, 3(11), 133–151. https://doi.org/10.37547/ajsshr/Volume03Issue11-16
52. Azamat Orunbayev. (2023). GLOBALIZATION AND SPORTS INDUSTRY. American Journal Of Social Sciences And Humanity Research, 3(11), 164–182. https://doi.org/10.37547/ajsshr/Volume03Issue11-18