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HOW TO MAKE A PARABOLOID SOLAR CONCENTRATOR

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Abstract

This article presents the test results of a concentrator device in the form of a paraboloid, which is made as a solar kitchen for personal use.

Sources of conventional energy are harvested on account of natural fuels such as coal, wood, petroleum products and natural gas. This, in turn, leads to a decrease in the reserves of resources in nature. This situation is considered a very global ecological problem, the use of clean energy in the national economy has now become the focus of the world's scientists. The creation and application of alternative energy sources such as solar, wind, geothermal energy, potential energy of river waters, and rising and falling energy of Okene waters as a solution to the above-mentioned problems is noted in many publications [1].

This article provides information on the solar kitchen net, which is designed for household chores, especially for tea brewing or cooking for a non-plural family. the device consists of a concentrator in the form of a paraboloid, which consists of a large number of mirrors. The basis of the solar concentrator is made of plaster (alabaster). The mold, which is used to form a paraboloid form on it, was cut from a metal plate, making it simpler, lighter and more convenient to move, since the plaster was a edible substance with the property of hardening within 1-2 minutes after mixing with water. To do this, draw a parabola, the focus of which is equal to masofasi 70 cm on the metal plate. In the process of cutting a parabola-shaped mold from a metal plate according to the Parabola pattern, precise processing in millimeter order is required, otherwise the mold may not meet the requirement.

When we come to the geometrical form of the paraboloid, we first determine that it is round (neither elliptical nor hyperbolic), that is, the spherical paraboloid can be formed as a result of the conversion of the paraboloid around its axis. The only remaining option is the focal length, which serves to specify the parameters of the round paraboloid. Determines how wide or narrow it is. The analytical round paraboloid can be described in the system of coordinates of Decard, where the F-focus length is the only parameter.

$$x^2 + y^2 = 4fz \qquad (1)$$

We see drawings of different parabolas of different focal lengths with a single symmetry axis[Figure 1].

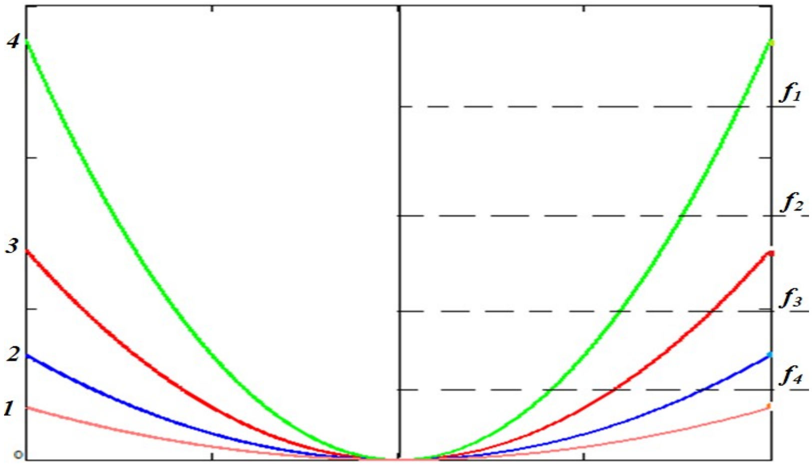
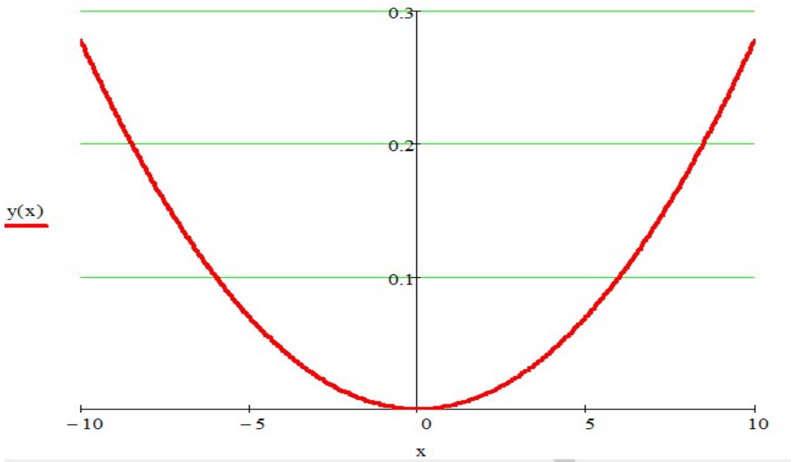


Figure 1: different focus length parabolas garfish

The proposed device was designed for household chores, especially for the purpose of boiling tea or cooking food for a non-plural family.The device consists of a concentrator in the form of a paraboloid, which was poured from plaster. Due to the fact that the plaster is a substance that has the property of hardening within 1-2 minutes after mixing with water, the mold used to form a paraboloid into it was cut from the metal plate, making it simpler, lighter and more convenient to move. The equation of Parabola drawing with coordinates is known to us when the central F point is given.

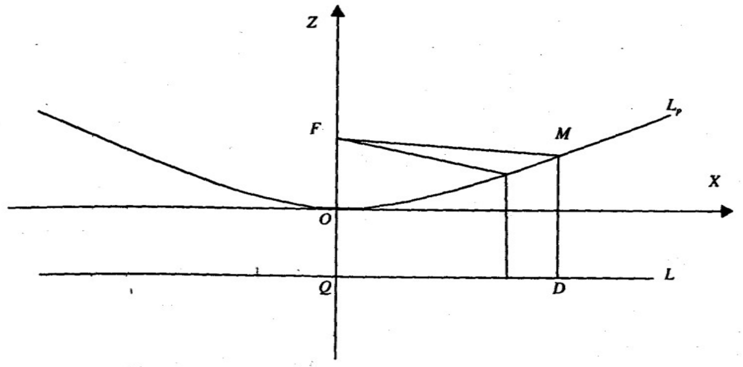
$$y = \frac{x^2}{4f} \qquad (2)$$

If the values of X are taken to correspond to the values of Y in the system of rectangular coordinates, then in each pair of X and Y values determine the appropriate points mimkin. On a metal plate draw a parabola, the focus of which is equal to masofasi 70 cm. This parabola is presented in Figure 2 below.



2-picture. The focus is the parabola drawing, which is equal to masofasi 70 cm.

There are several ways of drawing a parbole should we will consider some of them. Suppose m Point LP lies on the parabola line. This is MF = MD. Picture 3



3-picture. The process of drawing a Parabola line.

Parábola from the equation of determining the focus distance [7]

$X^2 = 4f \cdot Y$ (3)

or

$x^2 = 2p \cdot Y$ (4)

In this case, p = FQ, the distance from the focal point of the parabola to the standard line; f = OF = p / 2, focus distance of the parabola; F is the central point of the parabola; O is the tip of the parabola.

A straight line along the center point and the end of the parabola is the main axis of the parabola.

$\tan\psi = \frac{x_0}{f - \frac{x_0}{4f}}$ (5)

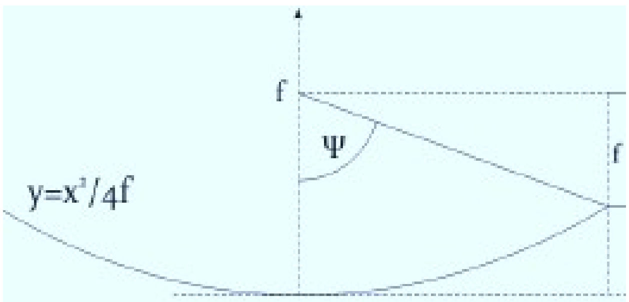


Figure 4: Image of the angle at the intersection of the paraboloid

Taking into account where the diameter of the aperture of the collector is 2x_0=d (5), the equation can be changed as follows:

$$\tan\psi = \frac{\frac{d}{f}}{2 - \frac{1}{a}(\frac{d}{f})^2} \quad (6)$$

this means the relationship between the angle of rotation and the ratio of the diameter of the aperture to the focal length.

(6) the equation can be modified to represent the ratio d-f as a function of the angle of rotation:

$$\frac{d}{f} = -\frac{4}{\tan\psi} + \sqrt{\frac{16}{\tan^2\psi} + 16} \quad (7)$$

The surface area of the mirror with a larger ring Angle is larger than the surface area of the mirror with the same diameter and a smaller ring Angle. This affects the material demand and the weight of the Collector.

$$A = \frac{8}{3}\pi f^2\left(\left(1 + \frac{d^2}{16f^2}\right)^{\frac{3}{2}} - 1\right) \quad (8)$$

Here is the surface area of the A-Mirror

The reflector should combine the following characteristics:

1. Surface: Most importantly, the reflector should be a very effective surface. For glass materials in the spectral range of the sun, the reflection coefficient should typically be between the average light return values and, moreover, the mirror surface should reflect light without scattering at an angle other than the incident angle. The illuminated surface may be stainless steel or aluminum or silver coated glass or plastic film.

2. Climate resistance: The concentrator and its coating must be resistant to climatic conditions located in a suitable location to ensure a high degree of reflection. Typically, climate change factors are high temperature changes, especially high daily changes. It can also be a factor in sandstorms. Materials and construction must withstand temperature changes and the mechanical effects of wind and sinking sand.

3. Weight: easy to carry, relatively light and easy to find making from local materials.

The following materials combine the stated requirements very well:

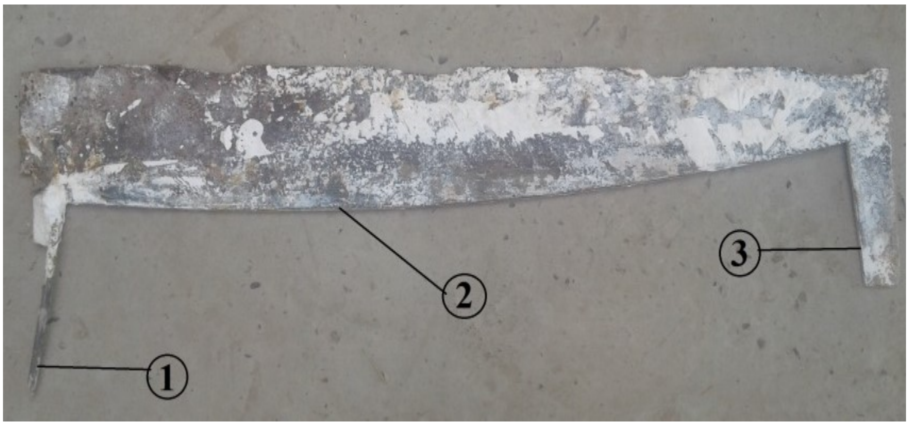
1. The simple possibility of providing the surface with a surface is metal, aluminum or stainless steel, the return coefficient of which is greater. However, the main drawback of this method is that due to climate changes and other effects, the ability to reflect quickly decreases.

2. Another option for providing the surface with a surface is the use of glass mirrors, which are covered from the back. The coating is usually silver or aluminum (similar to interior windows). It should be taken into account that the thicker the glass, the lower the coefficient of return. Silver has the highest return property of any metal surface for the solar spectrum. Silver reaches almost 98% light return property. If Silver is covered on the surface of the mirror, the light should pass through the mirror twice, then approximately 95% of the total radiation performance is achieved. Mirrors with aluminum coating have a slightly lower reflection property.

Glass mirrors are very resistant to changing weather conditions, silver glass mirrors are used in the most durable selling collars [10-11]. The disadvantage of glass mirrors is the relatively high weight and lack of adaptability to various given shapes.

If the parabolas are twisted along the main optical axis, a paraboloid is formed in the bun (picture 4).

After The Shape of the parabola is lowered into the plate, the plate is cut along the manashu shape. The use of a convenient scraper tool that is as light and manageable as possible during the scraping process ensures an accurate and quality output of the parabola shape. And the material of the mold can be made of wood and more. The mold from the plate is described in Figure 5.



5-picture.Parabola is a real appearance of a mold in shape. 1. The axis of the mold (parabola Axis), 2.parabola shape, 3. The base part of the mold.

The mold is magnified using the axis shown in Figure 5 in the horizontal plane. When rotating around its axis (1) in the horizontal plane, the paraboloid-shaped part of the mold (2) forms a paraboloid shape in the plaster [figure 6].

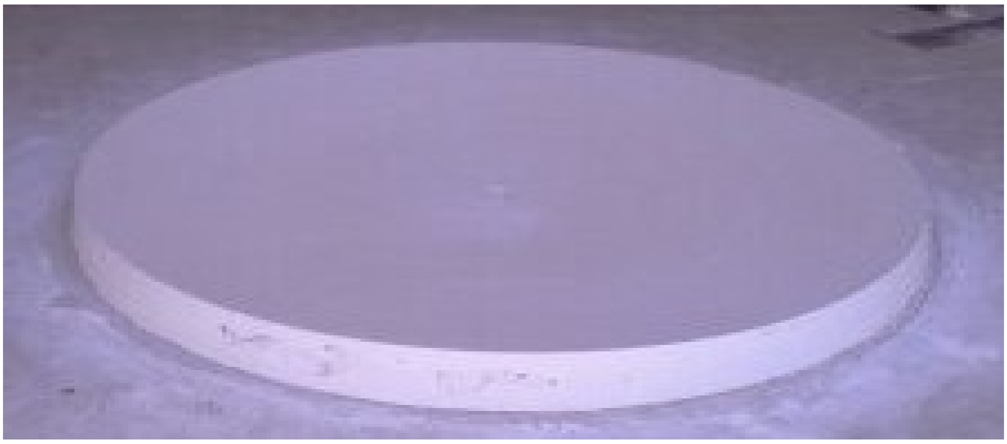


Figure 6. Paraboloid poured from gypsum.

The focal length of the resulting paraboloid is 70 cm. The gypsum cast paraboloid was thoroughly dried at room temperature (20-300). In fact, there are several other ways to make a mold. The mold currently made is one of the most convenient molds for casting a paraboloid in plaster.

The temperature should not be raised sharply during construction. Otherwise, the shape of the paraboloid will change. After drying, the paraboloid surface is smoothed and painted to cover it with an aluminum-covered polyethylene teraftalat (foil).

Figure 7. Appearance of a paraboloid with a foil-coated surface.

To the area covered with paint, polyethylene teraftalate (foil), on which the top is covered with aluminum, very well adheres. Paraboloid, whose surface is covered with foil coating, is given in Figure 7.

The surface of the paraboloid was covered with small breasts of a size of 5x5 CM, due to the fact that the results of the paraboloid, covered with foil, were not very good. The total number of Mirrors is 256 units. The sunlight falling into these mirrors accumulates in the light receiver, which is located at the focal distance of the concentrator back from each mirror. The real appearance of the paraboloid, whose surface is covered with tiny mites, is described in Figure 8.

Figure 8. The surface is covered with mirrors 5x5 cm in size, the real appearance of the paraboloid.

In order to move along the direction of the sun, a base was created from a metal pipe to the device. In order for it to be more convenient to move along the direction of the sun, focusing on the sides of the beam, wheels are installed on the three base parts of the base. Built-in wheels serve to twist the device and move it to other non-distant places. For ease of deflection of the paraboloid part of the device to the angle it needs relative to the horizontalalga, a special deflector is installed. The appearance of the Changer is shown in Figure 9.

Figure 9. View of paraboloid in relation to the horizontalalga of the position of the deflector

Analysis of the results obtained: the dynamics of the change in time and temperature at which 0,5 liters of water went to the boiling point was analyzed in the device. In this case, the mouth of the container with water is closed, the result is obtained.

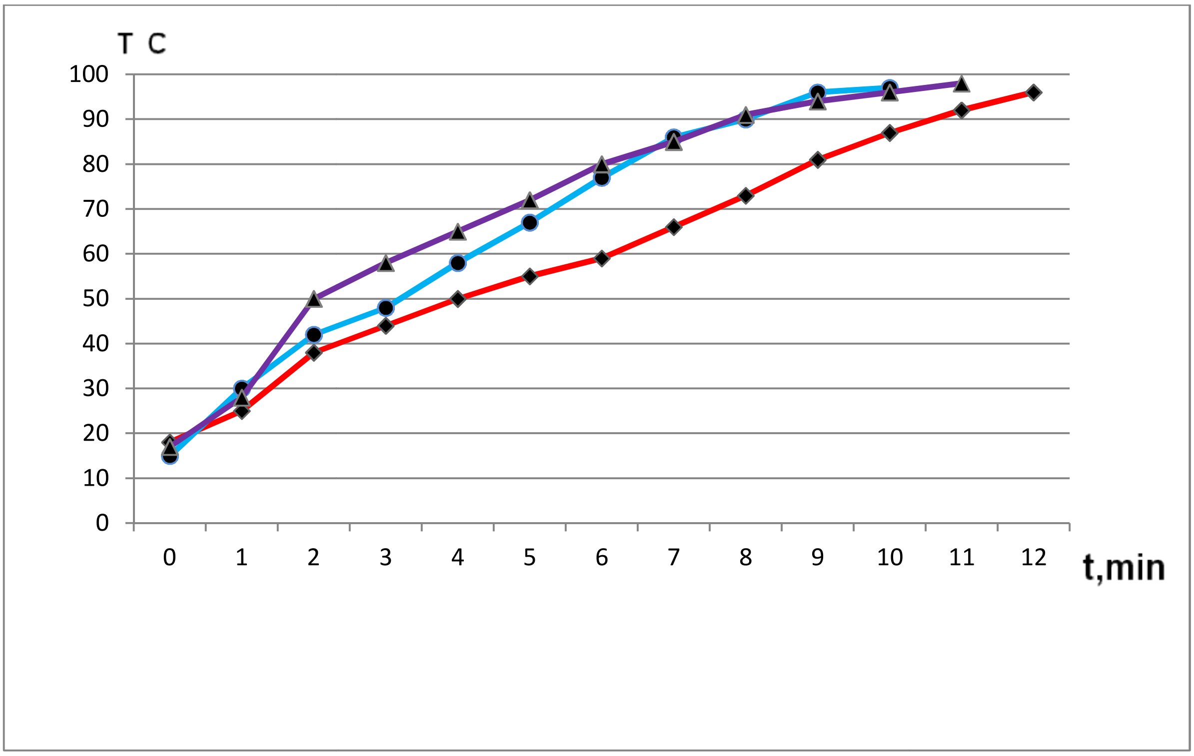


Figure 10. Dynamics of temperature changes in the device 0,5 liters of water.

1. Data were presented on the technology of creating a paraboloid solar kitchen, which was created to obtain and analyze results. In the process of making the device, he was given a certain amount of information about the homeopaths used and made suggestions. Additional information about the technology of creating a device using the literature was passed.

2. The thermal technical parameters of the device were analyzed during the boorish process, which led to experiments on the ground device. The dynamics of the connection of the time and temperature at which 0,5 liters of water went to a boil was presented in graphs and analyzed.

3. In order to further improve the device and establish its application in agriculture, the establishment of production will be interpreted.

REFERENCE:

1. Темиров С. А., Тураев О. Г. ПОСТРОЕНИЕ СОЛНЕЧНОГО КОНЦЕНТРАТОРА И ИССЛЕДОВАНИЕ ТЕПЛОВЫХ СВОЙСТВ //Главный редактор: Ахметов Сайранбек Махсутович, д-р техн. наук; Заместитель главного редактора: Ахмеднабиев Расул Магомедович, канд. техн. наук; Члены редакционной коллегии. – 2021. – С.
2. Авезов, А. Х. Численное моделирование трехмерных турбулентных струй реагирующих газов, вытекающих из сопла прямоугольной формы, на основе K-e-модели турбулентности / А. Х. Авезов, Т. Х. Жумаев, С. А. Темиров. — Текст : непосредственный // Молодой ученый. — 2015. — № 10 (90). — С. 1-6.
3. Захидов Р.А. Зеркальный системы концентрации лучистой энергии. Ташкент: Фан. 1986. -176
4. Zahidov R.A. Technology and testing of solar energy concentrating systems. Tashkent: 1978. 184 P.184.
5. R. Pavlović, P. Stefanović, Evangelos Bellos Design and Simulation of a Solar Dish Concentrator with Spiral-Coil Smooth Thermal Absorber

6. Клычев Ш.И., Мухитдинов М.М., Бахрамов С.А. Методика расчёта системы параболический концентра- тор трубчатый приёмник солнечных теплоэнергетических установок // Гелиотехника. - 2004. № 4. С. 50-55.
7. Klychev Sh.I., Zakhidov R.A., Bakhramov S.A., Dudko Yu.A., Khudoikulov A.Ya., Klychev Z.Sh., and Khudoiberdiev I.A. Parameter optimization for paraboloid-cylinder-receiver system of thermal power plants // Applied Solar Energy. Applied Solar Energy. 2009. Vol. 45. No. 4. P. 281–284.
8. Рыбаков А.О., Чебодаев А.В., Кулаков Н.В. Разработка лабораторного стенда по исследованию характеристик солнечного модуля и солнечной электростанции // Universum: технические науки : электрон. научн. журн. 2020. 12(81)
9. А.Б.Гниленко и др. Моделирование кремниевого солнечного элемента с вертикальным p-n переходом. // Відновлювана енергетика. 2013, №2, 34-44 сс.
10. Ismatovna A. Y. Using the Moodle Platform in Extreme Cases //Central asian journal of mathematical theory and computer sciences. – 2021. – Т. 2. – №. 6. – С. 13-19.
11. Ismatovna A. Y. Passing the Traditional Lesson with the Help of Open Moodle Platforms. – 2021.
12. Асадова Ю. The use of Moodle platform in the traditional transition of Information Technology Science in medicine to foreign students accepted on the basis of MBBS program at Bukhara State Medical Institute //Общество и инновации. – 2021. – Т. 2. – №. 7/S. – С. 35-43.
13. Ismatovna A. Y. The Method of Using the Moodle Platform for the Organization of Teaching in Education (The Introduction of Distance Learning Technologies in the Educational Process) //International Journal of Innovative Analyses and Emerging Technology. – 2021. – Т. 1. – №. 4. – С. 30-46.
14. Юлдуз А. ИСПОЛЬЗОВАНИЕ СОВРЕМЕННОЙ ПЛАТФОРМЫ MOODLE ДЛЯ САМОСТОЯТЕЛЬНОГО ОБУЧЕНИЯ СТУДЕНТОВ НА ТРАДИЦИОННЫХ УЧЕБНЫХ ЗАНЯТИЯХ //ЦЕНТР НАУЧНЫХ ПУБЛИКАЦИЙ (buxdu. uz). – 2021. – Т. 4. – №. 4.
15. Ismatovna A. Y. TODAY'S ROLE OF ELECTRON EDUCATION IN TEACHING THE SCIENCE OF INFORMATION TECHNOLOGY IN MEDICINE //Gospodarka i Innowacje. – 2022. – Т. 22. – С. 518-522.
16. Ismatovna A. Y. The method of organizing the pedagogical process of application of Information Technology in the Independent Education of students in the science of Information Technology in medicine using information technologies //Texas Journal of Engineering and Technology. – 2022. – Т. 7. – С. 70-73.
17. Ismatovna A. Y. Using the Moodle Platform for Organizing Training in Education //" ONLINE-CONFERENCES" PLATFORM. – 2021. – С. 15-18.
18. Sobirovich T. B. National and universal principles of democracy //Asian Journal of Research in Social Sciences and Humanities. – 2022. – Т. 12. – №. 1. – С. 334-338.
19. Sobirovich T. B. The implementation of human indicator reforms in Uzbekistan //Asian Journal of Multidimensional Research. – 2021. – Т. 10. – №. 9. – С. 197-202.
20. Sobirovich T. B. Issues of gender equality in uzbekistan: Strategy of reforms //Asian Journal of Multidimensional Research. – 2021. – Т. 10. – №. 9. – С. 203-207.
21. Sobirovich T. B. National Principles of Democracy in Uzbekistan //Mediterranean Journal of Basic and Applied Sciences (MJBAS). – 2021. – Т. 5. – №. 3. – С. 131-135.

22. Sobirovich T. B. Philosophical Dialectics of National and Universal Cultural Development //Irish Interdisciplinary Journal of Science & Research (IIJSR). – 2021.
23. Turdiyev B. S. The role of national harmony in the strategy of spiritual renewal //Scientific Bulletin of Namangan State University. – 2019. – T. 1. – №. 6. – C. 229-233.
24. Sobirovich T. B. Strategy of Renewal of National Spirituality of Uzbekistan //International Journal on Integrated Education. – 2020. – T. 3. – №. 8. – C. 122-126.
25. Sobirovich T. B., Murodogli I. S. The strategy for the implementation of the modern governance system in Uzbekistan //ACADEMICIA: An International Multidisciplinary Research Journal. – 2020. – T. 10. – №. 5. – C. 741-748.
26. Sobirovich T. B. Strategy of spiritual renewal in Uzbekistan //International Journal of Psychosocial Rehabilitation. – 2020. – T. 24. – №. 06.
27. Sobirovich T. B. The criterion of human indicators in development and renewals in Uzbekistan //EPRA International Journal of Multidisciplinary Research (IJMR). – 2020. – T. 6. – №. 8. – C. 509-511.
28. Sobirovich T. B. O‘‘ zbekiston demokratik jamiyat taraqqiyoti rivojida ma‘‘ naviy yangilanishlar strategiyasining roli //Imom Buxoriy saboqlari. – 2020. – №. 2. – C. 118-121.
29. Turdiev B. S., Yuldashev B. T. THE ISSUE OF AVOIDING CRIMES AMONG YOUNGSTERS IN UZBEKISTAN //Экономика и социум. – 2019. – №. 1-1. – С. 119-122.
30. Turdiyev B. S. SPIRITUAL RENEWAL AND INTERETHNIC RELATIONS IN THE STRATEGY OF ACTIONS //Теория и практика современной науки. – 2018. – №. 3. – С. 85-89.
31. Sobirovich T. B. The development of democratic society and spiritual renewal in the views of Eastern and Western thinkers //INTERNATIONAL JOURNAL OF ADVANCED RESEARCH AND REVIEW. – 2020. – T. 5. – №. 10. – C. 60-65.
32. Turdiyev Б. The development of democratic society and spiritual renewal in the views of eastern and western thinkers //Общество и инновации. – 2020. – Т. 1. – №. 1/s. – С. 710-717.
33. Sobirovich T. B. The development of democratic society and spiritual renewal in the views of Eastern and Western thinkers //INTERNATIONAL JOURNAL OF ADVANCED RESEARCH AND REVIEW. – 2020. – T. 5. – №. 10. – C. 60-65.
34. Sobirovich T. B. The Strategy of Cultural Development in Central Asia During Amir Temur and the Temurids Dynasty //Int. J. Sci. Res. in Multidisciplinary Studies. – 2021. – T. 2021.
35. Sobirovich T. B. The Strategy of Cultural Development in Central Asia during Amir Temur and Temurids Dynasty Reign //Irish Interdisciplinary Journal of Science & Research (IIJSR). – 2021. – T. 5. – №. 1. – C. 18-22.
36. Sobirovich T. B. Strategy of development of pilgrimage tourism in Uzbekistan //MODERNIZATION OF ISLAMIC CULTURE IN BUKHARA AND PROSPECTS FOR THE DEVELOPMENT OF SUSTAINABLE TOURISM" International Scientific and Practical Conference, Bukhara. – 2020. – T. 2. – C. 24.
37. Sobirovich T. B. O ‘zbekistonning ma’naviy yangilanish strategiyasi //Buxoro:“Sadriddin Salim Buxoriy” Durdona nashriyoti. – 2020. – C. 48.
38. Sobirovich T. B. Evolution of ideas and views on the development of democratic society and spiritual renewals //Scientific Bulletin of Namangan State University. – №. 10. – C. 243-250.
39. Sobirovich T. B. Tourism in Central Asian context //ВЕСТНИК ИНСТИТУТА/СОКРОВИЩНИЦА НАУКИ. – 2019. – №. 2. – С. 732-733.

40. Sobirovich T. B. The national and universal principles of democracy in the Central Asian context //INTERNATIONAL JOURNAL OF ADVANCED RESEARCH AND REVIEW. – 2021. – T. 6. – №. 1. – C. 30-34.
41. Turdiyev B. S. CULTURAL AND EDUCATIONAL DEVELOPMENT OF SOCIETY IN THE SCIENTIFIC HERITAGE OF WORLD PHILOSOPHERS //Academic research in educational sciences. – 2021. – T. 2. – №. 4. – C. 443-451.
42. Sobirovich T. B., Sharipovna A. F. NEW UZBEKISTAN–NEW STRATEGY OF ADMINISTRATIVE REFORMS //researchgate. net.
43. Sobirovich T. B. Ma'naviy yangilanishlar strategiyasining hayotbaxsh islohotlari: nazariya va amaliyot, O'zbekiston Milliy axborot agentligi–O'zA Ilm-fan bo'limi (elektron jurnal) //Tashkent, UzA. – C. 1-12.