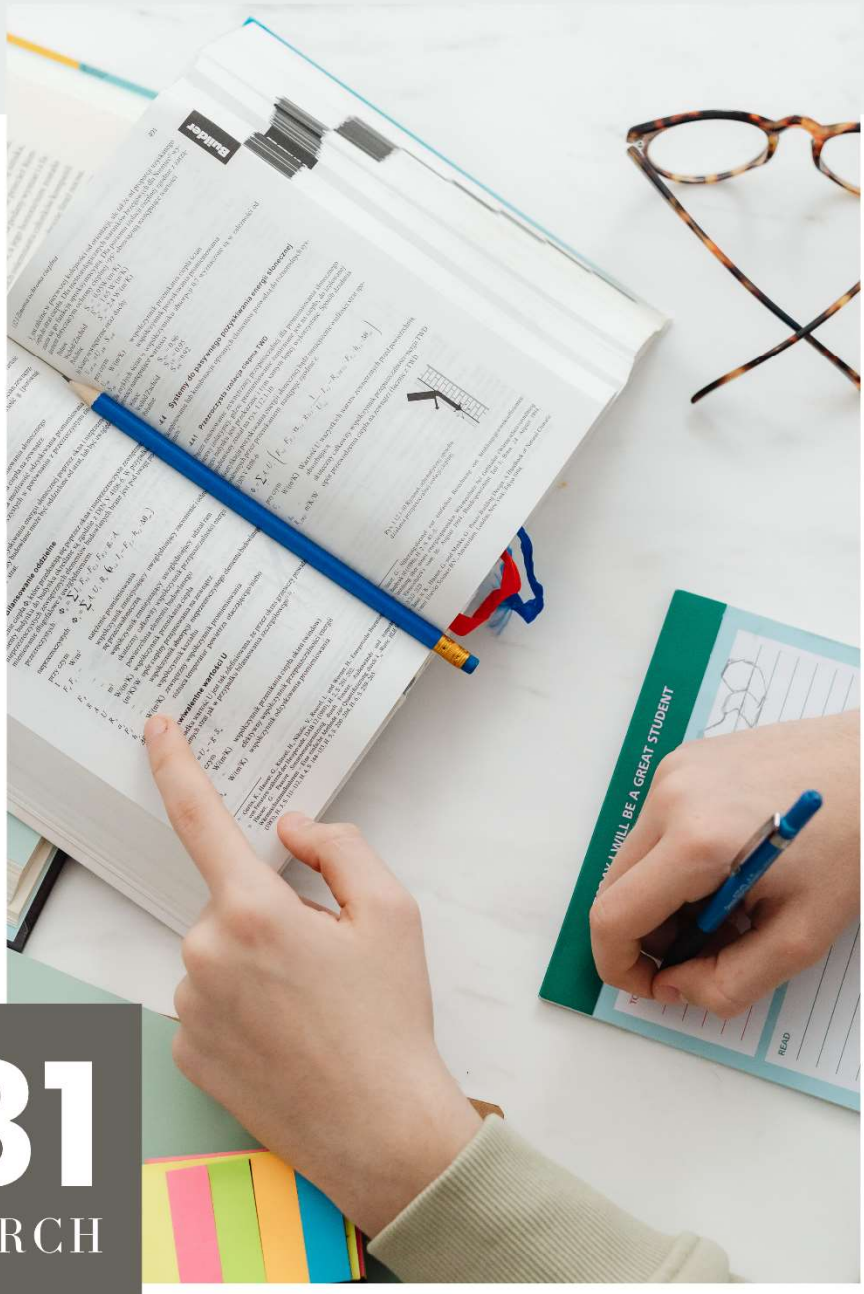
III INTERNATIONAL SCIENTIFIC AND PRACTICAL CONFERENCE 2026

COLLECTION

Innovation, integration and modern problems in the scientific activities of young researchers and students: theory and practice



31 MARCH

Jizzakh, Uzbekistan

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MINISTRY OF HIGHER EDUCATION, SCIENCE AND INNOVATION OF THE REPUBLIC OF UZBEKISTAN

JIZZAKH BRANCH OF THE NATIONAL UNIVERSITY OF UZBEKISTAN NAMED AFTER MIRZO ULUGBEK

SCIENTIFIC JOURNAL OF SCIENCE TECHNOLOGY & DIGITAL FINANCE

JOURNAL OF INTERNATIONAL SCIENCE NETWORKS

Innovation, integration and modern problems in the scientific activities of young researchers and students: theory and practice collection of materials of the international scientific and practical conference on the topic

(March 31, 2026)

Jizzakh-2026

Innovation, integration and modern problems in the scientific activities of young researchers and students: theory and practice – Jizzakh: Department of economics and tourism of Jizzakh branch of the national university of Uzbekistan named after Mirzo Ulugbek, March 31, 2026, 990 pp.

Editors in charge: Ass.prof. Soy M.P.

In the collection of materials of the conference, the role and role of Science, Education and production in the era of globalization, the pressing problems of the issues of interaction of these processes, feedback on their solutions were presented by mature specialists of the field.

In addition, research on the scientific and practical topic, carried out in the economics, Exact Sciences, Natural Sciences and socio-humanities during the globalization period, information is presented in the scientific and practical fields, which includes the latest innovative technologies in the fields of production.

It can be argued that this collection is one of the specific intersections of current thoughts and innovative ideas of the world of science. This scientific and practical conference was actively attended by professors and scientific researchers engaged in scientific research in Uzbekistan and foreign countries. In increasing the position of the scientific and practical conference, the professors and teachers of domestic and foreign higher educational institutions made a significant contribution.

Professors and teachers of foreign higher educational institutions who actively participated in the work of the conference made a worthy contribution to the high level of interaction with scientists of our country. The processes of international cooperation with foreign countries and exchange with them in the field of Science in the era of globalization have a positive effect on the development of Higher Education, the fields of Science and production. The materials of this conference are special in that they include a wide range of research, from theoretical developments to practical solutions, demonstrating the diversity of approaches and directions in this area.

In conclusion, it should be noted that this scientific and practical conference will be a very useful collection for everyone who is interested in modern research in the fields of further development of Higher Education, Science, Education and production in the era of globalization. The authors are responsible for the content and quality of the articles and abstracts included in the collection.

ANIQ INTEGRALLARNI TAQRIBIY HISOBLASHNING ZAMONAVIY USULLARI VA ULARNING QIYOSIY TAHLILI

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Annotatsiya: Ushbu maqolada aniq integrallarni taqribiy hisoblashning zamonaviy usullari tahlil qilinadi. To'g'ri to'rtburchaklar, trapetsiya, Simpson, Gauss kvadraturasi va Monte-Karlo usullarining matematik asoslari, hisoblash xatoliklari va amaliy qo'llanilishi batafsil ko'rib chiqiladi. Har bir usulning samaradorligi qiyosiy tahlil qilinib, real masalalarga mosligi baholanadi.

Kalit so'zlar: Aniq integral, taqribiy hisoblash, to'g'ri to'rtburchaklar usuli, trapetsiya, Simpson, Gauss kvadraturasi, Monte-Karlo usuli, sonli integrallar.

Kirish

Integral hisoblash matematik analizning ajralmas qismi bo'lib, ko'plab ilmiy va amaliy masalalarni yechishda muhim rol o'ynaydi. Fizika, muhandislik, iqtisodiyot kabi sohalarda ko'p hollarda funktsiyaning aniq integralini topish talab etiladi. Ammo, har doim analitik (aniq) yechim olish mumkin emas.

Shuning uchun, **aniq integrallarni taqribiy usullar bilan hisoblash** so'nggi asrlarda matematikalar va kompyuter fanlari rivojlanishida asosiy yo'nalishlardan biri hisoblanadi. Zamonaviy kompyuter texnologiyalari va algoritmlari yordamida murakkab integrallar sonli usullar bilan yuqori aniqlikda yechilmoqda.

Taqribiy integrallar hisoblashning nazariy asoslari. Aniq integral $+I=\int_a^b f(x)dx$ ning taqribiy hisoblashda, integralni kichik oraliqlarga bo'lib, funktsiyani oddiy shakllar bilan yaqinlashtirib, natijalarni yig'ish orqali hisoblash usullari qo'llaniladi. Umuman olganda,

$$I \approx I_n = \sum_{i=1}^{n} w_i \, f(x_i)$$

bu yerda x_i — nuqtalar, w_i — ularning vaznlari.
Har bir usul o'ziga xos x_i va w_i tanloviga ega.

To'g'ri to'rtburchaklar usuli. Integral oraliq $[a,b]n$ teng bo'lakka bo'linadi, har bir bo'lak uzunligi $h=\frac{b-a}{n}$. Har bir bo'lakda funktsiya qiymati bo'lakning boshlanishida olinadi va to'rtburchak maydoni sifatida qabul qilinadi.
Formulasi:

$$I \approx h \sum_{i=0}^{n-1} f(x_i), \quad x_i = a + ih$$

Misol:

$$\int_0^1 e^x\ dx, \quad n=4$$

Oraliqlar: [0,0.25], [0.25,0.5], [0.5,0.75], [0.75,1]

Hisoblash:

$$I\approx 0.25\,(f(0)+f(0.25)+f(0.5)+f(0.75))$$

Xatolik:

To‘g‘ri to‘rtburchaklar usulining xatolik chegarasi quyidagicha baholanadi:

$$|E|\leq \frac{(b-a)^2}{2}\max_{x\in[a,b]}|f'(x)|$$

Afzalliklari va kamchiliklari:

Afzalliklari	Kamchiliklari
Hisoblash juda oson	Aniqlik past
Dasturlash uchun sodda	Katta xatolik ehtimoli

Trapetsiya usuli. Bu usulda har bir kichik oraliqda funktsiya chizig‘i to‘g‘ri chiziq (trapetsiya) bilan yaqinlashtiriladi.

Formulasi:

$$I\approx \frac{h}{2}\left[f(a)+2\sum_{i=1}^{n-1} f(x_i)+f(b)\right]$$

Misol:

$$\int_0^1 \sqrt{x}\,dx integralinin=4$$

Xatolik:

Trapetsiya usulining xatolik chegarasi:

$$|E|\leq \frac{(b-a)^3}{12n^2}\max_{x\in[a,b]}|f''(x)|$$

Afzalliklari va kamchiliklari:

Afzalliklari	Kamchiliklari
Oddiy va samarali	Aniqlik funktsiyaga bog‘liq
Keng qo‘llaniladi	Keskin o‘zgaruvchilar uchun noqulay

Simpson usuli. Oraliq$[a,b]$ juft bo‘laklarga bo‘linib, har ikki bo‘lak uchun parabola yaqinlashtiriladi.

Formulasi:

$$I \approx \frac{h}{3}\left[f(x_0)+4\sum_{toq\ i} f(x_i)+2\sum_{juft\ i} f(x_i)+f(x_n)\right]$$

Misol:

$$\int_0^2 \frac{1}{1+x^2}\,dx, \quad n=4$$

Xatolik:
Simpson usulining xatolik chegarasi:

$$|E| \le \frac{(b-a)^5}{180n^4} \max_{x\in[a,b]} |f^{(4)}(x)|$$

Afzalliklari va kamchiliklari:

Afzalliklari	Kamchiliklari
Yuqori aniqlik	Hisoblash murakkabligi
Ko‘p hollarda samarali	Oraliq juft bo‘lishi shart

Gauss kvadraturasi. Integral hisoblashda maxsus tanlangan nuqtalar va vaznlar yordamida yuqori aniqlik bilan taqribiy baho olinadi.
Matematik asos:
Gauss-Legendre kvadraturasi quyidagicha ifodalanadi:

$$|E| \le \frac{(b-a)^5}{180n^4} \max_{x\in[a,b]} |f^{(4)}(x)|$$

bu yerda x_i *va* w_i *— maxsus tanlangan nuqtalar va vaznlar*
Misol:

Monte-Karlo usuli

Integralni hisoblashda tasodifiy nuqtalar yordamida funktsiya qiymatlari o‘rtachasi olinadi.
Formulasi:

$$I \approx \frac{b-a}{N}\sum_{i=1}^{N} f(x_i)$$

x_i *— tasodifiy tanlangan nuqtalar*

Misol:

$$\int_0^1 x^2\,dx \quad (\textit{Monte-Karlo usuli})$$

Afzalliklari va kamchiliklari

Afzalliklari	Kamchiliklari
Yuqori o‘lchamli masalalar uchun qulay	Aniqlik tasodifiylikka bog‘liq
Moslashuvchan	Hisoblash ko‘p vaqt talab qiladi

Qiyosiy tahlil

Usul	Aniqlik	Murakkablik	Qo‘llanish
To‘g‘ri to‘rtburchak	Past	Oson	Oddiy vazifalar
Trapetsiya	O‘rtacha	Oson	Amaliy hisoblash
Simpson	Yuqori	O‘rtacha	Ilmiy va muhandislik
Gauss	Juda yuqori	Murakkab	Professional hisoblash
Monte-Karlo	O‘zgaruvchan	Yuqori	Katta o‘lchamli masalalar

Xulosa

Aniq integrallarni taqribiy hisoblash usullari matematikada va amaliyotda muhim ahamiyatga ega. Har bir usulning o‘ziga xos kuchli va zaif tomonlari bor. Masalaning murakkabligi va aniqlik talablari asosida usullar tanlanadi. Zamonaviy kompyuter resurslari yordamida murakkab integrallarni yuqori aniqlikda yechish mumkin.

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O‘ZBEKISTONDA SANOAT KORXONALARIDA INVESTITSION FAOLIYATNI RAG‘BATLANTIRISH YO‘NALISHLARI

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Annotatsiya: Ushbu maqolada O‘zbekistonda sanoat korxonalarida investitsion faoliyatni rag‘batlantirish yo‘nalishlari ko‘rib chiqilgan. Maqola sanoat korxonalarining rivojlanishida investitsiyalarning o‘rni va ularga ta’sir qiluvchi asosiy omillarni tahlil qiladi. Mamlakatimizda sanoat tarmoqlarini modernizatsiya qilish, yangi texnologiyalarni joriy etish, korxonalarda ishchi kuchining malakasini oshirish kabi investitsion faoliyatni rag‘batlantirish mexanizmlari tavsiya etilgan. Ushbu strategiyalarni amalga oshirish sanoat korxonalarining barqaror rivojlanishini ta’minlashga xizmat qiladi. O‘zbekistonda sanoatni rivojlantirishda investitsiyalarning roli va samarali mexanizmlarining ishlab chiqilishi, shuningdek, davlat tomonidan yaratilgan rag‘batlantirish mexanizmlarining samaradorligini oshirish zarurati qayd etilgan.

Kalit so‘zlar: sanoat korxonalari, investitsion faoliyat, rag‘batlantirish, UzAuto Motors, texnologiyalar, modernizatsiya, ishlab chiqarish samaradorligi, davlat siyosati, raqobatbardoshlik, qo‘llab-quvvatlash mexanizmlari, investitsiya