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# MAHSULOT SIFATI VA SIFATNI BOSHQARISHDA SUN'IY INTELLEKTNING O'RNI.

**Fatkhullaeva Rano**

Sifat har kuni paydo bo'lgan va har bir sohada eslab o'tilgan tushunchadir. Sifat lotinaning ma'nosiga (so'zning lotincha ildizi qanday tashkil qilinganligini anglatadi) va u nimani anglatadi, qaysi mahsulot yoki xizmatlardan foydalanilganligi bilan bog'liq. Sifat mo'ljallangan maqsadlarga, texnologik o'zgarishlarga, iste'molchilarning ehtiyojlariga va qiymat baholashiga qarab turli yo'llar bilan aniqlanadi. Lekin, asosan, sifat va xizmatning ma'lum shartlarga muvofiqligi yoki muayyan ehtiyojni qondirish darajasi sifatida tavsiflanadi.

Mahsulot sifatini boshqarish tizimlari ishlab chiqish bosqichida texnikaviy darajani rivojlanishini yuqori sur’atlarda doimo bo‘lishini ta’minlaydi. Murakkab va mas’uliyatli buyumlar uchun ishlab chiqishda sifatni boshqarish jarayonida maxsus ish rejalari tuziladi. Maxsus konstruktorlik ilmiy-tadqiqot yoki loyihalash institutlarida, sanoat korxonalarida konstruktorlik texnologik bo‘lim (byuro)larda yangi mahsulot namunalarini ishlab chiqish mumkin. Bunda asosiy e’tibor ushbu buyum namunasi haqiqatan yangi bo‘lishiligiga yoki ishlab chiqarishdagi buyumlarning takomillashganligiga qaratiladi. Mahsulotni ishlab chiqarishga tayyorlash bosqichida optimal texnologik jarayonlarni tanlash qiyin va u mas’uliyatli vazifa, chunk) bu bosqichda doimiy texnologiyaning qiyinlashishi hamda ishlab chiqarishning iqtisodiy ko'rsatkichlarini yaxshilash zaruriyati bo‘ladi. Tayyorlash bosqichida mahsulot sifatini oshirish korxonaning asosiy vazifalaridan biri hisoblanadi. Maxsulotni ishlab chiqarishga tayyorlash bosqichida optimal tehnologik jarayonlarni tanlash qiyin va u mas'uliyatli vazifa, chunki bu bosqichda doimiy texnologiyaning qiyinlashishi hamda ishlab chiqarishning iqtisodiy ko’rsatkichlarini yaxshilash zaruriyati bo’ladi. Tayyorlash bo'sqichida mahsulot sifatini oshirish korhonaning asosiy vaziflardan biri hisoblanadi.

Sun'iy intellekt (SI) sifat va sifatni boshqarish jarayonlarida muhim o'rin tutadi va ko'plab sohalarda samaradorlikni oshiradi. Quyida SI sifat va sifatni boshqarishda qanday ishlatilishi va uning afzalliklari haqida qisqacha ma'lumot keltirilgan:

1. **Ma'lumotlarni tahlil qilish va prognoz qilish**

SI katta miqdordagi ma'lumotlarni tahlil qilish orqali korxonalar uchun sifat va ishlab chiqarish jarayonlarini optimallashtirish imkonini beradi. Misol uchun, zavodda ishlab chiqarish jarayonidagi nuqsonlarni oldindan aniqlash orqali turli sifat muammolarining oldini olishda yordam beradi.

2. **Real vaqtda monitoring** IoT (Internet of Things) qurilmalari bilan birgalikda ishlatiladigan SI ishlab chiqarish jarayonlarini real vaqtda kuzatib boradi. Masalan, ishlab chiqarish liniyasidagi har bir mahsulotning sifatini tekshirish, nuqsonlarni aniqlash va ularni darhol bartaraf etishga imkon yaratadi. Bu, ayniqsa, avtomobilsozlik, farmatsevtika va elektronika kabi yuqori aniqlikni talab qiluvchi sohalarda juda muhimdir.
3. **Sifat nazoratining avtomatlashtirilishi** Mashinasozlik, matnli va tasvirli ma'lumotlarni qayta ishlash texnologiyalari orqali sun'iy intellekt insonning xatoliklarining oldini olishga imkon yaratadi. Masalan, sun'iy intellekt tasvir tahlili orqali mahsulotlar yuzasidagi nuqsonlarni yoki o‘lchov xatolarini aniqlashi mumkin.
4. **Kuzatish va optimallashtirish** Sun'iy intellekt ishlab chiqarish jarayonini optimallashtirishda ishlatiladi. U ishlab chiqarish jarayonidagi samaradorlikni oshirish uchun real vaqtli tahlillar asosida o‘zgartirishlar kiritadi. Masalan, sun'iy intellekt tarmoqdagi ma'lumotlarni yig'ish orqali resurslardan samarali foydalanish uchun ishlab chiqarish rejalarini optimallashtiradi.
5. **Xatolarni oldini olish va muammolarni prognoz qilish** AI texnologiyasi yordamida ishlab chiqarish jarayonida yuzaga kelishi mumkin bo'lgan xatolarni oldindan prognoz qilish va oldini olish imkoniyati mavjud. Bu orqali ishlab chiqarish jarayonida sifatni yaxshilash, isrofgarchilik va vaqt yo'qotishlarni kamaytirish imkonini beradi.
6. **Innovatsiyalarni joriy etish va o‘rganish imkoniyati** Sun'iy intellekt korxona sifatini boshqarish strategiyalarini o‘rganadi va takomillashtiradi. Bu yangi innovatsiyalarni, usullarni joriy etishda yordam beradi hamda korxonalar o‘z raqobatdoshligini mustahkamlashga erishadi.

SI sifat va sifatni boshqarish jarayonlariga qo‘shilsa, korxona uchun raqobatbardoshlik oshadi, xarajatlar kamayadi va jarayonlarning aniqligi sezilarli darajada yuqori bo‘ladi. Shu bilan birga, sun'iy intellektning samarali ishlatilishi ishchi kuchini malakasini oshirish va murakkab vazifalarni bajarish uchun yangi ko‘nikmalarni rivojlantirishga imkon yaratadi.

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# СВОЙСТВА НОВЫХ СОРОЧЕЧНЫХ ТКАНЕЙ

**УДК 677.03**

**Паттахова Д. А., Узакова У.Р.**
*Ташкентский институт текстильной и легкой промышленности*

***Аннотация.*** *Разработан новый ассортимент сорочечной ткани. Проведены сравнительные исследования стандартной и разработанной сорочечной ткани на основе их структурных характеристик и физико-механических свойств и Обоснованы оптимальные сочетания переплетений и волокон для сорочечной ткани, а также преимущества инновационной сорочечной ткани по показателям - поверхностная плотность, воздухопроницаемость, стойкость к истиранию, разрывная прочность, удлинение, несминаемость, потеря прочности, гигроскопичность, степень эластичности.*
***Ключевые слова:*** *ткань, свойства, воздухопроницаемость, гигроскопичность, несминаемость, прочность, истирание, драпируемость.*
***Annotatsiya.*** *Tadqiqot ishida Ko‘ylakbop to‘qimaning yangi assortimenti ishlab chiqildi. Mavjud va yangi ishlab chiqilgan ko‘ylakbop to‘qimalarning tuzilish tavsiflari va fizik mexanik xususiyatlari asosida qiyosiy tadqiqotlar o‘tkazildi. Ko‘ylakbop to‘qimalar uchun tolalar va o‘rilishlarning optimal birikmalari aniqlandi. Yangi tuzilishdagi ko‘ylakbop to‘qimaning mavjud to‘qimalarga nisbatan yuza zichligi, havo o‘tkazuvchanligi, ishqalanishga chidamliligi, uzilishdagi cho‘zilishi, g‘ijimlanmasligi, gigroskopiklik, buramdorligi va boshqa ko‘rsatkichlari bo‘yicha ustunlik tomonlari asoslandi.*
***Kalit so‘zlar :*** *To’qima, xususiyat, havo o’tkazuvchanligi, suv o’tkazuvchanligi, g’ijimlanmasligi, mustahkamligi, ishqalanishga chidamliligi, buramdorlik.*
***Abstract.*** *A new range of shirt fabrics has been developed. Comparative studies of standard and developed shirt fabric were carried out based on their structural characteristics and physical and mechanical properties and the optimal combinations of weaves and fibers for shirt fabric were substantiated, as well as the advantages of innovative shirt fabric in terms of surface density, breathability, abrasion resistance, tensile strength, elongation, wrinkle resistance, loss of strength, hygroscopicity, degree of elasticity.*
***Keyword*** *: fabric, properties, breathability, hygroscopicity, wrinkle resistance, strength, abrasion, drapability.*

Свойства сорочек зависят главным образом от свойств тканей, ее составляющих. Степень пригодности тканей для тех или иных сорочек определяются, в основном, их физико-механическими свойствами. Наибольшее гигиеническое значение имеют следующие свойства: вес, толщина, воздухопроницаемость, паропроницаемость, гигроскопичность, гидрофильность (капиллярность), водоемкость, водопроницаемость, теплопроводность, пористость, упругость, гибкость, сминаемость, усадка, скорость высыхания, пылеемкость, коэффициент отражения. Ткань не является монолитным образованием. Она представляет собой сложную структуру, состоящую из текстильных волокон и воздуха, количество которого весьма велико и колеблется в зависимости от структуры ткани. Непосредственно с объемным весом связано другое важное свойство тканей - их пористость. Пористость материала определяется отношением объема пор к объему данного материала, выраженным в процентах. При одном и том же количестве воздуха в тканях, воздух может по-разному в тканях размещаться, отчего зависят воздухопроницаемость, паропроводимость и другие свойства тканей. Воздухопроницаемость тканей, т. е. степень проходимости ее для воздуха, в значительной мере определяет ее пригодность для того или иного вида одежды [5-8]. Выражается она количеством воздуха ($дм^3$), проходящего в единицу времени (с) через единицу поверхности ткани (1 $м^2$) при определенном давлении (h = 5 мм рт. ст.). Важным показателем гигиенических свойств тканей является их отношение к гигроскопичности.

Механические свойства – комплекс свойств определяющих отношение материала к действию различно приложенных к нему внешних сил таких, как прочность, удлинение, истирание, драпируемость и т д. Прочность учитывается при определении носкости сорочек. Драпируемость это способность ткани образовывать в подвешенном состоянии мягкие подвижные складки. Драпируемость зависит от гибкости материала и его массы [9-12].

Вышеотмеченные свойства сорочечной ткани исследованы на приборах лаборатории CENTEXUZ [13-14]. Для эксперимента представлены образцы базовой и разработанной сорочечной ткани. В базовой ткани плотность по утку $P_y$=190 нить/дм., плотность ткани по основе $P_o$=276 нить/дм., переплетение полотняное, линейная плотность по основе и линейная плотность по утку $T_o = T_y$ =11,8x2 текс (100% хлопчатобумажная). Отличие разработанной ткани от стандартной ткани то, что через каждые три рапорта

по основе полотняного переплетения, расположен один рапорт по основе перевивочного переплетения. В перевивочном переплетении использованы лавсановые нити различных линейных плотностей по основе $T_o$ = 6,6 текс, $T_o$ = 10 текс, $T_o$ = 14 текс, $T_o$ = 17 текс, $T_o$ = 22 текс, остальные параметры неизменны (плотность ткани по основе и по утку, линейная плотность по утку, и т. д). Образцы разработанных тканей закодировали Т1, Т2, Т3, Т4 и Т5 с различной линейной плотностью по основе 6,6; 10; 14; 17; 22 текс или с процентным содержанием лавсановой нити 4,0%, 10%, 14%, 20% и 24% в сорочечной ткани соответственно. Выработаны образцы разработанных тканей на ткацком станке с микропрокладчиками. В таблице 1 представлена кодировка образцов разработанных тканей.

Таблица 1.

Кодировка образцов разработанных тканей

| Код образцов тканей | Т1 | Т2 | Т3 | Т4 | Т5 |
|---|---|---|---|---|---|
| Сырье | лавсан | лавсан | лавсан | лавсан | лавсан |
| Линейная плотность по основе | 6,6 | 10 | 14 | 17 | 22 |
| Процент содержания лавсана в ткани | 4,0 | 10 | 15 | 20 | 24 |
| Переплетения | перевивочное | перевивочное | перевивочное | перевивочное | перевивочное |

Далее были исследованы физико-механические свойства, включая, прочность на разрыв (N) и удлинение при разрыве (%), произведен анализ образцов сорочечных тканей, изготовленных из разных линейных плотностей нитей основы перевивочного переплетения. Результаты испытаний механических свойств (прочность на разрыв и удлинение при разрыве) образцов разработанных сорочечных тканей приведены в таблице 2 и в таблице 3.

| Образцы ткани | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|
| Прочность на разрыв нитей основы | 290 | 300 | 310 | 320 | 340 |
| Прочность на разрыв нитей утка | 190 | 190 | 191 | 192 | 193 |

Таблица 2.
Влияние линейной плотности нитей основы перевивочного переплетения на прочность разрыва.

Таблица 3.
Влияние линейной плотности нитей основы перевивочного переплетения на удлинения при разрыве.

| Образцы ткани | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|
| Удлинение при разрыве ткани по основе | 14 | 15 | 16 | 18 | 20 |
| Удлинение при разрыве ткани по утку | 12 | 12 | 13 | 14 | 16 |

Из таблицы 2 следует то, что на прочность ткани на разрыв существенно влияет линейная плотность нитей основы. Построены графики влияния линейной плотности нитей на прочность на разрыв ткани, которые представлены на рис.1. Из графиков (рис.1) следует, что по мере увеличения линейной плотности нитей основы прочность ткани на разрыв повышается. Это обусловлено тем, что больший вес ткани и относительно плотная ткань всегда сопровождаются более высокой линейной плотностью нитей.

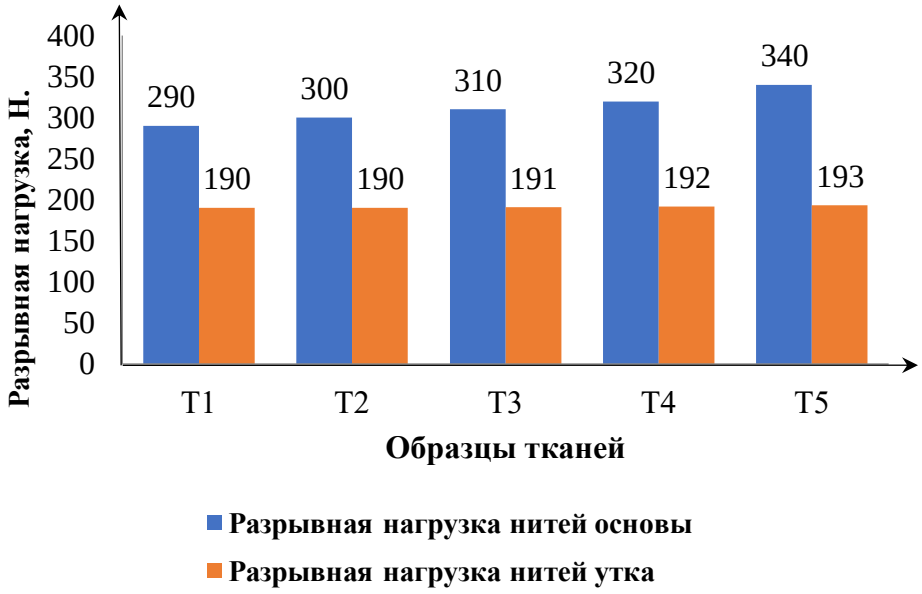


Рис.1. Гистограмма влияния линейной плотности нитей основы перевивочного переплетения на прочность на разрыв ткани.

Анализ таблицы 3 показывает, что на удлинение при разрыве образцов ткани также значительно влияет линейная плотность нитей основы перевивочного переплетения. На рис. 2 представлен график влияния линейной плотности нитей основы перевивочного переплетения на удлинение при разрыве ткани.

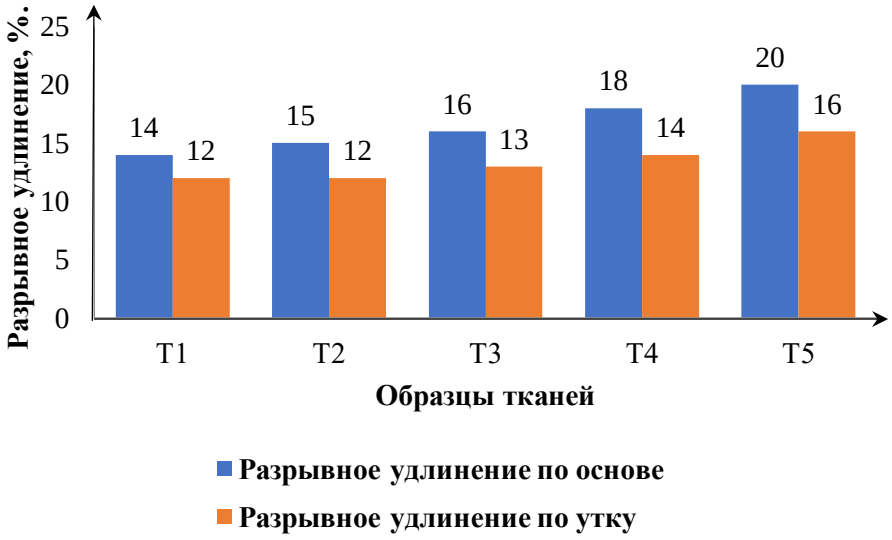


Рис.2. Гистограмма влияния линейной плотности нитей основы перевивочного переплетения на удлинение при разрыве ткани.

Как видно из рис.2 удлинение при разрыве ткани увеличивается с увеличением линейной плотности нитей основы перевивочного переплетения. Это связано с тем, что относительное удлинение при разрыве волокон лавсана выше, чем у волокон хлопка. Это максимальное удлинение при разрыве наблюдалось для

образца ткани Т5, а минимальное значение удлинения при разрыве также наблюдалось для образца ткани Т1.

Также были исследованы влияние на параметры комфорта сорочечной ткани. К параметрам комфорта ткани относятся воздухопроницаемость и драпируемость ткани. В таблице 4 приведены результаты влияния линейной плотности нитей основы перевивочного переплетения на воздухопроницаемость ткани.

Таблица 4.

Влияние линейной плотности нитей основы перевивочного переплетения на воздухопроницаемость ткани.

| Образцы ткани | Т1 | Т2 | Т3 | Т4 | Т5 |
|---|---|---|---|---|---|
| Воздухопроницаемость ткани, $дм^3м^2с^2$ | 180 | 170 | 160 | 155 | 150 |

На рис. 3 построены график влияния линейной плотности нитей основы перевивочного переплетения на воздухопроницаемость ткани.

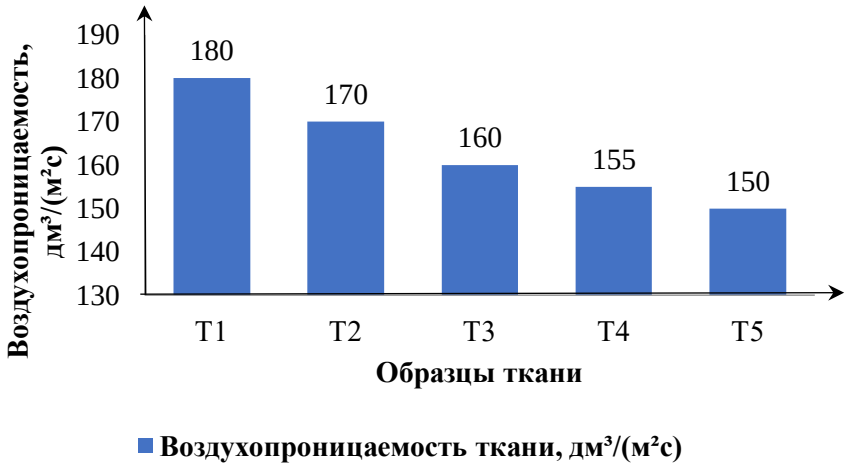


Рис. 3. Гистограмма влияния линейной плотности нитей основы перевивочного переплетения на воздухопроницаемость ткани.

Анализ этих гистограмм показывает, что максимальная воздухопроницаемость на образце ткани Т1, в то время как низкая воздухопроницаемость на образце Т5. Более высокое значение воздухопроницаемости наблюдается в ткани с более малым значением линейной плотности нитей основы перевивочного переплетения, и оно уменьшается по мере увеличения значений линейной плотности нитей основы перевивочного переплетения. По мере того, как линейная плотность нитей

основы перевивочного переплетения увеличивается, уработка сорочечной ткани становиться больше, что делает ткань более компактной, объемной и более толстой, что приводить к высокому сопротивлению воздушному потока. Следовательно, более высокая линейная плотность нитей основы перевивочного переплетения может помочь в достижении более высокой способности к растяжению с пониженной воздухопроницаемости.

Драпируемость - это показатель жесткости ткани. Ткань с большей драпируемостью более жесткая. Жесткость влияет на драпировку ткани и тактильный комфорт. Ткань с очень малой драпируемостью неудобна в носке и не сгибается с контурами тела при носке. В таблице 5 представлены результаты влияния линейной плотности нитей основы перевивочного переплетения на драпируемость сорочечной ткани.

Таблица 5.

Влияние линейной плотности нитей основы перевивочного переплетения на драпируемость сорочечной ткани.

| Образцы ткани | T1 | T2 | T3 | T4 | T5 |
|---|---|---|---|---|---|
| Драпируемость ткани, %. | 26,4 | 28,5 | 29,3 | 30,2 | 30,6 |

На рис.4 построен график влияния линейной плотности нитей основы перевивочного переплетения на драпируемость сорочечной ткани. Из графика следует то, что максимальная драпируемость на образце ткани T5, в то время как самая низкая драпируемость на образце T1.

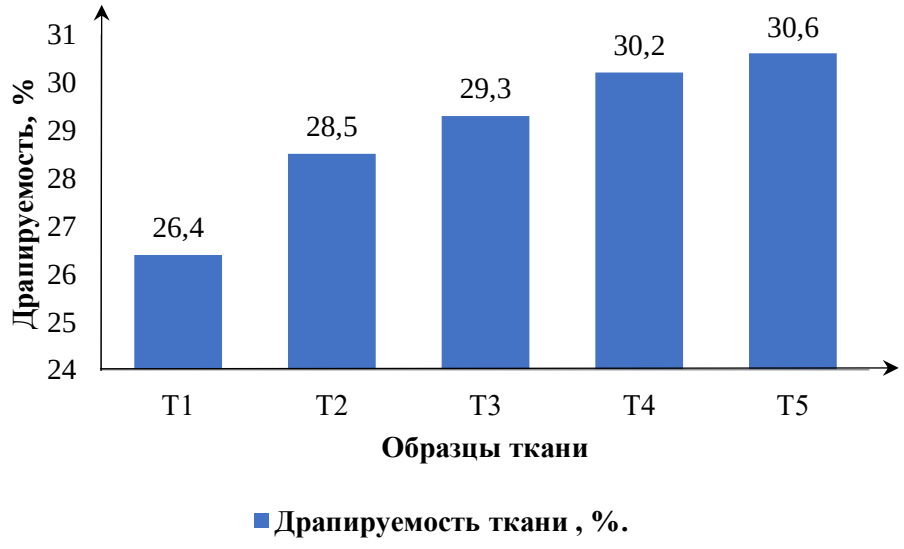

Рис. 4. Гистограмма влияния линейной плотности нитей основы перевивочного переплетения на драпируемость сорочечной ткани.

## ВЫВОДЫ

1. Разработан новый ассортимент сорочечной ткани. Проведены исследования разработанной сорочечной ткани на основе их структурных характеристик и физико-механических свойств и Обоснованы оптимальные сочетания переплетений и волокон для сорочечной ткани, а также преимущества новой сорочечной ткани по показателям - поверхностная плотность, воздухопроницаемость, стойкость к истиранию, разрывная прочность, удлинение, несминаемость, потеря прочности, гигроскопичность, степень эластичности.

2. Воздухопроницаемость сорочечной ткани снижается по мере увеличения процентного содержания лавсана, поскольку остается меньше места для прохождения воздуха. По мере того, как процентное содержание лавсана увеличивается, сжатие ткани больше, что делает ткань более компактной, объемной и толстой, в результате приводить к более высокому сопротивлению потоку воздуха. Следовательно, более высокое содержание лавсана может помочь в достижении более высокой способности к растяжению с пониженной воздухопроницаемостью.

3. Драпирующая способность сорочечной ткани увеличивается с увеличением процентного содержания лавсана. Способность ткани к растяжению и восстановление эластичности ткани увеличивается с увеличением процентного содержания лавсана.

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# THE STATE OF CELLULAR IMMUNITY IN PATIENTS WITH KIDNEY DAMAGE AFTER THE SARS-COV2

**Khursandov Ilyos Akhmedovich**
Faculty of Medicine of the Termez University of Economics and Service

**Resume.** Acute kidney damage in patients after SARS-CoV2 occurs against the background of a low number and activity of CD4+ cells and a high value of CD8+, CD19+ cells, which ultimately leads to impaired regeneration of individual parts of damaged nephrons, stimulating the growth and accumulation of circulating immune complexes and changing their antigenic structure. High values of phagocytic number and index may indicate the continued destruction of the basement membranes of nephrons, which ultimately leads to a decrease in the functional volume of the kidneys with the development of chronic renal failure.
**Keywords:** kidneys, cellular immunity, SARS-COV 2.

**Relevance.** To date, it has been established that the direct pathological effect of the SARS-CoV-2 coronavirus on the kidneys occurs through the receptors of the ACE2 organ, an angiotensin converting enzyme. Progressive application with the protein component of the receptor leads to the destruction of the renal parenchyma. Mediocre pathological effects occur through disorders in the immune system as a result of a so-called cytokine storm (1,3,5,7,31,32,33,34,35,36,37,38,39,40).
SARS-CoV-2 affects both the innate and acquired immune response of the host. SARS-CoV-2 can induce an immune response in two phases: an early specific acquired immune response to eradicate the virus and inhibit disease progression, and uncontrolled inflammation as a responsible mechanism for ARDS. The virus spreads and affects tissues with ineffective immune responses (2,4,6,8,10,41,42,43,44).
Necrosis or apoptosis of T cells promotes the release of a cytokine storm leading to a reduction of T cells (9,11,13,15), especially in cases with severe disease, lower circulating CD4+ and CD8+ T cells and higher, IL-10 and tumor necrosis factors-α (TNFa) (12,14,16,18,20,22). Therefore, systemic inflammation harms viral clearance, contributing to the depletion of T cells (17,19,21,23,25,45).
Almost all patients with SARS-CoV-2 developed lymphopenia as an important marker of immune system disorders (24,26,28,30). Kidney macrophages play a key

role in immune defense, as they are the predominant cells interacting with virus targets and can activate phagocyte and chemokine signaling [27,29]. In addition, the cytopathic effect of the SARS-CoV-2 virus can directly damage renal tubular cells during infection and replication stages, spreading a complex immune response. In addition, the chemokine network, activation of complement cascades and coagulation play a potential role in the development of PP in patients with SARS-CoV-2.

**The purpose of the study.** To study the state of cellular immunity in patients with kidney damage after undergoing SARS-COV 2.

**Research materials and methods:** The paper presents information on the comprehensive examination and treatment of 62 patients with kidney damage who underwent SARS-CoV-2. The distribution of patients was carried out on the basis of a prospective targeted open randomized trial.

The period of research and collection of clinical material began in the second quarter of 2020 and ended in December 2023. At the same time, during the period from April to August 2020, the clinic also functioned as a specialized covid center, with the involvement of specialists from all directions in accordance with quarantine requirements. All patients were grouped into one main group.

The criteria for inclusion of patients in the main group were: the age of patients not younger than 20 and not older than 75 years; the presence of a history of coronavirus infection, with severe course, with signs of kidney damage during treatment; preservation of signs of kidney disease (proteinuria, albuminuria, micro- or macrohematuria, decreased glomerular filtration rate, high creatinine values and urea in the blood, etc.); the presence of a negative result of a PCR test for SARS-CoV-2 during hospitalization in our clinic; availability of the patient's voluntary informed consent to participate in a clinical trial.

In a comparative assessment of clinical and immunological changes, data from 20 healthy individuals recognized by the medical commission as absolutely healthy were used. All of them were combined into a control (reference) group.

The criteria for the inclusion of volunteers in the control group were: the age of patients from 20 to 50 years; the absence of any chronic somatic or mental diseases; the mandatory conclusion of the medical commission on a healthy state during the last 3 months before the study; the absence of a history of diseases from the urinary system; the absence of a history of SARS-CoV-2; the presence of a negative result of the PCR test for SARS-CoV-2; the presence of voluntary informed consent to participate in a clinical trial.

All patients in the main group were divided by stages of kidney damage after suffering SARS-CoV-2, which were also recommended by KDIGO.

Kidney damage was typical mainly for mature and elderly patients, while acute kidney damage after SARS-CoV-2 was typical for younger age.

Male patients prevailed (67.7%), and among both patients of the first and second subgroups.

Immunological studies were performed at the Bukhara branch of the Institute of Human Immunology and Genomics.

**Results and their discussion.** The study of the state of cellular immunity in patients with kidney damage after undergoing SARS-CoV2 was mainly aimed at assessing their activity against viruses. At the first stage, we studied the dynamics of changes in leukocytes in the blood. The general dynamics of leukocyte levels among patients with kidney damage after SARS-CoV2 was characterized by the presence of leukocytosis. Thus, the average value of leukocytes in the blood for the entire study period in patients with kidney damage after SARS-CoV2 was 9.16±1.08 x109/l [CI:8.08; 10.08]. The maximum level of leukocytosis was noted among patients of the first subgroup before treatment [CI:10.47; 13.79], which was 2.9 times higher than the reference values ($p<0.05$). Even after the treatment in patients of the first subgroup, the level of leukocytosis was 2.75 times higher [CI:11.28; 12.22] than the level of the reference value [CI:4.08; 4.44]. In patients of the second subgroup, when contacting our clinic, the leukocyte level corresponded to a range of physiological values [CI:6.63; 7.67]. By the end of the treatment, this indicator decreased by 1.3 times compared to the period when patients were admitted to our clinic [CI:3.93; 7.25]. The number of neutrophils in patients with kidney damage after undergoing SARS-CoV2 was characterized by the presence of high values, although there was a relative decrease in the dynamics of the treatment. The average level of neutrophils in patients over the entire period of the study was 68.89±1.91% ($p<0.05$ relative to the reference values). At the same time, in patients before treatment, its level was equal to 70.16±2.01% ($p<0.05$ relative to the reference values), and after treatment they decreased to 67.62±1.77% ($p<0.05$ relative to the reference values).

The ranges of the confidence interval in the dynamics of the treatment ranged from [CI: 68.11; 72.22] before the treatment and within [CI: 65.86; 69.4] after the treatment. The average level of this indicator was [CI: 66.98; 70.81].

A separate analysis of the dynamics of changes in the number of neutrophils in the blood, depending on the time of admission to the clinic, showed that in patients of the first subgroup, the difference between the number of neutrophils before

treatment [CI: 67.81; 70.97] and after treatment [CI: 67.55; 72.23] was not significant, whereas in patients of the second subgroup, significant changes in according to this indicator, before [CI: 68.4; 73.46] and after [CI: 64.16; 66.56] treatment ($p<0.05$). The average number of neutrophils among patients of the first subgroup was 69.64±1.96%, and among patients of the second subgroup it was less - 68.15±1.87%.

The number of eosinophils over the entire period of the study in patients with kidney damage, after undergoing SARS-CoV2, averaged 2.61±0.89% [CI: 1.72; 3.51], exceeding the reference value by 1.2 times [CI: 1.64; 2.64] – Table 3.3. At the same time, the number of eosinophils in patients of the main group in The period of treatment at the clinic was characterized by an increase in this indicator of 2.9±0.62% [CI: 2.28; 3.52] compared with the reference values (2.14±0.5%; $p<0.05$).

In a separate analysis of changes in the level of eosinophils in the blood of patients of different subgroups, we noted relative eosinophilosis after a course of treatment among patients of the first subgroup [CI: 1.61; 0.33]. It should be noted that the initial value of blood eosinophils in patients of the first subgroup upon admission to our clinic was 1.3 times less than the reference [CI: 1.64; 2.64] values ($p<0.05$). After the treatment, in patients of the first subgroup, there was an increase in the number of eosinophils [CI: 2.58; 3.74], which exceeded the reference value by 1.5 times. At the same time, a 2-fold increase in eosinophils after treatment was also noted by us in relation to the period before the start of treatment [CI: 1.28; 1.94] in patients of the first subgroup ($p<0.05$). Thus, the average value of eosinophils among patients of the first subgroup for the entire period of the study was 2.39±0.46% [CI: 1.93; 2.84], which was lower than the overall average value [CI: 1.72; 3.5].

In patients of the second subgroup, the average value of eosinophils, which was 2.84±0.47% [CI: 2.37; 3.31], exceeded this indicator in patients of the first subgroup by 1.2 times [CI: 1.93; 2.84] and the index of reference values [CI: 1.64; 2.64] by 1.3 times.

When patients went to the clinic, before the start of treatment, a high value of this indicator was revealed [CI: 3.27; 5.09], which exceeded the reference values by an average of 1.9 times ($p<0.05$), the values of patients of the first subgroup before the start of treatment by 2.6 times ($p<0.05$) and the values of patients of the first the subgroups after treatment increased 1.3 times ($p<0.05$). We deliberately focus on this fact, since the level of eosinophils in the blood of patients of the second subgroup

before the start of treatment exceeded (by 1.4 times; $p<0.05$) the average value of this period for all patients with kidney damage after undergoing SARS-CoV2.

After the treatment, patients of the second subgroup have a mirror image of the reverse pattern in the change in the number of eosinophils in the peripheral blood. The number of eosinophils in patients of the second subgroup after treatment [CI: 1.47; 1.53] decreased by 2.8 times ($p<0.05$), compared with the previous study period. Compared with the same period of the study of patients of the first subgroup, there was also a 2.1-fold decrease in the number of eosinophils ($p<0.05$). The share of this indicator in the share of the total average value of patients in the main group after treatment was 64.4%, and among patients in the second group – 52.8%.

Thus, the increase in the number of eosinophils noted by us in chronic kidney damage after SARS-CoV2 is characterized by a decrease below the reference value after treatment, whereas in patients with acute kidney damage after SARS-CoV2, the reverse pattern occurs, characterized by an initially low number of these cells with gradual growth after treatment.

The average number of monocytes in peripheral blood in patients with kidney damage due to SARS-CoV2 was 5.08±1.25% [CI: 3.83; 6.32], which was 1.4 times higher than the reference values (3.73±0.51% [CI: 3.22; 4.24]) ($p<0.05$).

monocytes in patients with kidney damage after undergoing SARS-CoV2 at the initial visit to our clinic equated to 5.05±0.63% [CI: 4.42; 5.68], and after treatment this indicator remained almost unchanged and amounted to 5.10±1.86% [CI: 3.24; 6.96].

In patients with acute kidney injury after SARS-CoV2, the average content of monocytes in peripheral blood was 4.57±0.59% [CI: 3.99; 5.16], which was 1.22 times higher than the reference values. Upon admission to the clinic, the number of monocytes in peripheral blood [CI: 4.03; 4.93] exceeded the reference value by 1.24 times. The number of monocytes in the peripheral blood of patients of the first subgroup upon admission to the clinic was 1.25 times lower than in patients of the second subgroup during this study period. The proportion of the average number of monocytes of patients before the start of treatment measures was 44.4%. The same level was noted in relation to the total average value of peripheral blood monocytes of the entire main group of patients.

After the treatment, the number of monocytes in peripheral blood increased slightly [CI: 3.94; 5.38] compared to the previous study period [CI: 4.03; 4.93], whereas among patients of the second subgroup there was an inverse pattern of changes (decrease in the number of monocytes from 5.62±0.81% to 5.54±3.0%).

Thus, the overall dynamics of changes in the number of monocytes in peripheral blood was characterized by an unreliable increase after treatment. At the same time, a similar trend of changes was noted among patients with acute kidney injury after undergoing SARS-CoV2, which characterizes the pathological process as the determining mechanism of changes in the structure of leukocytes.

The pattern of lymphocyte changes in CD3+ cells was almost identical in patients with various forms of kidney damage after undergoing SARS-CoV2. It was characterized by a decrease in the value in patients compared with the control data. Thus, the average value of the total number of CD3+ T lymphocytes was 61.87±3.0% [CI: 58.88; 64.87], which was 5.86±1.97% less than the reference values [CI: 62.76; 72.7]. At the same time, the number of CD3+ T lymphocytes in patients before treatment was lower (61.68±3.62%; [CI: 58.06; 65.3]) than in patients after treatment (62.07±2.37%; [CI: 59.7; 64,44]), which indicates a positive effect of methods for correcting kidney damage in patients who have undergone SARS-CoV2 in the form of CD3+ cell expression.

Separate analysis, depending on the timing of treatment in our clinic of patients with kidney damage after SARS-CoV2, low average values of lymphocytes in patients with acute pathological process (60.92±3.39%; [CI: 57.53; 64.30]) can be noted than in patients with chronic pathological process (62.83±2.61%; [CI: 60,22; 65,43]).

In patients of the first subgroup, the number of CD3+ cells in peripheral blood was higher before treatment [CI: 57.02; 65.32] than after replacement therapy [CI: 58.04; 63.28]. In both cases, these indicators were lower than the reference values by 6.56±1.32% and 7.07±2.85%, respectively. At the same time, in patients of the second subgroup, the tendency to change the number of CD3+ cells corresponded to the general average, was higher than in patients with acute kidney injury after SARS-CoV2 and was characterized by an increase in CD3+ cells ([CI: 59.09; 65.27] before treatment and [CI: 61.35; 65.59] after treatment).

We obtained a relatively similar dynamics of changes when studying the number of subpopulations of T helper lymphocytes by CD4+ cells.

The average level of CD4+ T helper cells among patients with kidney damage after SARS-CoV2 was lower (34.58±1.34%) than the reference values (35.26±1.32%), although the confidence interval range did not have such a high difference ([CI: 33.94; 36.58] in the control group and [CI: 33.24; 35.92] the average level of the main group of patients). At the same time, between patients with kidney damage after SARS, the average value was before (34.41±1.29%; [CI: 33.13; 35.7]) and after

(34.75±1.4%; [CI: 33.35; 36,15]) treatment did not have a significant difference, which was due to different phases of the pathological process ($p>0.05$).

The average value of CD4+ T-helper cells among patients with acute kidney injury after undergoing SARS-CoV2 was 35.43±1.51% [CI: 33.92; 36.94], whereas among patients with Over a longer period of the pathological process, this indicator was lower and amounted to 33.73±1.18% [CI: 32.56; 34.91].

When conducting a separate analysis, it can be noted that in acute kidney injury, in patients who underwent SARS-CoV2, the number of CD4+ T helper cells increased [CI: 34.74; 37.48], which was the maximum value compared with the general main group [CI: 33.13; 35.7]. A decrease in CD4+ cell T-helper cells was characteristic of patients with kidney damage after undergoing SARS-CoV2 [CI: 31.51; 33.91], which acquired a chronic course. Renal replacement therapy in patients of the first subgroup led to a decrease in the number of CD4+ T helper cells in peripheral blood [CI: 33.1; 36.4], and hemodialysis in the second subgroup of patients ended with an increase in the number of CD4+ T helper cells [CI: 33.6; 35.9]. In other words, the acute inflammatory process occurred against the background of suppression of T-helpers, whereas the chronic one was stimulated. However, in both cases, the data obtained indicated that the reference values were not reached, which was typical for kidney damage after SARS-CoV2. After the treatment, the level of CD4+ cells in both subgroups becomes the same.

The average number of cytotoxic CD8+ T lymphocytes in patients with kidney damage after SARS-CoV2 was almost at the level of reference values, which was determined by the similarity of fluctuations in the confidence interval ([CI: 19.84; 21.54] reference values and [CI: 19.02; 21.22] in the main group of patients).

The average number of CD8+ cells in the control group was 20.69±0.85%, whereas in patients of the main group it was 20.12±1.1%.

In patients of the main group, the number of CD8+ cells when contacting our clinic was higher than 20.37±1.04% [CI: 19.33; 21.41] than in subsequent periods of therapy 19.87±1.17% [CI: 18.71; 21.04], that is, against the background of replacement therapy, the number of cytotoxic T lymphocytes CD8+ cells it decreased, reaching a level below the reference values.

We noted higher values of CD8+ T cells among patients with acute kidney injury after undergoing SARS-CoV2 [CI: 19.93; 21.55]. This value was higher than the reference value [CI: 19.84; 21.54] and the values of patients in the second subgroup [CI: 18.73; 21.27]. After the therapy, the number of CD8+ T cells in patients of the

first subgroup decreased [CI: 18.08; 20.0], whereas in patients of the second subgroup it increased [CI: 19.33; 23.07].

The average number of CD19+ B lymphocytes in patients with kidney damage after SARS-CoV2 was 10.83±1.12% [CI: 9.72; 11.95], which was higher than the reference values (9.0±0.79% [CI: 8.21; 9.79]). The variance of B lymphocyte values among patients with kidney damage was low at the time of admission to the clinic (10.53±1.0% [CI: 9.54; 11.53]), followed by an increase to 11.13±1.24% [CI: 8.21; 9.79] as a result of substitution therapy. In general, patients with kidney damage after SARS-CoV2 were characterized by an increased value of CD19+ cells. In patients with acute kidney injury after undergoing SARS-CoV2, the level of CD19+ cell elevation was higher than among patients with a chronic pathological process. The number of B lymphocytes increased after the treatment.

The phagocytic number in patients with kidney damage after undergoing SARS-CoV2, both when contacting the clinic and during treatment, was 2.35 times higher than the reference values ($p<0.05$) and 2.13 times ($p<0.05$), respectively.

In patients of the second subgroup, this difference was more pronounced upon admission to the clinic (3.18 times; $p<0.05$) and tended to decrease after therapy. In patients of the first subgroup, changes in the phagocytic number were of a mirror–like nature, that is, after treatment, they increased.

The phagocytic index in patients of the main group, which was 54.18±3.09 CU [CI: 51.09; 57.26], was higher than the reference values.

At the same time, in the dispersion value, the reserve capabilities of phagocytes were relatively high in patients before replacement therapy and amounted to 54.6±2.93 CU [CI: 51.67; 57.53]. After treatment, the phagocytic index decreased to 53.76±3.24 CU [CI: 50.52; 57.0].

On the day of hospitalization of patients to the clinic, relatively high values of the phagocytic index were detected by us in patients of the first subgroup. The same value was noted by us among patients of the second subgroup. After treatment in patients of both the first and second subgroups, the number of phagocytic index decreased in an unreliable value.

The average number of phagocytic index in patients of the first subgroup was 54.3±3.99 cu [CI: 50.31; 58.28], and in patients of the second subgroup - 54.06±2.19 CU [CI: 51.88; 56.25].

The reference values of circulating immune complexes were 33.47±1.4 cu [CI: 32.07; 34.87], whereas in patients of the main group they increased to 57.25±4.96 cu [CI: 52.28; 62.21].

The prevalence of circulating immune complexes was noted among patients before treatment - 62.52±5.37 CU [CI: 57.15; 67.89]. After replacement therapy, the level of circulating immune complexes in the blood decreased to 51.98±4.56 CU [CI: 47.42; 56.53], although it remained 1.55 times higher than the reference values ($p<0.05$).

The highest values were found among patients with acute kidney injury after SARS-CoV2 up to 64.94±5.7 CU [CI: 59.25; 70.64], which was 1.94 times higher than the reference values ($p<0.05$). As a result of the treatment, the decrease in the concentration of circulating immune complexes was insignificant – by 9.48 ± 1.17 cu. We deliberately focus on this fact, since in patients of the second subgroup, the relatively low values of circulating immune complexes in the blood at admission to the clinic, after treatment, decreased by 11.60±2.46 cu.

## CONCLUSION.

1. Acute kidney damage in patients after SARS-CoV2 occurs against the background of a low number and activity of CD4+ cells and a high value of CD8+, CD19+ cells, which ultimately leads to impaired regeneration of individual parts of damaged nephrons, stimulating the growth and accumulation of circulating immune complexes and changing their antigenic structure.
2. 2. High values of phagocytic number and index may indicate the continued destruction of the basement membranes of nephrons, which ultimately leads to a decrease in the functional volume of the kidneys with the development of chronic renal failure.

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# DYNAMIC DEFINITION OF TYPES

**Kholmirzayev Muslimbek Muzaffarovich**
**Sadikov is the son of Nursaid Sanatjon**
TDIU Andijan faculty 2nd stage
ATT 70/23 group students

**Abstract:** This paper explores the dynamic definition of types in the context of algorithm science, highlighting its implications for programming language design, software engineering, and data representation. By analyzing theoretical and practical perspectives, we aim to predict future trends in type systems and their applications.
**Keywords:** Dynamic typing, type theory, programming languages, algorithm design, software engineering, data representation, type inference, flexibility, performance.

## Turlarning dinamik ta'rifi

**Xolmirzayev Muslimbek Muzaffarovich**
**Sodiqov Nursaid Sanatjon o’g’li**
TDIU Andijon fakulteti 2-bosqich
ATT 70/23 guruh talabalari

**Annotatsiya:** Ushbu maqola algoritm fani kontekstida turlarning dinamik ta'rifini o'rganadi, uning dasturlash tilini loyihalash, dasturiy ta'minot muhandisligi va ma'lumotlarni taqdim etish uchun ta'sirini ta'kidlaydi. Nazariy va amaliy istiqbollarni tahlil qilib, biz turdagi tizimlar va ularni qo'llash bo'yicha kelajakdagi tendentsiyalarni bashorat qilishni maqsad qilganmiz.
**Kalit so'zlar:** Dinamik yozish, tip nazariyasi, dasturlash tillari, algoritm dizayni, dasturiy ta'minot injiniringi, ma'lumotlarni taqdim etish, tur xulosasi, moslashuvchanlik, ishlash

## KIRISH

Turlarning dinamik ta'rifi zamonaviy dasturlash tillarining rivojlanishini shakllantiruvchi va dasturiy injiniring amaliyotiga ta'sir ko'rsatuvchi algoritmik fan sohasida asosiy tushuncha sifatida paydo bo'ldi. Asosan, dinamik terish kodlashda ko'proq moslashuvchanlik va moslashuvchanlikni ta'minlovchi kompilyatsiya

vaqtida emas, balki ish vaqtida o'zgaruvchilarga turlarni belgilash qobiliyatini anglatadi. Ushbu paradigma zamonaviy ilovalarda, xususan, veb-ishlab chiqish, ma'lumotlarni tahlil qilish va san'at kabi sohalarda ma'lumotlarning murakkabligi va o'zgaruvchanligi ortib borayotganiga javoban mashhur bo'ldi.

Oldinga qarab, ilovalarni tez ishlab chiqish va mashinani o'rganish usullarini integratsiyalashuviga bo'lgan talab tufayli dinamik tarzda yozilgan tillarni qabul qilish o'sishda davom etishi taxmin qilinmoqda. Tashkilotlar katta ma'lumotlar to'plamining kuchidan foydalanishga intilishlari sababli, dinamik turlarni qo'llab-quvvatlaydigan dasturlash muhitlari ilg'or turdagi xulosalar mexanizmlari va xatolarni boshqarish tizimlarini o'z ichiga olishi mumkin. Ushbu evolyutsiya nafaqat ishlab chiquvchilarning mahsuldorligini oshiradi, balki yanada mustahkam va bardoshli yumshoqlikka yo'l ochadi.

**Metodologiya**

Metodologiyaning asosi algoritmik nazariya va turdagi tizimlar bo'yicha tegishli adabiyotlarni to'liq ko'rib chiqishni o'z ichiga oladi. Bu turli xil yozish paradigmalarining algoritm harakati va samaradorligiga qanday ta'sir qilishiga e'tibor qaratib, kompyuter fanlari va algoritmik dizayndagi asosiy matnlarni tekshirishni o'z ichiga oladi. Turlarning dinamik ta'rifini kontseptual tushunishni ta'minlash uchun tur xavfsizligi, polimorfizm va turdagi xulosalar kabi asosiy tushunchalar o'rganiladi.

**Algoritmik baholash**

Dinamik yozishning algoritm ishlashiga ta'sirini baholash uchun biz bir qator algoritmik baholashlarni o'tkazdik. Bu dinamik ravishda terilgan tillarda (masalan, Python va JavaScript kabi) va statik terilgan tillarda (Java va C++ kabi) algoritmlar to'plamini amalga oshirishni o'z ichiga oladi. Baholash uchun ko'rsatkichlar quyidagilarni o'z ichiga oladi:

✓ **Bajarish vaqti:** Turli matn terish kontekstlarida algoritmlarning tezligini tahlil qilish.

✓ **Xotiradan foydalanish:** dinamik yozish xotirani taqsimlash va boshqarishga qanday ta'sir qilishini baholash.

✓ **Xatolar chastotasi:** dinamik va statik tarzda kiritilgan ilovalarda ish vaqti tipidagi xatolarni solishtirish.

Ushbu baholashlar amaliy stsenariylarda dinamik turlar algoritmlarning samaradorligi va ishonchliligiga qanday ta'sir qilishi mumkinligi haqida empirik ma'lumotlarni taqdim etadi.

**Empirik tadqiqotlar**

Algoritmik baholashdan tashqari, turli dasturlash tillari bilan ishlaydigan dasturiy ta'minot muhandislari va kompyuter olimlari bilan so'rovlar va intervyular orqali empirik tadqiqotlar o'tkazildi. Ushbu sifatli ma'lumotlar quyidagilar bo'yicha tushunchalarni olishga qaratilgan:

- ✓ Dinamik tipdan foydalanishda yuzaga keladigan qiyinchiliklar va imtiyozlar
- ✓ Dinamik terish qanday ta'sir qilishi haqidagi tasavvurlar
- ✓ Kelgusi algoritmik dasturda dinamik va statik yozishni qabul qilishning kutilayotgan tendentsiyalari

Misolda dinamik turlar bilan ishlovchi oddiy yig'uvchi algoritm ko'rish. std::vector bu yerda:

```
#include <iostream>
#include <vector>
#include <variant>

using namespace std;

using VariantType = variant<int, string>;

int sum(const vector<VariantType>& values) {
    int total = 0;
    for (const auto& value : values) {
        if (holds_alternative<int>(value)) {
            total += get<int>(value);
        }
    }
    return total;
}

int main() {
    vector<VariantType> values = {1, 2, 3, "four", 5}; // "four" raqam emas
    cout << "Yig'indi: " << sum(values) << endl; // Natija: 6

    return 0;
```

}

## XULOSA

Ushbu maqola algoritm fanidagi turlarning dinamik ta'rifini yoritib, uning zamonaviy dasturiy ta'minotni ishlab chiqishdagi hal qiluvchi rolini ta'kidladi. Dinamik va statik yozishni qarama-qarshi qo'yish orqali biz har bir paradigmaga xos bo'lgan afzallik va kamchiliklarni, xususan, moslashuvchanlik, ishlash va xatolarni boshqarish bilan bog'liqligini ko'rsatdik. Python, JavaScript va Ruby kabi turli xil dasturlash tillarining tahlili dinamik tiplar qanday qilib osonlashtirishini ko'rsatdi.

Kelajakka nazar tashlaydigan bo'lsak, dinamik yozishning evolyutsiyasi sun'iy intellekt va mashinani o'rganish sohasidagi yutuqlarga mos kelishi kutilmoqda. Ushbu texnologiyalar tobora ko'proq moslanadigan ma'lumotlar tuzilmalariga tayanganligi sababli, dasturlash tillari yanada murakkab turdagi xulosa tizimlarini o'z ichiga olishi mumkin. Bundan tashqari, dinamik yozishni statik tahlil vositalari bilan birlashtirish xavfsizlikni kuchaytiruvchi gibrid yondashuvlarga olib kelishi mumkin.

Xulosa qilib aytadigan bo'lsak, turlarning dinamik ta'rifi nafaqat ishlab chiquvchilarning algoritmlarni qurish usulini shakllantiradi, balki dasturiy ta'minot muhandisligi amaliyotlari haqida kengroq ma'lumot beradi. Dasturlash landshafti rivojlanishda davom etar ekan, dinamik turlarning ta'sirini tushunish imkonini.

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# KONTEYNERLAR BILAN ISHLAYDIGAN ALGORITMLAR

Toshkent Davlat Iqtisodiyot Universiteti Andijon Fakulteti 2- bosqich AATT yo'nalish 70/23 guruh talabalari
**Abdumutaliyev Azamat**
**Nemadjonov Feruzbek**
Ilmiy rahbar **Ismailov Alisher**

**Anotatsiya.** Ushbu maqolada konteynerlar bilan ishlaydigan algoritmlar va ularning dasturlash jarayonidagi o'rni keng ko'lamda yoritiladi. Konteynerlar, odatda, ma'lumotlarni boshqarish, saqlash va ularga samarali ishlov berish uchun ishlatiladigan muhim ma'lumot tuzilmalari hisoblanadi. Konteynerlar yordamida turli xil ma'lumot turlarini tartiblash, qidirish, qo'shish va olib tashlash kabi amallarni tezkorlik va qulaylik bilan bajarish mumkin. Zamonaviy dasturlash tillarida, jumladan, C++ dasturlash tilida STL (Standard Template Library) kutubxonasi orqali turli xil tayyor konteynerlar taqdim etilgan bo'lib, ular yordamida murakkab ma'lumot tuzilmalari va ularning ustida bajariladigan algoritmlar soddalashtiriladi.

Konteynerlar bilan ishlaydigan algoritmlar dasturiy ta'minotning samaradorligini oshirishda katta ahamiyatga ega, chunki ular ma'lumotlarga oson va tezkor kirishni ta'minlaydi. Vector, Stack, Queue, Set va Map kabi konteynerlar turli xil ma'lumotlar bilan ishlashda yordam beradi va ular uchun mos algoritmlar ishlab chiqilgan. Misol uchun, Vector konteynerida tartiblash algoritmlari (Quick Sort, Bubble Sort) va qidirish algoritmlari (Linear Search, Binary Search) qo'llaniladi, Stack va Queue konteynerlarida esa push, pop, enqueue, va dequeue amallari bajariladi. Set konteyneri ma'lumotlarning noyobligini saqlashda samarali bo'lsa, Map konteyneri kalit-qiymat juftligini boshqarishda qo'llaniladi.

Ushbu maqolada konteynerlar bilan ishlashning nazariy jihatlari bilan birga, amaliy misollar ham keltiriladi. C++ dasturlash tilida yozilgan kod misollarida konteynerlar bilan ishlaydigan algoritmlarning ishlash jarayoni aniq ko'rsatiladi. Bu esa dasturchilarga konteynerlar va ularning ustida bajariladigan algoritmlarni samarali ishlatishni o'rgatadi. Algoritmlarning samaradorligi va mosligini tushunish, dasturiy ta'minotning optimallashtirilishiga yordam beradi.

Maqolada konteynerlar bilan ishlashning asosiy tamoyillari, ularning afzalliklari va har bir turdagi konteynerga mos algoritmlarning samaradorligi batafsil yoritiladi.

Shu bilan birga, dasturlash amaliyotida konteynerlar bilan ishlashning qanday afzalliklari borligi ham tahlil qilinadi.
**Kalit so'zlar:** Konteyner, algoritm, ma'lumot tuzilmalari, C++, tartiblash, qidirish, vector, stack, queue, STL.
**Annotation.**Algorithms that work with containers and their role in the programming process are covered in this article. Containers are typically important data structures used to manage, store, and efficiently process data. Sorting, searching, adding and removing various types of information can be done quickly and conveniently with the help of containers. In modern programming languages, including the C++ programming language, various ready-made containers are provided through the STL (Standard Template Library) library, which simplify complex data structures and algorithms executed on them.
Algorithms that work with containers are of great importance in improving the efficiency of software, because they provide easy and fast access to data. Containers such as Vector, Stack, Queue, Set and Map help in working with various data and suitable algorithms have been developed for them. For example, sorting algorithms (Quick Sort, Bubble Sort) and search algorithms (Linear Search, Binary Search) are used in the Vector container, and push, pop, enqueue, and dequeue operations are performed in the Stack and Queue containers. While the Set container is effective in maintaining the uniqueness of data, the Map container is used to manage key-value pairs.
In this article, along with the theoretical aspects of working with containers, practical examples are presented. Code examples written in the C++ programming language clearly show the working process of algorithms working with containers. It teaches developers how to effectively use containers and the algorithms that run on them. Understanding the efficiency and suitability of algorithms helps in software optimization.
The article details the basic principles of working with containers, their advantages, and the effectiveness of algorithms suitable for each type of container. At the same time, the advantages of working with containers in programming practice are also analyzed.
**Keywords:** Container, algorithm, data structures, C++, sort, search, vector, stack, queue, STL.

**Kirish.** Dasturlashning muhim jihatlaridan biri bu ma'lumotlar bilan samarali ishlashdir. Ma'lumotlar strukturasini to'g'ri tanlash va ularni boshqarish

algoritmlarini o’rganish dasturchilarga yuqori samaradorlikka ega dasturlar yozishga yordam beradi. Dasturlashda turli xil ma’lumotlarni boshqarish uchun ishlatiladigan asosiy vositalardan biri konteynerlardir. Konteynerlar — bu turli xil ma’lumotlarni bir joyda saqlash va ularga turli amallarni bajarish imkoniyatini beruvchi ma’lumot tuzilmalari. Ular dasturchilar uchun ma’lumotlar ustida tezkor va oson ishlash imkonini yaratadi.

C++ dasturlash tilida konteynerlar bilan ishlashning asosiy vositasi bu Standard Template Library (STL) hisoblanadi. STL, turli xil ma’lumotlarni boshqarish uchun mo’ljallangan bir qator tayyor ma’lumot tuzilmalarini va algoritmlarni taqdim etadi. Ushbu kutubxona yordamida dasturchi turli xil konteynerlar (masalan, vector, stack, queue, set, map) va ularga mos algoritmlarni osongina ishlatishi mumkin. Buning natijasida dasturiy ta’minotni ishlab chiqish jarayoni sezilarli darajada tezlashadi va kod yanada toza va o’qiladigan bo’ladi.

Konteynerlar bilan ishlashda asosiy maqsad ma’lumotlarni samarali saqlash va ularga ishlov berishdan iborat. Har bir konteynerning o’ziga xos xususiyatlari va ularga mos keladigan algoritmlari mavjud. Masalan, vector — bu eng ko’p ishlatiladigan konteynerlardan biri bo’lib, u dinamik uzunlikka ega ketma-ket ma’lumot tuzilmasidir. Vector ichidagi elementlarga indeks orqali kirish mumkin va bu uni boshqa konteynerlarga qaraganda tezroq ishlashga olib keladi. Vector bilan ishlaydigan algoritmlar orasida tartiblash (masalan, Bubble Sort, Quick Sort) va qidirish (Linear Search, Binary Search) algoritmlari mavjud. Ushbu algoritmlar vector ichidagi elementlar bilan samarali ishlash uchun mo’ljallangan.

Yana bir muhim konteyner — bu stack (to’plar). Stack ma’lumotlarni saqlashda LIFO (Last In, First Out) tamoyiliga asoslanadi, ya’ni oxirgi kiritilgan element birinchi bo’lib chiqariladi. Stack dasturlashda ko’pincha rekursiv muammolarni hal qilishda yoki funksiyalarni chaqirish jarayonlarini boshqarishda ishlatiladi. Stack bilan ishlaydigan asosiy operatsiyalar — bu push (elementni qo’shish) va pop (elementni olish). Bu operatsiyalar o’zaro bog’liq bo’lib, stack ichidagi ma’lumotlarga to’g’ridan-to’g’ri kirish o’rniga, ularning ketma-ketligini boshqarishga imkon beradi.

Queue (navbat) esa FIFO (First In, First Out) tamoyiliga asoslanadi, ya’ni birinchi kiritilgan element birinchi bo’lib chiqariladi. Navbatlar odatda resurslarni boshqarish, vazifalarni ketma-ket bajarish yoki tarmoq orqali ma’lumot uzatish jarayonlarida qo’llaniladi. Navbat bilan ishlashda asosiy operatsiyalar — bu enqueue (elementni navbatga qo’shish) va dequeue (elementni navbatdan chiqarish).

Bu operatsiyalar navbatni to’g’ri boshqarishga va elementlarni tartib bilan chiqarib olishga yordam beradi.
Bundan tashqari, set (to’plam) va map (lug’at) kabi konteynerlar ham mavjud bo’lib, ular o’ziga xos ma’lumot tuzilmalari sifatida ma’lum maqsadlarga xizmat qiladi. Set noyob elementlarni saqlashda ishlatiladi va u elementlarning takrorlanishini oldini olish imkonini beradi. Set ichidagi ma’lumotlar tartiblangan bo’lmaydi, lekin undagi elementlarga tezkor kirish imkonini beradi. Map esa kalit-qiymat juftligini saqlash uchun mo’ljallangan konteynerdir. Bu kalitlar orqali ma’lumotlarni tez va oson topish imkonini beradi, bu esa katta hajmdagi ma’lumotlar bilan ishlashda juda foydali.
Umuman olganda, konteynerlar va ular bilan ishlaydigan algoritmlar dasturlashning ajralmas qismi bo’lib, ular yordamida ma’lumotlarni samarali boshqarish va ularga ishlov berish imkoniyati yaratiladi. Ushbu maqolada konteynerlarning turlari va ularga mos keladigan asosiy algoritmlar haqida batafsil to’xtalib o’tamiz. Shuningdek, C++ dasturlash tilida konteynerlar bilan ishlash jarayoniga amaliy misollar orqali yondashamiz. Maqsad — konteynerlarning dasturlashdagi ahamiyatini va ularning samaradorligini tushuntirish.
Konteyner bilan ishlashga C++ dasturlash tilida misol:

```
#include <iostream>
#include <vector>
#include <algorithm> // sort funksiyasi uchun kerak
using namespace std;

int main() {
    // Vektorni yaratamiz va uni dastlabki qiymatlar bilan to’ldiramiz
    vector<int> numbers = {5, 2, 9, 1, 5, 6};

    // Dastlabki ro’yxatni chiqaramiz
    cout << "Dastlabki ro’yxat: ";
    for (int num : numbers) {
        cout << num << " ";
    }
    cout << endl;

    // Vektorni tartiblaymiz (sort funksiyasidan foydalanamiz)
    sort(numbers.begin(), numbers.end());
```

```
    // Tartiblangan ro’yxatni chiqaramiz
    cout << "Tartiblangan ro’yxat: ";
    for (int num : numbers) {
        cout << num << " ";
    }
    cout << endl;

    return 0;
}
```

Kodni tushuntirish

#include <vector> va #include <algorithm>

Biz dasturimizda vector konteynerini ishlatmoqdamiz, shuning uchun <vector> kutubxonasini dasturga kiritamiz. <algorithm> kutubxonasi esa sort funksiyasini ishlatish uchun kerak bo’ladi. sort — bu STL kutubxonasida mavjud bo’lgan tayyor algoritm bo’lib, u ma’lumotlarni tartiblashni avtomatik ravishda amalga oshiradi.

vector<int> numbers = {5, 2, 9, 1, 5, 6};

Bu yerda biz bir nechta butun sonlardan iborat vektor (yig’indi) yaratmoqdamiz. Vektor C++ STLda dinamik ravishda o’lchamini o’zgartira oladigan ma’lumotlar tuzilmasidir. Uning yordamida sonlarni saqlash va ularning ustida turli amallarni bajarish mumkin.

for (int num : numbers)

Bu sikl vektordagi har bir elementni ketma-ket ko’rib chiqadi va ularni ekranga chiqaradi. num har bir element qiymatini oladi va cout orqali ularni ko’rsatadi. Bu yerda dastlabki ro’yxat ekranga chiqariladi.

sort(numbers.begin(), numbers.end());

Bu qator vektor ichidagi barcha elementlarni kichikdan kattaga qarab tartiblaydi. sort funksiyasi ikkita parametr qabul qiladi: vektorning boshlanishi (numbers.begin()) va oxiri (numbers.end()). begin() vektorning birinchi elementiga ishora qiladi, end() esa so’nggi elementdan keyingi pozitsiyani bildiradi. Shu orqali butun vektor oralig’ida elementlar o’zaro taqqoslanadi va o’rinlari almashtiriladi.

Tartiblangan ro’yxatni chiqarish:

Kodning oxirida yana bir marta for sikli yordamida tartiblangan elementlar ekranga chiqariladi. Endi ro’yxat kichikdan kattaga qarab joylashgan bo’ladi.

Kod natijasi:

Dastlabki ro’yxat: 5 2 9 1 5 6

Tartiblangan ro’yxat: 1 2 5 5 6 9

Yuqoridagi kodda biz vector konteyneridan foydalandik va unga sort algoritmini qo’lladik. Bu kod oddiy bo’lishiga qaramasdan, C++ STL kutubxonasidagi kuchli vositalarni qanday ishlatishni ko’rsatadi. Vektor ma’lumotlarni saqlashda qulay bo’lsa, sort funksiyasi esa ularni samarali tartiblash imkonini beradi. sort funksiyasi katta hajmdagi ma’lumotlarni tez va samarali tartiblash uchun mo’ljallangan.

**Xulosa.** Konteynerlar va ular bilan ishlaydigan algoritmlar zamonaviy dasturlashda asosiy komponentlardan biri hisoblanadi. Ushbu maqolada biz konteynerlar va ular bilan ishlashning muhim tomonlarini, C++ dasturlash tilida STL kutubxonasi orqali konteynerlar bilan qanday ishlashni ko’rib chiqdik. Konteynerlar yordamida dasturlash jarayonida ma’lumotlarni saqlash va ularga ishlov berish sezilarli darajada soddalashadi va samaradorligi oshadi. Ma’lumotlarning har xil tuzilmalari bilan ishlashda mos keladigan konteynerlar tanlanadi, bu esa ma’lumotlarga tezkor va samarali kirishni ta’minlaydi.

Maqolada vector, stack, queue, set va map kabi asosiy konteynerlar bilan ishlash haqida ma’lumot berildi. Har bir konteynerning o’ziga xos xususiyatlari bor, ular muayyan ma’lumot turlarini boshqarish va amallarni bajarishda samaradorlikni ta’minlaydi. Vector — eng keng qo’llaniladigan konteynerlardan biri bo’lib, u dinamik ma’lumotlar yig’indisi sifatida har xil o’lchamdagi ma’lumotlarni saqlash imkonini beradi. Stack va queue ma’lumotlarga ketma-ket ishlov berish uchun ishlatiladi: stack LIFO (Last In, First Out) tamoyiliga asoslanib, so’nggi kiritilgan ma’lumotni birinchi bo’lib chiqaradi, queue esa FIFO (First In, First Out) tamoyiliga muvofiq ishlaydi va birinchi kiritilgan ma’lumot birinchi chiqariladi.

Shuningdek, set va map konteynerlari noyob elementlar va kalit-qiymat juftligini saqlashda samarali vositalar hisoblanadi. Set konteynerida takroriy elementlar bo’lmaydi, bu esa o’ziga xos qiymatlarni boshqarishni osonlashtiradi. Map esa ma’lumotlar juftligi sifatida kalitlar va qiymatlarni bog’lashda ishlatiladi, bu ma’lumotlarga tezkor kirish imkonini beradi.

Konteynerlar bilan ishlovchi algoritmlar, ayniqsa, tartiblash va qidirish amallarini samarali bajarishga mo’ljallangan. Sort kabi tayyor funksiyalar ma’lumotlarni tez va to’g’ri tartiblash imkonini beradi. Maqolada C++ tilida vector konteyneridan foydalanib, tartiblash algoritmi yordamida qanday qilib ma’lumotlarni oson tartiblash mumkinligi ko’rsatildi. Sort funksiyasi orqali vektor ichidagi elementlarni kichikdan kattaga qarab tartiblash jarayoni tushuntirildi. Ushbu funksiyadan foydalanish nafaqat kod yozish jarayonini tezlashtiradi, balki kodni osonroq tushunishga yordam beradi.

C++ dasturlash tilida konteynerlar va ularga mos algoritmlar yordamida murakkab ma’lumotlarni samarali boshqarish imkoniyati yaratiladi. STL kutubxonasi dasturchilarga nafaqat konteynerlarni, balki ular ustida ishlaydigan algoritmlarni ham taqdim etadi, bu esa kodni qisqartirish va optimallashtirish uchun qulay imkoniyatdir. Konteynerlar va ularning algoritmlari dasturiy ta’minotni ishlab chiqish jarayonida dasturchilarga ko’plab murakkab vazifalarni hal qilishda yordam beradi.

Umuman olganda, konteynerlar va ular bilan ishlaydigan algoritmlarning to’g’ri qo’llanilishi dasturiy ta’minotni yanada samarali va barqaror qiladi. Dasturchilar uchun konteynerlar bilan ishlashning asosiy tamoyillarini bilish va ularni turli amaliyotlarda qo’llay olish muhimdir. Ushbu maqolada keltirilgan nazariy va amaliy misollar konteynerlar bilan samarali ishlash uchun zarur bo’lgan bilimlarni taqdim etdi. Shu bilan birga, konteynerlar va algoritmlar yordamida dasturiy ta’minotni optimallashtirish hamda ma’lumotlar bilan ishlashda resurslardan to’g’ri foydalanish haqida kengroq tushuncha berdi.

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# KOMPONENTA TUSHUNCHASI VA XUSUSIYATLARI

Toshkent Davlat Iqtisodiyot Universiteti
Andijon fakulteti II bosqich AATT 70/23 guruh
talabalari **Tursunov Ziyodillo**
**To‘ychiyev Bexruz**
Ilmiy rahbar:**Ismailov.A.SH**

# COMPONENT CONCEPT AND PROPERTIES

Tashkent State University of Economics
Andijan faculty II stage AATT 70/23 group
student **Tursunov Ziyodillo**
**Toychiyev Bekhruz**
Scientific supervisor: **Ismailov.A.SH**

**Abstract:** This article provides detailed information about the concept of component in C++ programming language, its features, advantages and disadvantages, as well as the different types of components. Examples of how to create components in C++ and how to use them in program development are given, explaining how they affect the programming process. Components exist not only in software, but also in physical systems, and their integration contributes to successful project implementation in many ways. We will also look at some examples to better understand the concept of a component.

**Annotatsiya:** Bu maqolada C++ dasturlash tilida komponenta tushunchasi, uning xususiyatlari, afzalliklari va kamchiliklari, shuningdek, komponentlarning turli xil turlari haqida batafsil ma'lumot berilgan. C++ da komponentlarni qanday yaratish va ularni dasturlarni ishlab chiqishda qanday ishlatish mumkinligi misollari keltirilib, ularning dasturlash jarayoniga qanday ta'sir qilishi tushuntiriladi. Komponentlar nafaqat dasturiy ta'minotlarda balki fizik tizimlarda ham mavjud bo'lib, ularning integratsiyasi ko'p jihatdan muvaffaqiyatli loyiha amalga oshirishga xizmat qiladi. Shuningdek, biz komponenta tushunchasini yaxshiroq tushunish uchun ba'zi misollarni ham ko'rib chiqamiz.

**Keywords:** Component, C++, Modularity, Reusability, Interface, Services, Software, Architecture.

**Kalit so'zlar:** Komponenta, C++, Modullik, Qayta ishlatish, Interfeys, Xizmatlar, Dasturiy ta'minot, Arxitektura.

## KIRISH

Zamonaviy dasturlashda murakkab dasturlarni yaratish juda tez va samarali bo'lishi kerak. Bu vazifani bajarishda C++ kabi kuchli dasturlash tillari muhim rol o'ynaydi. C++ da dasturni tez va samarali yaratish uchun ishlatiladigan asosiy tushunchalardan biri - komponenta tushunchasi hisoblanadi. Dasturlash dunyosida murakkab dasturlarni yaratish uchun biz mayda-mayda qismlarga bo'lib, ularni birlashtirib foydalanamiz. Bu qismlarga biz "komponenta" deb ataymiz. Komponenta - bu C++ da qayta ishlatiladigan va bir-biri bilan o'zaro bog'liq bo'lgan mustaqil modullar hisoblanadi. Ular ma'lum bir vazifani bajaradi va boshqa dasturlar bilan osongina integratsiyalanadi. Komponentlar dasturlash jarayonini soddalashtiradi, dasturni tezroq ishlab chiqishga imkon beradi va dastur kodini qayta ishlatish samaradorligini oshiradi.Komponentalarni turli xil dasturlash tillarida, shu jumladan C++, JavaScript, Python, Java va boshqalarda qo'llash mumkin. Ular veb-saytlar, mobil ilovlar, stol ilovlari va boshqa turli xil dasturlarni yaratish uchun ishlatilishi mumkin.Ushbu maqolada C++ da komponenta tushunchasini chuqurroq o'rganamiz, uning asosiy xususiyatlarini, afzalliklari va kamchiliklari, shuningdek, komponentlarning turli xil turlari haqida batafsil ma'lumot beramiz.

**C++ da Komponenta Ta'rifi**

C++ da komponenta - bu qayta ishlatiladigan va mustaqil kod bo'lagi bo'lib, ma'lum bir vazifani bajaradi va boshqa dasturlar bilan integratsiyalanadi. C++ ob'ektga yo'naltirilgan dasturlash tili sifatida, komponentlar odatda sinflar (class) va interfeyslar (interface) yordamida amalga oshiriladi.

Visual C++ dasturlash tilida komponentalar dasturiy ilovalarni loyihalashda muhim elementlardir. Komponentlar - bu dasturiy kod va interfeys qismlarini bir butun sifatida ifodalaydigan obyektlardir. Komponentalar, odatda, UI elementlar (masalan, tugmalar, oynalar, list box'lar), tizim resurslari (masalan, vaqt o'lchovchi, fayl menejeri), va boshqa turli dasturiy elementlarni o'z ichiga oladi.

Komponentalar asosiy dasturiy qismning ba'zi funktsiyalarini soddalashtirish, shuningdek, ularni qayta foydalanishga imkoniyat yaratish maqsadida qo'llaniladi. Ular yordamida dasturiy loyihani modullarga ajratish va kodning qayta ishlatilishini ta'minlash mumkin. Visual C++ dasturiy muhitida komponentalar foydalanuvchi interfeysini loyihalashda va tizim bilan integratsiyada keng qo'llaniladi.

**Komponenta Xususiyatlari**

• Modullik: Komponentlar dasturni kichikroq, mustaqil bo'limlarga ajratadi. Bu kodni tushunishni, saqlashni va yangilashni osonlashtiradi.

• Qayta ishlatish: Komponentlar turli xil dasturlarda qayta ishlatilishi mumkin, bu esa ishlab chiqish vaqtini va xarajatlarni kamaytiradi.
• Interfeys: Har bir komponenta aniq interfeysga ega bo'lib, bu boshqa komponentlarga uning xizmatlaridan qanday foydalanishni ko'rsatib beradi.
• Xizmatlar: Komponentlar aniq vazifalarni bajaradigan xizmatlar to'plamini taqdim etadi.
• Mustaqillik: Komponentlar bir-biridan mustaqil ravishda ishlaydi va o'zaro bog'liqliklarni minimallashtiradi.

**Visual C++ muhitida ishlatiladigan komponentalar quyidagi asosiy toifalarga bo'linadi: Standart Komponentalar:** Bu guruhga *Button*, *Label*, *TextBox*, *ListBox* kabi asosiy foydalanuvchi interfeysi elementlari kiradi. Ular dasturiy ilovada foydalanuvchi bilan muloqot o'rnatishda keng qo'llaniladi. Ushbu komponentalar asosan GUI (Graphical User Interface) elementlarini loyihalash uchun ishlatiladi.

Button: Bu foydalanuvchi interfeysidagi bosish uchun mo'ljallangan tugma.

![Button Komponentasi](file-WvVj9ARAw7lwI0D7MMRGJD0X)

TextBox: Bu matn kiritish uchun mo'ljallangan komponenta bo'lib, foydalanuvchidan ma'lumot olish uchun qo'llaniladi.

**Additional Komponentalar:** Bu guruhga maxsus foydalanish uchun mo'ljallangan komponentalar kiradi. Misol uchun, *Timer*, *ProgressBar*, va *PictureBox* kabi komponentalar qo'shimcha interfeys imkoniyatlarini taqdim etadi.

Timer: Bu komponenta vaqtni o'lchash va ma'lum bir vaqt oralig'ida avtomatik ravishda ma'lum bir funksiyani bajarish uchun ishlatiladi.

![Timer Komponentasi](file-WvVj9ARAw7lwI0D7MMRGJD0X)

ProgressBar: Bu komponenta biror vazifaning bajarilish darajasini ko'rsatish uchun qo'llaniladi.

**System Komponentalari:** Bu guruhga *File Dialog*, *Print Dialog*, *System Tray Icon* kabi tizim bilan bog'liq bo'lgan komponentalar kiradi. Bu komponentalar dasturiy ilova va operatsion tizim o'rtasidagi o'zaro aloqani ta'minlash uchun ishlatiladi.

File Dialog: Bu komponenta foydalanuvchi tomonidan faylni tanlash yoki saqlash uchun ishlatiladi.

![File Dialog](file-WvVj9ARAw7lwI0D7MMRGJD0X)

System Tray Icon: Bu komponenta ilovaning kichik ikonasini tizim paneliga joylashtirish imkoniyatini beradi.

**C++ da Komponenta Afzalliklari**

• Tez ishlab chiqish: Komponentlardan foydalanish dasturni tezroq va samarali ishlab chiqishga imkon beradi.
• Qayta ishlatish: Komponentlar qayta ishlatilishi mumkin, bu esa ishlab chiqish vaqtini va xarajatlarni kamaytiradi.
• Ko'p platformali: C++ komponentlarini turli xil platformalarda ishlatish mumkin.
• Jamoaviy ishni osonlashtiradi: Komponentlar dasturchilar guruhi tomonidan birgalikda ishlab chiqilishi va ishlatilishi mumkin.

**C++ da Komponenta Kamchiliklari**

• Murakkablik: Komponentlarni yaratish va ularni boshqarish murakkab bo'lishi mumkin.
• Qaramlik: Komponentlar boshqa komponentlarga qaram bo'lishi mumkin, bu esa muammolarga olib kelishi mumkin.
• Integratsiya: Komponentlarni boshqa tizimlarga integratsiyalash qiyin bo'lishi mumkin.
• Xavfsizlik: Komponentlar xavfsizlik muammolariga moyil bo'lishi mumkin.

**Visual C++ Muhitida Komponentalar bilan Ishlash**

Visual C++ muhitida komponentalar bilan ishlash uchun Toolbox menyusidan kerakli komponentani tanlash va Form Designer oynasiga qo'shish kifoya. Komponentni formaga joylashtirgandan so'ng, unga tegishli xususiyatlar va metodlarni sozlash mumkin. Har bir komponentning o'ziga xos Properties bo'limi mavjud bo'lib, unda komponentning hajmi, ranglari, va boshqa xususiyatlarini o'zgartirish mumkin.

**C++ da Komponenta yaratish va ishlatish misollari**

• **UI komponentlari yaratish:**

```
#include <iostream>
#include <string>
class Button {
public:
    void click() {
        std::cout << "Tugma bosildi!" << std::endl;
    }
};

int main() {
    Button button;
    button.click();
```

```
    return 0;
}
```

**Ma'lumotlar bazasi bilan ishlash:**

```
#include <iostream>
#include <sqlite3.h>

int main() {
    sqlite3 *db;
    char *err;
    int rc = sqlite3_open("mydatabase.db", &db);
    // Ma'lumotlar bazasiga kirish va ishlash ...
    sqlite3_close(db);
    return 0;
}
```

**Biznes mantig'i komponentlari yaratish:**

```
class User {
public:
    std::string name;
    int age;

    void showInfo() {
        std::cout << "Ism: " << name << ", Yosh: " << age << std::endl;
    }
};

int main() {
    User user;
    user.name = "Javohir";
    user.age = 20;
    user.showInfo();
    return 0;
}
```

## Xulosa

Ushbu maqolada biz komponenta tushunchasi va xususiyatlarini chuqurroq o'rganib chiqdik. Komponentalar zamonaviy dasturlashda kodni qayta ishlatishni, loyihalarni boshqarishni osonlashtirishni va samaradorlikni oshirishni ta'minlaydigan muhim

qadamlardir. C++ da komponenta tushunchasi dasturlarni tez va samarali ishlab chiqishda muhim rol o'ynaydi. U dasturlarni tezroq ishlab chiqish, qayta ishlatishni oshirish va dastur kodini samarali boshqarish imkonini beradi. C++ da komponentlarni tushunish va ularni qanday yaratishni o'rganish har qanday C++ dasturchisi uchun juda muhimdir.

Komponentalar - bu mustaqil ravishda ishlaydigan va qayta ishlatiladigan kod bloklari bo'lib, ular aniq vazifani bajarish uchun mo'ljallangan. Bu ularni dasturlash jarayonida qayta ishlatishga imkon beradi, bu esa vaqt va resurslarni tejashga yordam beradi. Shuningdek, ular kodni tashkil qilish va boshqarishni osonlashtiradi, bu esa katta va murakkab loyihalarda juda muhimdir.

Komponentalar turli xil xususiyatlarga ega bo'lib, ularning funksiyalari va imkoniyatlarini belgilaydi. Komponentalar boshqa kod bloklari bilan bog'liq bo'lmasdan o'zlari mustaqil ravishda ishlay olishi kerak.Komponenta dasturlashning boshqa qismlarida yoki boshqa loyihalarda qayta ishlatilishi mumkin. Komponentalar o'z ichki ma'lumotlar va funksiyalarni yashirib, boshqa qismlarga kirishni cheklashi mumkin. Komponentalar o'z xizmatlarini boshqa qismlarga taqdim qilish uchun aniq interfeysga ega bo'lishi kerak.

Shunga qaramay, komponenta tushunchasini tushunish va ularni to'g'ri qo'llash dasturlashning samaradorligini oshirish uchun muhimdir. Ushbu maqolada keltirilgan ma'lumotlar sizga komponenta tushunchasi va xususiyatlarini chuqurroq tushunishda va uni dasturlash jarayonida samarali qo'llashda yordam berishga mo'ljallangan.

Kelajakda komponenta tushunchasi yanada rivojlanib, dasturlash dunyosida muhim rol o'ynaydigan texnologiyalarning asosiy qismlaridan biri bo'lib qoladi.

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# STL KUTUBXONALARI

Toshkent Davlat Iqtisodiyot Universiteti
Andijon Fakulteti 2- bosqich AATT yo'nalish
70/23 guruh talabalari **Umarjanov Shoxrux**
**Choriyev Mahmudjon**
Ilmiy rahbar **Ismailov Alisher**

**Annotatsiya**: Dasturlash – kompyuterlar va boshqa mikroprotsessorli elektron mashinalar uchun dasturlar tuzish, sinash va o'zgartirish jarayonidan iborat. Odatda dasturlash yuqori savilayi dasturlash tillari (PHP, Java, C++, Pyhton) vositasida amalga oshiriladi. Bu dasturlash tillarining semantikasi odam tiliga yaqinligi tufayli dastur tuzish jarayoni ancha oson kechadi. Dasturlash jarayoni, odatda, quyidagi bosqichlarga bo'linadi: masalaning qo'yilishi; masalaning algoritmik tavsifini tuzish; masalani yuqori darajadagi programma tilida Dasturlash: masalani mashina tilida Dasturlash

Dasturlashning asosiy qismlaridan biri STL (Standart shablon kutubxonalari) biz bu mavzuni C++ dasturlash tilida yoritib beramiz. C++ Standart Shablon Kutubxonasi (STL) dasturchilarga ma'lumotlar strukturalari va algoritmlarni samarali boshqarish uchun umumiy yondashuvni taqdim etadi. STL ning asosiy qismi konteynerlar bo'lib, ular ma'lumotlarni saqlash va boshqarish uchun mo'ljallangan sinflar to'plamini o'z ichiga oladi. Konteynerlar odatda turlar va ma'lumotlar ketma-ketligini saqlash uchun ishlatiladi va ular turli xil ehtiyojlarga mos keladigan ko'rinishlarga ega.

C++ da STL (Standart Shablon Kutubxonasi) — bu shablonlar texnologiyasiga asoslangan kutubxona bo'lib, umumiy ma'lumotlar strukturalari va algoritmlarni o'z ichiga oladi. STL uch asosiy komponentdan iborat:

1. Konteynerlar (Containers): Ma'lumotlarni saqlash va boshqarish uchun maxsus sinflar to'plami.
2. Algoritmlar (Algorithms): Ma'lumotlar ustida bajariladigan umumiy amallar (masalan, `sort()`, `find()`.
3. Iteratorlar (Iterators): Konteyner elementlariga kirish va ularni boshqarish uchun foydalaniladigan mexanizmlar.

STLning asosiy maqsadi — kodni qayta foydalanish, dasturiy ta'minotning moslashuvchanligini ta'minlash va ma'lumotlar ustida samarali operatsiyalarni amalga oshirishdir. STL kutubxonasi konteyner sinflarini taqdim etadi, ular

yordamida ma'lumotlar tuzilmalarini yaratish va boshqarish imkoniyatiga ega bo‘lamiz.

**Kalit so’zlar**: STL, C++, Visual Studio, Code::Blocks, Iterator, Algaritm, Konteyner

**Abstract**: Programming is the process of designing, testing, and executing programs for computers and other microprocessor-based electronic machines. programming using high-level programming languages (PHP, Java, C++, Python). Since the semantics of these programming languages are close to humans, the programming process is much easier. The programming process is divided into stages: setting the problem; algorithmic description of the problem; Programming the problem in the above programming language: Programming the problem in machine language One of the programming works STL (Sdart Template Libraries) we cover this topic in C++ programming language. The C++ Standard Template Library (STL) provides programmers with common objects for manipulating data structures and algorithms. The food part of the STL are containers, which contain a collection of classes designed to store and control data. Containers are for storing sequences and have views that correspond to different types of data. In C++, the STL (Standard Template Library) is a free template-powered library that contains common data structures and algorithms. STL consists of three structural components:

1. Containers: A set of special classes for storing and managing data.
2. Algorithms (Algorithms): General operations performed on data (for example `sort()`, `find()`.
3. Iterators (Iterators): Recursive mechanisms for accessing and controlling container checks.

The goal of code processing is to process the code, provide it, and work on the data to perform STL production. The STL library provides classes with which we can get the container data structures we need and want.

**Keywords**: STL, C++, Visual Studio, Code::Blocks, Iterator, Algorithm, Container

**Kirish:** STL 1970-yillarning oxiri va 1980-yillarning boshlarida Aleksandr Stepanov tomonidan ishlab chiqilgan. C++ da umumiy dasturlashdan foydalanish usulini yaratishga intilgan.

Dastlabki maqsad algoritmlarga turli xil ma'lumotlar tuzilmalarida ularni qayta yozmasdan ishlash imkonini beradigan kutubxona yaratish edi. STL bir nechta asosiy tushunchalarni, jumladan, iteratorlar, konteynerlar va algoritmlarni taqdim etdi. Iteratorlar konteynerlardagi elementlarga kirishning yagona usulini taqdim etdi,

konteynerlarda esa vektorlar, ro'yxatlar va xaritalar kabi ma'lumotlar tuzilmalari mavjud. C++ tomonidan qabul qilish: 1990 yilda STL C++ hamjamiyatiga taqdim etildi va C++ ishlab chiquvchilari orasida mashhurlikka erisha boshladi. 1998 yilda C++ standartining birinchi nashri chiqarilishi bilan STL rasman C++ standart kutubxonasining bir qismi sifatida kiritildi.Evolyutsiya: STL keyingi C++ standartlarida (C++11, C++14, C++17, C++20 va boshqalar) takomillashtirildi va kengaytirildi, aqlli ko'rsatkichlar, parallellikni qo'llab-quvvatlash va diapazonga asoslangan xususiyatlarni joriy etdi. STL ning ta'siri STL kodni qayta ishlatish va samaradorlikni rag'batlantirish orqali C++ dasturlashiga sezilarli ta'sir ko'rsatdi. Uning umumiy dasturlash paradigmasi ishlab chiquvchilarga mavhum va moslashuvchan kod yozish imkonini beradi. U akademik va sanoat dasturlarida keng qo'llaniladigan zamonaviy C++ dasturlashning asosiy qismiga aylandi. C++ tilidagi standart andozalar kutubxonasi (STL) bir nechta muhim maqsadlarga xizmat qiladi: STL ning vazifalari umumiy dasturlashni ta’minlaydi,bu algaritmlarga kodni qayta yozmasdan turli xil ma’lumotlar turlarida ishlashga imkon beradi. Bu esa kodni qayta ishlatish va moslashuvchanlikni ta’minlaydi.

**Yoritilgan mavzu:** Standart andoza kutubxonalari (STL) C++ dasturlash tilida muhim bir bo’lagi hissoblanadi u C++ hamjamiyatiga katta katta hissa qo’shdi.Uning e’tiborga loyiq yutuqlarini sanab o’tadigan bo’lsak:

1) STL C++ tilida umumiy dasturlash tushunchasini joriy etgan birinchi kutubxonalardan biri edi. Bu ishlab chiquvchilarga har qanday ma'lumotlar turi bilan ishlaydigan algoritmlarni yaratishga imkon berdi, bu kodning qayta ishlatilishi va moslashuvchanligini sezilarli darajada oshirdi.

2) STL C++ 98 standartida standartlashtirilib, uni C++ tilining asosiy qismiga aylantirdi. Ushbu standartlashtirish turli kompilyatorlar va platformalarda izchil interfeys va xatti-harakatni ta'minlab, portativlik va ishonchlilikni oshirdi.

3) STL turli xil kompanentlar majmuasini taqdim etdi. Jumladan yuqorida ham tilga olib o’tdik:

Konteynerlar: (masalan, vectorlar, royxatlar, toplamlar, xotiralar) ma’lumotlarni saqlash uchun.

Algaritmlar: (masalan, saralash, qidirish) ma’lumotlarni manipulyatsiya qilish.

Iteratorlar: konteyner elementlarini samarali o’tkazish uchun.

Ushbu kompanentlar yordamida kutubxonalardan foydalanib kodlarni oson va vaqt sarlamasdan yozish imkoniyatini beradi.

4) STL yuqori unumdorlik uchun mo'ljallangan. Uning ko'pgina algoritmlari tezlik va samaradorlik uchun optimallashtirilgan bo'lib, ko'pincha foydalanish

qulayligini yo'qotmasdan past darajadagi dasturlash strategiyalaridan foydalanadigan usullardan foydalanadi. Bu STL ni yuqori unumli ilovalar uchun mos qiladi.

5) Yaratilganidan beri STL turli C++ standartlari orqali rivojlandi. C++ 11 da harakatlanuvchi semantika va lambda ifodalari, shuningdek C++ 17 da parallel algoritmlarni joriy etish kabi yaxshilanishlar STL ni zamonaviy dasturlashda tegishli va kuchli bo'lib qoldi.

6) STL ma'lumotlar tuzilmalari va algoritmlarni o'rgatishda hal qiluvchi rol o'ynadi. Uning aniq tatbiq etilishi va keng ko'lamli hujjatlari uni talabalar va o'qituvchilar uchun murakkab dasturlash tushunchalarini tushunishga yordam beruvchi manbaga aylantirdi.

Xar bir yutuqning o’ziga yarasha kamchiliklari bor bu esa STL ni ham chetlab o’tmadi uning ham o’ziga yarasha kamchiliklari mavjud, men hozir ma’lum miqdorda kamchiliklarini ham sanab o’tishga harakat qilaman. STL ning asosiy kamchiliklari :

1) Tik o'rganish egri chizig'i: STL foydalanuvchilar uchun qulay bo'lsa-da, uning barcha xususiyatlarini va ulardan qanday samarali foydalanishni to'liq tushunish vaqt talab qilishi mumkin, ayniqsa shablonlar va iteratorlar tushunchalarini qiyin deb topishi mumkin bo'lgan yangi boshlanuvchilar uchun.

2) Ishlash uchun qo'shimcha xarajatlar: STL ning umumiy dasturlash yondashuvi ishlash uchun jarimalarni kiritishi mumkin. Masalan, assotsiativ konteynerlarda (masalan, xaritalar) operatsiyalar uchun iteratorlardan foydalanish ushbu konteynerlar uchun mo'ljallangan a'zo funktsiyalaridan to'g'ridan-to'g'ri foydalanishga qaraganda sekinroq bo'lishi mumkin.

3) Cheklangan sozlanishi: Ba'zi ishlab chiquvchilar STL konteynerlarining standart ilovalarini sozlash imkoniyatlari nuqtai nazaridan cheklovchi deb hisoblashlari mumkin. Bu oldindan taqdim etilmagan o'ziga xos funksiyalarga muhtoj bo'lganlar uchun kamchilik bo'lishi mumkin.

4) Abstraktsiyaning umumiy xarajatlari: STL tomonidan taqdim etilgan abstraktsiyalar ba'zan samarasizlikka olib kelishi mumkin, ayniqsa, ushbu abstraktsiyalarni boshqarish uchun qo'shimcha xarajatlar ular taqdim etadigan foydadan ustun bo'lgan hollarda

5) Nosozliklarni tuzatishning murakkabligi: STL-dan foydalanadigan disk raskadrovka kodi, ayniqsa, shablon xatolari yoki iteratorni bekor qilish bilan bog'liq muammolarni hal qilishda murakkab bo'lishi mumkin. STL konteynerlari va

algoritmlarining asosiy mexanikasini tushunish bunday kodni samarali tuzatish uchun juda muhimdir.

Ushbu kamchiliklarga qaramasdan, ko'plab ishlab chiquvchilar STL dan foydalanishning afzalliklari, masalan, unumdorlikni oshirish va yaxshi sinovdan o'tgan komponentlardan foydalanish qobiliyati ko'pincha kamchiliklardan ustun ekanligini aniqlaydilar.

STL (standart andoza kutubxonalari) bu qanday dasturlarda ishlashini ko’ramiz:

Standart andozalar kutubxonasi (STL) dasturlash tili sifatida C++ dan foydalanadigan har qanday dastur yoki dasturda ishlaydi. STL C++ standart kutubxonasining bir qismi bo'lgani uchun u C++ ni qo'llab-quvvatlaydigan turli ishlab chiqish muhitlari va operatsion tizimlar bilan mos keladi. STL ma’lumotlar tuzilmalari, algoritmlar va xotirani samaraliroq boshqarish uchun C++ da ishlab chiqilgan ish stoli ilovalarida keng qo‘llaniladi. Visual Studio, Code::Blocks va CLion kabi mashhur integratsiyalashgan ishlab chiqish muhitlari (IDE) STLni qo'llab-quvvatlaydi. C++ ko'pincha o'rnatilgan tizimlarda ishlash uchun muhim ilovalar uchun ishlatiladi. STL ning yengil konteynerlari (masalan, "vektor" va "massiv") xotira va protsessordan foydalanish asosiy muammolar bo'lgan bunday muhitlarda foydalidir. Umumiy olib qaraydigan bo’lsak, STL deyarli har qanday C++ dasturida, ish stoli va mobil ilovalardan tortib, o'rnatilgan tizimlar, o'yin dvigatellari, ilmiy hisoblashlar va boshqalar uchun ishlatilishi mumkin, agar muhit C++ ni qo'llab-quvvatlasa. STL ning qachon ishlatilishi maqsadga muvofiq bo’lar edi: STL (Standart andozalar kutubxonasi) ko'pgina C++ dasturlash stsenariylarida juda foydali, lekin u, ayniqsa, umumiy ma'lumotlar tuzilmalari va algoritmlari bilan ishlashda foydalidir. STL turli xil foydalanish holatlari uchun optimallashtirilgan “vektor”, “ro‘yxat”, “xarita”, “to‘plam” va “deque” kabi konteynerlarni taklif etadi. Agar sizning dasturingiz ushbu ma'lumotlar tuzilmalaridan birini talab qilsa va siz ularni noldan amalga oshirishdan qochmoqchi bo'lsangiz, STL juda mos keladi. Misollar ma'lumotlar to'plamini boshqarish, kalit-qiymat xaritalarini yaratish yoki dinamik massivlarni amalga oshirishni o'z ichiga oladi. STL ishlash va xotirani boshqarish uchun yaxshi optimallashtirilgan. Agar sizga tezkor saralash (`std::sort`), qidirish (`std::find`, `std::binary_search`) yoki katta ma`lumotlar to`plamlarini o`tkazish kerak bo`lsa, STL samarali va ishlatish uchun qulay algoritmlarni taqdim etadi. - vaqt ichida murakkablik kafolatlari. STL C++ standart kutubxonasining bir qismi bo‘lib, turli kompilyatorlar va platformalarda qo‘llab-quvvatlanadi, bu esa uni platformalararo ilovalarni ishlab chiqish uchun ideal qiladi. Turli muhitlarda izchil xatti-harakatlar va interfeysni ta'minlaydi.

STL eng yaxshi tanlov bo'lmasligi mumkin, agar:
- Siz o'zingizning foydalanish holatlaringizga xos xotira yoki ishlashni optimallashtirish ustidan juda nozik nazoratga muhtojsiz.
- STL osonlikcha sig'dira olmaydigan maxsus ma'lumotlar tuzilmalari yoki algoritmlari talab qilinadi.

C++ tilidagi standart andozalar kutubxonasi (STL) birinchi navbatda ishlab chiquvchilar uchun qimmatli manba hisoblanadi, chunki u ma’lumotlar tuzilmalari va algoritmlarini samarali boshqarish va boshqarish uchun yaxshi tashkil etilgan vositalar to‘plamini taqdim etadi. STL dan qachon foydalanish kerak ? Keling shu haqida ko’rib chiqamiz.

Qachon samaradorlik kaliti: STL vektorlar, ro‘yxatlar va xaritalar kabi optimallashtirilgan, oldindan tuzilgan ma’lumotlar tuzilmalarini taqdim etadi, bu esa noldan murakkab ma’lumotlarni qayta ishlashni qo‘lda kodlash bilan solishtirganda vaqtni tejaydi.

Tez prototiplash va ishlab chiqish: STL yordamida ishlab chiquvchilar ushbu funksiyalarni mustaqil ravishda amalga oshirish zaruratisiz standart ma’lumotlar bilan ishlashni (masalan, saralash yoki qidirish) tezda sozlashlari mumkin, bu esa uni tez sur’atda rivojlanayotgan muhitlarda foydali qiladi.

Kod ishonchliligi va texnik xizmat ko‘rsatish: STL funksiyalari yaxshi sinovdan o‘tgan va keng tarqalgan bo‘lib foydalaniladi, bu esa xatolar ehtimolini kamaytiradi va kod barqarorligini oshiradi. Bu, ayniqsa, kod sifatini saqlash muhim bo'lgan loyihalar uchun foydalidir.

Qayta foydalanish mumkin va kengaytiriladigan kod: STL konteynerlari va algoritmlari masshtabni boshqarish uchun yaratilgan bo‘lib, ularni ma’lumotlarga ehtiyoj sezilarli darajada farq qiladigan ilovalar uchun mos qiladi.

STL kim uchun muhim: dasturchi yoki foydalanuvchi?

Albatta ishlab chiquvchilar uchun: STL birinchi navbatda ishlab chiquvchilar uchun zarur, chunki u vaqtni tejaydi, kod murakkabligini kamaytiradi va kodlar bazasini toza va boshqariladigan qiladi. Bu ishlab chiquvchilarga standart operatsiyalar uchun g'ildirakni qayta ixtiro qilmasdan turib, o'z loyihasining o'ziga xos jihatlariga e'tibor qaratish imkonini beradi. Foydalanuvchilar uchun: Garchi foydalanuvchilar STL bilan bevosita o'zaro aloqada bo'lmasalar ham, ular bilvosita foyda ko'radilar. STL-dan foydalanadigan kod ko'pincha tezroq va ishonchliroq bo'lib, kamroq xatoliklarga ega bo'lgan yaxshi ishlaydigan ilovalarga olib keladi. Masalan, tezkor ma'lumotlarni olish uchun STL-dan foydalanadigan ilovalar tezroq javob vaqtlariga ega bo'lishi mumkin, bu esa foydalanuvchi tajribasini oshiradi. Xulosa qilib

aytadigan bo’lsak, STL ishlab chiquvchilar uchun juda muhim, ammo dasturiy ta'minotda sifatni yaxshilash orqali foydalanuvchilarga bilvosita ustunlik beradi. Bu samarali, ishonchli va qo'llab-quvvatlanadigan kodni yaratmoqchi bo'lgan har bir kishi uchun C++ tilida amaliy tanlovdir.

## XULOSA

Standart andozalar kutubxonasi (STL) C++ shablon sinflari va funksiyalarining kuchli to‘plami bo‘lib, ma’lumotlarni boshqarish va algoritmlarni bajarish uchun samarali, qayta foydalanish mumkin bo‘lgan komponentlarni taqdim etadi. Ushbu maqolada biz konteynerlar,iteratorlar va algaritmlar ular bilan ishlashning muhim tomonlarini, C++ dasturlash tilida STL kutubxonasi orqali konteynerlar bilan qanday ishlashni ko’rib chiqdik. Konteynerlar yordamida dasturlash jarayonida ma’lumotlarni saqlash va ularga ishlov berish sezilarli darajada soddalashadi va samaradorligi oshadi. Ma’lumotlarning har xil tuzilmalari bilan ishlashda mos keladigan konteynerlar tanlanadi, bu esa ma’lumotlarga tezkor va samarali kirishni ta’minlaydi. C++ dasturlash tilida konteynerlar va ularga mos algoritmlar yordamida murakkab ma’lumotlarni samarali boshqarish imkoniyati yaratiladi. STL kutubxonasi dasturchilarga nafaqat konteynerlarni, balki ular ustida ishlaydigan algoritmlarni ham taqdim etadi, bu esa kodni qisqartirish va optimallashtirish uchun qulay imkoniyatdir. Konteynerlar va ularning algoritmlari dasturiy ta’minotni ishlab chiqish jarayonida dasturchilarga ko’plab murakkab vazifalarni hal qilishda yordam beradi.

Ushbu maqoladi STL ning hayotimizda qanchalikm darajada muhim ahamiyatga ega ekanligi u kim uchun muhim, qanday yollarda foydalanish mumkinligi haqida yoritib berilgan. Maqolada STL kim uchun muhim foydalanuvchi uchunmi yoki dasturchi uchunmi bularning hammasi yotirib o’tilgan. STLning ichida foydalanishimiz mumkin bo’lgan bir qancha massivlar haqida ham yoritilgan. Umuman olganda STL ning hayotimizda muhim ahamiyatga ega ekanligini korishimiz mumkin. STL dasturnyozishda bir qancha vaqtni tejash imkonini ham beradi. Dasturchilar uchun STL bilan ishlashning asosiy tamoyillarini bilish va ularni turli amaliyotlarda qo’llay olish muhimdir. Umuman olganda maqolada STL haqida to’liq ma’lumot olish mumkin.

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# STANDARD ALGORITHMS

**Son of Nematov Diorbek Tolkin**
**Son of Sodiqov Qobuljon Bobir**
TDIU, Andijan faculty, 2nd stage,
AATT 70/23 group student
Scientific leader: **A. Ismailov**

**Abstract**: This paper explores the foundations and advancements in algorithmic sci ence, focusing on the design, analysis, and optimization of algorithms across variou s fields. Algorithmic science serves as the backbone of computational efficiency, i mpacting diverse domains such as artificial intelligence, data science, and systems e ngineering. This study examines core algorithmic paradigms, including divide-and-conquer, dynamic programming, and greedy algorithms, and evaluates their perfor mance metrics such as time complexity, space complexity, and scalability. The pap er also investigates the role of algorithms in problem-solving within real-world app lications, highlighting emerging trends in machine learning algorithms, distributed computing, and cryptographic protocols. Through a comprehensive analysis, this pa per aims to deepen the understanding of algorithmic principles and promote the dev elopment of robust, efficient, and innovative algorithms.
**Keywords**: Algorithmic Science, Computational Efficiency, Time Complexity, Spa ce Complexity, Algorithm Design, Optimization, Machine Learning Algorithms, D istributed Computing, Cryptographic Protocols, Divide-and-Conquer, Dynamic Pro gramming, Greedy Algorithms.

# STANDART ALGORITIMLAR

Ne’matov Diyorbek To’lqin o’g’li
Sodiqov Qobuljon Bobir o’g’li
TDIU, Andijon fakulteti, 2-bosqich,
AATT 70/23 guruh talabalari
Ilmiy rahbari: A.Ismoilov

***Annotatsiya**: Ushbu maqola turli sohalardagi algoritmlarni loyihalash, tahlil qilish va optimallashtirishga e'tibor qaratib, algoritmika fanining asoslari va yutuqlarini o'rganadi. Algoritmik fan hisoblash samaradorligining asosi bo'lib xizmat qiladi, sun'iy intellekt, ma'lumotlar fani va tizim muhandisligi kabi turli sohalarga ta'sir*

*qiladi. Ushbu tadqiqot asosiy algoritmik paradigmalarni, jumladan, bo'lish va zabt etish, dinamik dasturlash va ochko'z algoritmlarni o'rganadi va ularning vaqt murakkabligi, makon murakkabligi va miqyoslilik kabi ishlash ko'rsatkichlarini baholaydi. Maqola, shuningdek, real dunyo ilovalarida muammolarni hal qilishda algoritmlarning rolini o'rganadi, mashinani o'rganish algoritmlari, taqsimlangan hisoblash va kriptografik protokollardagi rivojlanayotgan tendentsiyalarni ta'kidlaydi. Keng qamrovli tahlil orqali ushbu maqola algoritmik tamoyillarni tushunishni chuqurlashtirish va mustahkam, samarali va innovatsion algoritmlarni ishlab chiqishga yordam berishga qaratilgan.*

***Kalit so'zlar**: Algoritmik fan, Hisoblash samaradorligi, vaqt murakkabligi, kosmik murakkablik, algoritmni loyihalash, optimallashtirish, mashinani o'rganish algoritmlari, taqsimlangan hisoblash, kriptografik protokollar, bo'l va zabt et, dinamik dasturlash, ochko'z algoritmlar.*

## KIRISH.

Algoritmik fan o'zining asosi sifatida algoritmlarni loyihalash, tahlil qilish va optimallashtirishni, hisoblash va ilmiy sohalarda muammolarni hal qilish uchun muhim vositalarni o'rganadi. Ta'rifga ko'ra, algoritm muayyan turdagi muammolarni hal qilish yoki hisob-kitoblarni bajarish uchun mo'ljallangan aniq qadamlar ketma-ketligidir. Bu soha sun'iy intellekt va mashinani o'rganishdan tortib moliya, biologiya va ma'lumotlar tahliligacha bo'lgan fanlar uchun ajralmas bo'lib, bu erda algoritmlar kirishlarni amaldagi natijalarga aylantirish uchun asos bo'lib xizmat qiladi.

Algoritmik fanning ahamiyati uning universalligi va qo'llanilishidadir. Algoritmlar yuqori darajadagi inson tushunchalarini bajariladigan bosqichlarga aylantirish orqali mashinalarga murakkab vazifalarni avtonom tarzda bajarishga imkon beradi. Bo‘l va zabt et, dinamik dasturlash va ochko‘z algoritmlar kabi asosiy usullar algoritmik yondashuvlarning xilma-xilligini namoyish etadi, bu esa tezlik, aniqlik yoki resurslar samaradorligi kabi turli jihatlarga ustuvor ahamiyat beradigan moslashtirilgan yechimlarni topish imkonini beradi. Bundan tashqari, algoritm samaradorligini o'rganish, ko'pincha vaqt va makon murakkabligi o'lchovlari (masalan, Big O belgisi) yordamida baholanadi, algoritmlarning ham funktsional, ham ishlash uchun optimallashtirilganligini ta'minlaydi, ayniqsa resurslari cheklangan muhitda.

Hisoblash muammolari miqyos va murakkablik darajasida o'sib borar ekan, algoritmik ilm-fan doimiy ravishda murakkablik va masshtablilik kabi muammolarni hal qilish uchun rivojlanadi. Ushbu moslashuv innovatsion metodologiyalar, jumladan hal qilib bo'lmaydigan muammolarning yechimlarini taxminiy baholash uchun evristik yondashuvlar, noaniqlikni boshqarishning ehtimollik usullari va muammolarni hal qilishni tezlashtirish uchun parallel hisoblash orqali erishiladi. Algoritmik fan nafaqat tarmoqlar bo'ylab raqamli transformatsiyani asoslaydi, balki kvant hisoblash va neyron tarmoqlar kabi sohalarda kelajakdagi texnologik yutuqlar uchun asos yaratadi.

Algoritmlar yanada murakkablashib borayotganligi sababli, soha zamonaviy hisoblash landshaftlarini qayta shakllantiradigan yutuqlar uchun zamin yaratib, turli xil ilovalarni qo'llab-quvvatlash uchun qat'iy dizayn tamoyillariga - to'g'rilik, samaradorlik va mustahkamlikka urg'u beradi. Shunday qilib, algoritmik fanni o'rganish ham nazariy, ham amaliy informatika uchun ajralmas bo'lib qolmoqda.

Algoritmik fan bo'yicha maqolaning metodologiyasi bo'limida algoritmlarni loyihalash, tahlil qilish va amalga oshirishning tizimli, bosqichma-bosqich yondashuvi batafsil yoritilgan bo'lishi kerak, bunda asosiy e'tibor hisoblash muammolarini samarali hal qilish uchun foydalaniladigan asosiy metodologiyalarga qaratiladi.

1. Muammolarni shakllantirish va abstraksiya qilish: Dastlabki bosqich real muammoni tuzilgan, algoritmik vazifaga aylantirishni o‘z ichiga oladi. Bu mavhumlikni talab qiladi, bu erda murakkab tafsilotlar boshqariladigan komponentlarga soddalashtiriladi, bu muammoni kirishlar, kerakli natijalar va cheklovlar nuqtai nazaridan ko'rsatishga imkon beradi. Ushbu qadam algoritm maqsadlarini hisob-kitob vaqtini minimallashtirish yoki ma'lumotlar o'tkazuvchanligini optimallashtirish kabi amaliy talablarga moslashtirish uchun asos yaratadi.

2. Algoritmni loyihalash texnikasi: bo'l va zabt et, dinamik dasturlash va ochko'zlik usullari kabi turli dizayn paradigmalari muammoning mohiyatiga qarab qo'llaniladi. Masalan, “bo‘l va zabt et” muammoni kichik muammolarga ajratadi va yechimning aniqligini oshirish uchun har birini rekursiv hal qiladi. Dinamik dasturlashda oraliq natijalarni saqlash orqali bir-birining ustiga tushadigan kichik muammolar optimallashtiriladi, bu esa ortiqcha hisob-kitoblarni oldini oladi va ishlashni tezlashtiradi. Ochko'zlik usullari ko'pincha optimallashtirish vazifalarida qo'llaniladi, bunda har bir bosqichda mahalliy optimal tanlash samarali umumiy yechimga olib keladi.

3. Imlementatsiya va samaradorlikni tahlil qilish: Algoritmlarni amalga oshirish psevdokod yaratish va uni bajariladigan kodga aylantirish, shu bilan birga hisoblash samaradorligini yodda tutishni o'z ichiga oladi. Ishlash vaqt murakkabligi va kosmik murakkabligi kabi ko'rsatkichlar yordamida baholanadi, odatda Big O belgisi orqali tahlil qilinadi. Bu yechimning nafaqat to‘g‘ri, balki keng ko‘lamli ilovalar uchun ham optimal bo‘lishini ta’minlaydi. Eng yaxshi, o'rtacha va eng yomon stsenariylarni o'rganib chiqib, tadqiqotchilar turli xil sharoitlarda algoritm samaradorligini tasdiqlaydilar.
4. Sinov va takomillashtirish: Bu bosqich turli ma'lumotlar to'plamlari va muhitlar bo'ylab potentsial samarasizlik yoki noxush holatlarni aniqlash uchun jiddiy sinovlarni o'z ichiga oladi. Kodning ayrim qismlarini optimallashtirish yoki real dunyo ilovalarida masshtablilik va aniqlikni oshirish uchun algoritmik yondashuvlarni sozlash kabi zaruriy tuzatishlar amalga oshiriladi.

## Xulosa

Xulosa qilib aytadigan bo'lsak, algoritma fani kompyuter fanlari, ma'lumotlar tahlili, sun'iy intellekt va qaror qabul qilish kabi ko'plab sohalarga ta'sir ko'rsatadigan zamonaviy texnologik taraqqiyotning poydevori sifatida paydo bo'ldi. Algoritmlarning tez evolyutsiyasi hisoblash samaradorligini sezilarli darajada yaxshilashga olib keldi, bu esa real vaqt rejimida katta hajmdagi ma'lumotlarni qayta ishlash imkonini berdi. Ushbu maqola algoritmik nazariya va amaliyot o'rtasidagi murakkab munosabatlarni o'rganib chiqdi va turli xil ilovalarda muvaffaqiyatga erishishda algoritmik murakkablik va samaradorlikni tushunish muhimligini ta'kidladi.
Algoritmni ishlab chiqishning dinamik tabiati matematika, informatika va sohaga oid bilimlarni o'z ichiga olgan fanlararo yondashuvni talab qiladi. Algoritmlar jamiyat tuzilmalariga kirib borishda davom etar ekan, ularning oqibatlarini tushunish juda muhim bo'lib qoladi. Axloqiy mulohazalar, algoritmik tarafkashlik va algoritmik jarayonlarda shaffoflik zarurati kabi masalalarni e’tibordan chetda qoldirib bo‘lmaydi. Ushbu qiyinchiliklar algoritmik yutuqlarning ikki tomonlama xususiyatini ta'kidlaydi; ular misli ko'rilmagan imkoniyatlarni taklif qilish bilan birga, mas'uliyat bilan boshqarilmasa, katta xavf tug'diradi.
Bundan tashqari, qaror qabul qilish jarayonlarini avtomatlashtirishda algoritmik fikrlashning roli ushbu tizimlar javobgarlik va axloqiy me'yorlarni hisobga olgan holda ishlab chiqilganligini ta'minlash uchun mustahkam tizim zarurligini ta'kidlaydi. Algoritmik fanning kelajagi texnologlar va siyosatchilar o'rtasidagi

yaqin hamkorlikni o'z ichiga oladi, bu esa texnologik taraqqiyot jamiyat qadriyatlari va ehtiyojlariga mos keladigan landshaftni rivojlantiradi.

Biz oldinga siljiganimizda, davom etayotgan tadqiqotlar algoritmik samaradorlik va adolatni oshirishga qaratilgan bo'lib, keng tarqalgan algoritmlarni qo'llashning ijtimoiy-texnik oqibatlarini ko'rib chiqishi kerak. Murakkab algoritmlarga intilish axloqiy tamoyillarga sodiqlik bilan to'ldirilishi kerak, bu esa algoritmik yutuqlarning jamiyatda teng taqsimlanishini ta'minlashi kerak.

Xulosa qilib aytadigan bo'lsak, algoritmik fan turli sohalarni tubdan o'zgartirish salohiyatiga ega bo'lsa-da, jamiyatni yaxshilash uchun uning imkoniyatlaridan to'liq foydalanish uchun uning murakkabliklarini puxta o'ylash va axloqiy jihatdan boshqarish zarur.

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# BANK ASSET AND LIABILITY MANAGEMENT

***Olimova Maftuna Komil kizi***
*Bank and Finance Academy Master's degree student*
Tel: +998909044097
Mail: maftunaolimova970802@gmail.com

## ANNOTATION

In globalized world Bank management can be defined in a variety of ways. Bank management, in general, refers to the process of managing the Bank's statutory activities. Here will be discussed some arguments according to scientists point of view **.**

**Key words:** Assets, liabilities, bank management, risk management, liquidity problem, cash flow, interest rate,

Bank management refers to the process of managing the Bank's statutory activity. Bank management is characterized by the specific object of management - financial relations connected with banking activities and other relations, also connected with implementation of management functions in banking.

The main objective of bank management is to build organic and optimal system of interaction between the elements of banking mechanism with a view to profit.

Successful optimization of the "profitability-risk" ratio in a bank lending operations is largely determined by the use of effective methods of bank management. Ability to take reasonable risk is one of the elements of entrepreneurship culture in general and banking culture in particular.

Reliability of the bank management is determined by the following characteristics:

- management expertise in strategic analysis, planning, policy development and management functions;
- quality of planning;
- risk management (credit, interest rate and currency risks);
- liquidity management;
- management of human resources;
- creation of control systems: audit and internal audit, monitoring of profitability and risks liquidity;
- unified information technology system: integrated automation of workflow, accounting, current analysis and control, strategic planning.

Asset and liability management is the one of major problem in banking. ALM plays a very important role bringing together the different activities of the bank. Appropriate liquidity and balance sheet management is a key factor in ensuring the bank's business and its continuity. More recently, even the major international financial institutions have been faced with serious liquidity problems and even took some outside help. This shows that the importance of APV was not evaluated or it was not properly executed. This has led to the financial market supervisory authorities around the world have taken action to ensure that financial institutions should have an effective ALM mechanism. Therefore relevance and importance of the problem being investigated enables to developed research in this area. The aim of this paper is to analyze Lithuanian banking sector ALM activity and make assumptions of how sustainable the sector was during the different business cycle stages and how banks can manage their risks according to business cycles. The article consists of five sections. The second section presents the literature review highlighting the principal role of ALM. Third section provides a brief methodological research techniques background and its application. Results of the study are presented in section four, and section five concludes the paper.

ALM [1] is a generic term that is used to refer to a number of things by different market participants. The principal objective of the ALM function is to manage interest-rate risk and liquidity risk. It also sets overall policy for credit risk and credit risk management, although tactical-level credit policy is set at a lower level within credit committees. Although the basic tenets of ALM would seem to apply more to commercial banking, rather than investment banking, in reality it is important that it is applied to both functions. A trading desk still deals in assets and liabilities, and these must be managed for interest rate risk and liquidity risk. In a properly integrated banking function, the ALM desk will have a remit covering all aspects of a bank’s operations. ALM deals with the optimal investment of assets in view of meeting current goals and future liabilities. Choudhry said, that the definitions of assets, liabilities, and risks are specific to each institution, but, very generally, assets may be viewed as expected cash flows, and liabilities as expected cash outflows. Although shortterm risks arising from the possibility that an institution's assets will not cover its short-term obligations are important to assess and quantify, ALM is usually conducted from a long-term perspective. As such, ALM is considered a strategic discipline as opposed to a tactical one. Mitra & Schwaiger explain, that

[1] ALM- Asset and liability management

ALM is a financial (analytic) tool for decision making that sets out to maximize stakeholder value. Its overall objective is to make judicious investments that increase the value of capital, match liabilities and protect from disastrous financial events. An integrated asset and liability management model sets out to find the optimal investment strategy by considering assets and liabilities simultaneously. Simply stated, the purpose of such an approach is to reduce risk and increase returns. ALM is a future oriented process involving simultaneous asset and liability management to measure, monitor and control the impact of changing interest rates on the bank's earnings, asset value, liquidity and capital requirements. Summarize, the ALM is simply combines several bank portfolios - asset, liabilities, and the difference between the banks received and interest paid – management processes into a single coordinated process. In other words, Social and Behavioral Sciences 1082 – 1093 main feature of the ALM is coordinated and not broken the total bank's balance sheet management. ALM as a planning tool has evolved from the need to ensure the asset and liability time overlap for different time periods. Nowadays this process is much more complex, overlapping terms to ensure interest rate management using both static and dynamic simulations. The main ALM purpose is to connect different bank activities into a single unit, facilitating liquidity and balance sheet management, which is crucial for ensuring the normal operation of the bank, service delivery and consistent and profitable growth of the bank. ALM provides timely identification potential problems and risks of operating in the bank's balance sheet and income. The most common problem occurs when the bank's liability costs are rising faster than revenues from the asset, or when falling interest rates asset income is declining faster than the liability side. Birge & Judice research results enable simulation of bank balance sheets over time given a bank’s lending strategy and provides a basis for an optimization model to determine bank ALM strategy endogenously. The main ALM functions are interest risk, the structural differences between asset and liability and simultaneous liquidity management. Structural imbalances in the balance management are one of the main functions of ALM This can be grounded on the fact that liquidity management is mainly focused on the short term, while ALM increasingly the focus of attention for a long period of time in an effort to balance asset and liability terms with the cash-flow on both sides of the balance sheet. The structural differences during ALM process are examined in several limits. The first is a static noncompliance evaluation, which consists of asset and liability division into groups according to the period and analysis of those groups reporting on funding shortages and surpluses during periods. Such an assessment must be carried out

regularly according all the time changing the structure of bank balance. This feature is important to evaluate the individual and the group's sensitivity to interest rate changes. Dynamic assessment of non-compliance is invoked when needed to assess possible ALM invoked hedging instruments, such as swaps the effect of discrepancies. More attention should give on ALM process management the interest rate sensitivity. There are some of the key interest rate sensitivity assessment and management techniques. The first, the sensitivity of non-compliance reports indicating the breakdown of cash flows over time should be taken with respect to the sensitivity of the asset and liability interest and revaluation options. DV01 or PVBP (Price Value of a Basis Point) ratio is used to evaluate how much change in the market value of the interest rate change of one basis point. Banks managing interest rate risk on its balance sheet often sets the visible range. Another measure is net interest income sensitivity changes to interest rates . Liquidity management feature is not limited to the management of liquidity gaps. Comprehensive ALM process involves the determination of policy and liquidity, contingency resolution plans and liquid asset holding, ensuring liquidity risk in the desired level.

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# БЕТОННИНГ МУСТАХКАМЛИГИНИ НАЗОРАТ ҚИЛИШНИНГ АМАЛДАГИ УСЛУБЛАРИНИ КЎП МЕЗОНЛИ ТАХЛИЛИ ХАҚИДА

Тошкент давлат транспорт университети
**Махаматалиев Иркин Муминович**
**Рузметов Фазлиддин Шарифбоевич**
**Маткурбонов Бунёд Богибек угли**

**Аннотация.** Бетоннинг мустахкамлигини назорат қилиш бир қатор услубларни ўз ичига олади. Улар қаторига ультратовушли импульсли услуб, узиб (ўйиб) олиш услуби, синдириш билан узиб олиш услуби, конструкция чеккасини синдириш услуби, эластик деформация ва зарбли импульс услуби ҳамда бошқа кам анъанавий услублар. Бетоннинг мустахкамлигини назорат қилишнинг амалдаги услубларини кўп мезонли тахлил қилиш очиқ қурилиш майдонининг талабларига тўлиқ жавоб берувчи ва бетоннинг қолипдан ечиш, критик, лойихавий ва бошқа мустахкамликка оид кўрсаткичларини самарали аниқлаш имкониятини берувчи назорат қилишнинг услублари.

**Калит сўзлар:** ультратовушли импульсли услуб, узиб (ўйиб) олиш услуби, синдириш билан узиб олиш услуби, конструкция чеккасини синдириш услуби, эластик деформация ва зарбли импульс услуби, ўқ отиш услуби, бетон танаси, анкерларни ўрнатиш, пўлат дискни узиб олиш услуби, пўлат дюбель, акустик эмиссия сигнали.

Бетоннинг мустахкамлигини емирмайдиган назорат қилиш бир қатор услубларни ўз ичига олади. Улар қаторига ультратовушли импульсли услуб, узиб (ўйиб) олиш услуби, синдириш билан узиб олиш услуби, конструкция чеккасини синдириш услуби, эластик деформация ва зарбли импульс услуби, ҳамда бошқа кам анъанавий услублар (СВЧ-услуб, радиоизотоп, ўқ отиш услублари ва бошқалар).

Емирмайдиган назортнинг механик услублардан энг объективи синдириш билан узиб олиш услуби [1] ҳисобланади. Унинг кенг миқёсда қўлланилишига жиддий тўсқинлик қилувчи камчиликлардан бетон танасига анкерларни ўрнатиш, ажратиб олиш ва ҳосил бўлувчи синиқлар ўрнини тўлдириш бўйича бажариладиган ишларнинг сермеҳнатлиги, асбоб-ускуналарнинг ва ишларни бажаришнинг қимматлиги , ушбу жараённи автоматлаштириш мумкин

эмаслиги, конструкциянинг кўплаб нуқталарида ва опалубкани ечмай туриб назорат қилишнинг имконсизлиги ҳисобланади.

Бундан ташқари, унинг қўлланилиши танланма назоратнинг асосий тамойилларидан бири – танланманинг эхтмолийлиги тамойилига зиддир. Қотиб қолган бетон танасида пармалаб ёки уриб очилувчи [2, 3] тешикларга махсус бўшатувчи конуснинг ўрнатилишига асоаланган И.В. Вольф [4] услуби танланманинг эхтимолийлиги билан боғлиқ бўлган вазиятни бир мунча тўғрилайди. Бироқ, у меҳнат сарфининг, синаш муддатларининг бундан -да ошиб кетишига олиб келади.

Конструкцияга махсус елим билан ёпиштириладиган пўлат дискни узиб олиш услуби [5, 6] синдириш билан узиб олиш услубига нисбатан бир қатар афзалликларга эга бўлиб улар қаторига қуйидагилар киради: меҳнат сарфининг камлиги, қўлланилгандан сўнг синиқ жойларнинг бўлмаслиги, бинобарин, нуқсонларни тузатиш зарурати бўлмаслиги. Камчиликлари қаторига эса қуйидагиларни келтириш мумкин: конструкция қолипдан ечилмагунча назорат қилишнинг имконсизлиги; назорат қилиш жараёнини автоматлаштириш имконсизлиги; олинадиган кўрсаткичларнинг ушбу назорат услубининг аниқлигини пасайишига олиб келувчи конструкция бетонининг фақат сиртқи қатламлари сифатига боғлиқ бўлиши.

Конструкция четини синдириб олиш услуби [1] ўлчаш аниқлигининг анча юқори бўлиши билан ажралиб турса-да, унинг кўп меҳнат талаб қилиши, ўлчаш жараёнини автоматлаштиришнинг имконсизлиги , хамда опалубкадан ечилмаган конструкцияни назорат қилиш имконияти йўқлиги, синаш жойининг ўзига хослиги (танловнинг эҳтимолийлиги тамойилининг бузилиши) унинг оммавий қўлланилиши кўламини сезиларли чеклайди.

МДХ мамлакатлари, шулар жумласидан Ўзбекистон Республикаси қурилишларида кенг қўлланилувчи бошқа механик синаш услублари жуда ҳам содда ва аниқлиги даражаси кам ҳисобланади.

Чунончи эластик урилиб-қайтиш, зарбали импульс ва пластик деформация услублари жуда ҳам кўп омилларга боғлиқ булар қаторига: бетоннинг фақат сиртки қатлами тавсифини акс эттириши, йирик тўлдиргичнинг тури ва арматуранинг жойлашувига боғлиқлиги [7, 8] киради. Шу билан бирга ушбу услубларнинг жиддий камчилиги қаторига опалубкани ечмасдан назорат қилишнинг имконсизлиги ва ўлчаш жараёнини автоматлаштиришнинг имконсизлигини ҳам киритиш мумкин.

Механик емирмайдиган услублар қаторига ўқ отиш услуби ҳам киради.Ушбу услуб бетон сиртининг ўқ, пўлат дюбель ёки порохга оид газлар энергияси таъсирида ҳаракатланувчи махсус каллакчанинг ўзаро таъсирлашувига асосланган. Ҳосил бўлувчи ўйиқ жойнинг чуқурлиги миқдори бўйича конструкция бетонининг мустахкамлиги ҳақида фикр юритилади [45, 79].

Ушбу услубнинг жиддий камчиликлари қаторига синовчи ва атрофдаги одамлар учун ҳавфлилиги, ўйиқ жой чуқурлиги миқдорига йирик тўлдирувчининг сезиларли таъсир кўрсатиши, юпқа деворли конструкцияларни синашнинг иложи йўқлигини киритиш мумкин.

Конструкциядаги бетоннинг мустахкамлигини назорат қилишнинг асосий физикавий услуби ультратовушли импульсли услуб ҳисобланади. Бунда яхлит қуйма бетон ва темирбетон учун, юқорида таъкидлаб ўтилганидек, фақат икки томонлама товуш ўтказишни қўллаш рухсат этилади [129]. Бироқ яхлит қуйма конструкцияларда шундай жойлар ҳам борки, ультратовушли қайта ўзгартиргичларни бир ўқ бўйича ўрнатиш имконсизлиги учун уларда икки томонлама товуш ўтказишнинг умуман иложи йўқ (масалан, туйнуксиз девор ёки ёпмалар). Ультратовушли услубнинг асосий камчиликларидан яна бири назоратнинг билвосита тавсифига (ультратовушнинг ўтиши тезлигига) конструкция бетонининг харорати ва намлиги, арматуранинг йўналиши ва диаметри, бетон ҳимоя қатламининг ўлчами, йирик тўлдиргичнинг мустахкамлиги, эластик тавсифлари ва миқдори, бетоннинг қотиш муддати, цементнинг тури, маркаси ва сарфи, қумниниг миқдори, қўшимчаларнинг тури ва сарфи, асбоб қайта ўзгартиргичларининг бетон сирти билан контактлашиши сифатининг таъсир қилиши ҳисобланади.

Услубнинг афзалликлари қаторига эса қуйидагиларни киритиш мумкин: синовлар ва уларни ишлаб чиқиш жарёнини автоматлаштириш, бетоннинг мустахкамлик олиши жараёнини опалубкага қайта ўзгартиргичларни ўрнатиш йўли билан эрта муддатлардаёқ назорат қилишнинг мумкинлиги, синовларни ўтказишнинг тезлиги ва соддалиги, асбоб-ускуналарнинг енгиллиги ва қулайлиги.

Бетоннинг мустахкамликка оид кўрсаткичларини назорат қилишнинг унинг электр ўтказувчанлиги бўйича назорат қилиш услуби ҳам мавжуд [1, 3].

Ушбу услубнинг афзаллиги қаторига унинг бетонда содир бўлувчи структуравий ўзгаришларга жуда ҳам сезгирлиги киради, камчиликлари бўлиб эса – ўлчанувчи катталикнинг электродларнинг геометрик

кўрсаткичлари ва улар орасидаги масофага, бетоннинг ғоваклиги ва намлигига боғлиқлиги ҳисобланади.

Бетон мустахкамлигини емирмасдан назорат қилишнинг имкониятини берувчи истеқболли услублардан яна бири акустик эмиссия услуби ҳисобланади. Унинг моҳияти бетоннинг қотишида, унга куч ёки бошқа таъсирлар кўрсатилганда ички структурасининг локал қайта қурилиши натижасида юзага келувчи акустик тўлқинларни регистрация қилишдан иборат бўлиб кейинчалик ушбу тўлқинлар тегишлича қайта ишланади ва интерпретация қилинади [4, 5].

Ушбу услубнинг камчиликлари қаторига акустик эмиссия сигналлари кўрсаткичларига бетонда содир бўлувчи физик-кимёвий жараёнларнинг, хамда бетоннинг тури ва таркибининг таъсири етарлича ўрганилмаганлигини киритиш мумкин.

Бундан ташқари бетон мустахкамлигини назорат қилишини амалга оиширишнинг радиоизотопли услубини [7] ва СВЧ- услубни [8] қўллаш ҳам синаб кўрилган. Лекин уларнинг мураккаблиги ва етарлича аниқмаслиги туфайли қурилиш амалиётида кенг қўлланилмаган.

Юқорида келтирилган яхлит қуйма бетон мустахкамлгини назорат қилишнинг мавжуд бўлган услубларининг тахлили энг муҳим бўлган мезонларни ажратиб олиш ва асосий услубларни кўп мезонли ўзаро таққослаш имкониятларини беради. Ўтказилган бундай таққослашда баҳолаш мезонлари сифатида қуйидагилар танлаб олинди: $K_1$ – услубнинг хаққонийлиги ва мехёрий ҳужжатлар билан таъминланганлиги; $K_2$ — тезкорлиги ва автоматлаштиришнинг имконияти борлиги; $K_3$ – турли конструкциялар (шакли, арматураланиши, маъсулиятлиги бўйича ) учун қўллашнинг имконияти борлиги; $K_4$ — синовлар ўтказишнинг қиймати, сермеҳнатлиги ва хавфсизлиги; $K_5$ – конструкцияга ножўя таъсири ва хосил бўлувчи нуқсонлрни бартараф қилиш зарурлиги.

Мезонлар балларда ифодаланиб 0 дан 1,0 гача (ўзаро фарқланиши 0,1 бирликка ) бўлиши мумкин. Энг юқори балл 1,0 бўлиб сифат мезонларига тўлиқ жавоб беришини кўрсатади. Тахлил ўргичмак тўри услубида бажарилди. Яхлит қуйма бетон мустахкамлигини назорат қилишнинг рационал услубини танлаш бўйича ўтказилган тахлил натижалари 1.2-жадвал ва 1.3-расмда келтирилган. Шуни айтиб ўтиш лозимки, мустахкамликни эрта муддатларда (опалубкани ечишдан олдин) назорат қилиш учун фақат 1.3 в – расмда келтирилган услубларни қўллаш мумкин.

1.1-жадвал.

Яхлит қуйма бетон мустахкамлигини назорат қилиш услубларини баҳолаш мезонларининг миқдорлари

| Услуб № | Услубнинг номи | Баҳолаш мезонлари | | | | |
|---|---|---|---|---|---|---|
| | | $K_1$ | $K_2$ | $K_3$ | $K_4$ | $K_5$ |
| 1 | Конструкция ёнида сақланувчи бетон намуна-кубларни синаш услуби | 0,9 | 0,2 | 1,0 | 0,4 | 1,0 |
| 2 | Қолдирма қолиплар ёрдамида конструкциядан ажратиб олинувчи бетон намуна-кубларни синаш услуби | 1,0 | 0,2 | 0,8 | 0,3 | 0,6 |
| 3 | Конструкциядан қирқиб олинувчи бетон намуна-кубларни синаш услуби | 0,9 | 0,2 | 0,8 | 0,3 | 0,6 |
| 4 | Синдириш билан конструкциядан узиб олинувчи услуб | 0,8 | 0,3 | 1,0 | 0,6 | 0,9 |
| 5 | Конструкциядан узиб олинувчи услуб | 0,7 | 0,3 | 1,0 | 0,4 | 1,0 |
| 6 | Конструкция қиррасини синдириш услуби | 0,8 | 0,3 | 0,4 | 0,7 | 0,8 |
| 7 | Ультратовушли импульсли услуб | 0,8 | 1,0 | 1,0 | 0,9 | 1,0 |
| 8 | Эластик қайтиб келиш услуби | 0,7 | 0,5 | 1,0 | 0,9 | 1,0 |
| 9 | Пластик деформациялар услуби | 0,7 | 0,3 | 1,0 | 0,9 | 1,0 |
| 10 | Зарбли импульс услуби | 0,7 | 0,5 | 1,0 | 0,9 | 1,0 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 11 | Харорат-вақтга оид омил бўйича назорат қилиш услуби | 0,7 | 1,0 | 1,0 | 1,0 | 1,0 |
| 12 | Электр ўтказувчанликни назорат қилиш услуби | 0,4 | 1,0 | 0,8 | 0,4 | 1,0 |
| 13 | Радиоактив услуб | 0,3 | 1,0 | 1,0 | 0,3 | 1,0 |
| 14 | Ўқ отиш услуби | 0,5 | 0,5 | 0,9 | 0,4 | 0,9 |

Бетон қоришмаси ва бетоннинг асосий кўрсаткичларини технологик назорат қилиш услубларининг ўтказилган тахлили асосида 1.2-жадвал шакллантирилди. Ушбу жадвалда келтирилган маълумотлардан кўриниб турибдики, энг универсал услублар қаторига бетон қоришмаси ва бетоннинг кўрсаткичларини назорат қилишнинг қуйидаги услублари киради: ультратовушли, электромагнитли, электромеханик. Бироқ уларнинг хаммаси ҳам ўзининг маълум камчиликларига эга бўлиб, фикримизча, барча талаб қилинувчи параметрларни аниқлаш учун фақат битта физикавий тамойилга асосланган усулбни ажратиб олиш амалда имконсиз ҳисобланади.

1.2-жадвал.

Ишлашининг физикавий тамойилига боғлиқ равишда назорат қилиш воситаларининг технологик имкониятлари

| Назорат қилиш воситалари ишлашининг физикавий тамойиллари | Назорат қилиш кўрсаткичи | | | | |
|---|---|---|---|---|---|
| | Бетон қоришмасининг ҳаракатчанлиги | Бетон қоришмаси зичланганлиги даражаси | Қотган бетоннинг намлиги | Қотиб борувчи бетоннинг харорати | Бетоннинг конструкциядаги мустахкамлиги |
| Механик (дастаки) | + | | + | + | + |
| Электрга оид, электромеханик | + | + | + | + | + |
| Ультратовушли | + | + | | | + |
| Радиацияга оид, | | + | + | | + |

| | | | | | |
|---|---|---|---|---|---|
| Радиоизотопга оид | | | | | |
| Электромагнит тўлқинигиа оид (СВЧ) | | + | + | + | + |

**Хулоса.** Шундай қилиб бетоннинг мустахкамлигини назорат қилишнинг амалдаги услубларини кўп мезонли тахлил қилиш очиқ қурилиш майдонининг талабларига тўлиқ жавоб берувчи ва бетоннинг қолипдан ечиш, критик, лойихавий ва бошқа мустахкамликка оид кўрсаткичларини самарали аниқлаш имкониятини берувчи назорат қилишнинг универсал услубларининг мавжуд эмаслигини кўрсатиб берди.

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# ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ ПРЕДПРИЯТИЙ С ГОСУДАРСТВЕННЫМ УЧАСТИЕМ И ЧАСТНОГО СЕКТОРА

**Нуралиев Р.Т.**
Заведующий отделом к.э.н., с.н.с. Центра исследований проблем приватизации и управления государственными активами при Агентстве по управлению государственными активами Республики Узбекистан, г.Ташкент

**Аннотация.** В данной статье обозначены роль и значение государственных и частных предприятий в развитии экономики страны, проанализированы эффективности работы государственных предприятий. а также сделаны выводы и предложения по вопросам развития государственно-частного партнерства.
**Ключевые слова:** Смешанная экономика, частный сектор, государственные предприятия, унитарные предприятия, рыночная экономика.

Государственные предприятия. всегда выполняли важнейшие функции в экономике, поэтому вопрос его взаимодействия с частным сектором является одним из центральных в обществе. Их роль в регулировании общественного производства возрастает и для этого имеются объективные условия, а именно постоянно усложняющаяся система и характер внешних и внутренних экономических связей, возрастают масштабы экономической деятельности.
Поскольку рыночная экономика, как и любой другой экономический механизм, является несовершенной системой, широкое распространение получила смешанная экономика, включающая в себя лучшие стороны других систем. Смешанная экономика, основанная на законах рыночной системы и включающая макроэкономическое регулирование, предполагает вмешательство государства для выполнения определенных задач по компенсации провалов рынка.
Сочетание различных форм собственности является необходимым условием повышения эффективности экономической системы. Присутствие на этом рынке предприятий с разными формами собственности активизирует здоровую конкуренцию и, как следствие, способствует повышению эффективности предприятий. Для этого необходимо найти оптимальное соотношение частного и государственного секторов для каждого условия. Правительство приходит на помощь тогда, когда частный сектор не может

последовательно и эффективно выполнять свою задачу, а также в сферах, где он не может преодолеть сложности кризисов, но есть и области, где правительство не может быть эффективным предпринимателем, и в этом отношении частный бизнес должен сохранять контроль [1].

В стратегии «Узбекистан – 2030» от 11.09.2023 года принят указ Президента Республики Узбекистан: увеличить долю негосударственного сектора в экономике до 85% и сократить численность на 2,3 тыс. предприятий с государственной долей в 6 раз [2].

**Таблица 1.**
**Количество государственных предприятий в Республике Узбекистан**

| № | **Показатели** | **2019** | **2020** | **2021** | **2022** | **2023** |
|---|---|---|---|---|---|---|
| 1. | Общее количество предприятий с государственным участием, в том числе: | 2965 | 2792 | 2781 | 2340 | 2137 |
| 1.1 | Акционерные общества и предприятия с государственной долей | 257 | 251 | 253 | 224 | 255 |
| 1.2 | Общества с ограниченной ответственностью и предприятия с государственной долей | 990 | 1000 | 1121 | 1219 | 1416 |
| 1.3 | Государственные унитарные предприятия | 1718 | 1541 | 1407 | 897 | 466 |

**Источник: составлено авторами на основе информации Агентства по управлению государственными активами Республики Узбекистан.**

Из данной таблицы мы видим, что в 2019 году общее количество государственных предприятий составляло 2965, а к концу 2023 года их число составило 2137. К 2030 году их число должно сократиться в 6 раз до 356.

Преимущество государственных предприятий в том, что они не всегда прибыльны, но в то же время выполняют социально важные и стратегические функции. В то время как основной целью частного сектора является получение прибыли, быстрая адаптация к любой среде и активное внедрение инноваций, государственный сектор существует для обеспечения и улучшения экономических показателей и благосостояния населения.

Помимо решения проблемы баланса между секторами экономики, необходимо решить проблему эффективной работы каждой отрасли. В связи с этим утверждение о неэффективности государственного сектора не обосновано, а вопрос эффективности каждого сектора является спорным, поэтому недостаточно будет изменить соотношение между секторами экономики.

В условиях рыночной экономики доля государственного сектора должна быть достаточно низкой и соответствовать экономической реальности. При этом государственный сектор должен обладать высокой эффективностью, чтобы в полной мере реализовать задачи национального уровня, а также организовать экономическую безопасность и экономический рост.

В широком смысле государственный сектор экономики – это совокупность ресурсов, находящихся непосредственно в распоряжении государства, совокупность экономических объектов, полностью или частично находящихся в собственности центральных или местных органов власти.

В Узбекистане существует ряд предприятий, деятельность которых носит стратегический характер и влияет на общее благосостояние государства. Такие предприятия находятся под контролем государства

Проблема эффективности государственных предприятий заключается в том, что, с одной стороны, государство как совладелец бизнеса стремится увеличить прибыль и рентабельность, но с другой стороны, государство выступает гарантом социальное и экономическое благополучие. Например, чтобы увеличить прибыль, необходимо одновременно повышать цены и удерживать их так, чтобы они не приводили к негативным социально-экономическим процессам.

Государство своей политикой предпринимательства стимулирует экономику, создает необходимые условия для ее процветания или жестко регулирует деятельность хозяйствующих субъектов и стремится получить максимальную

выгоду от их деятельности. Это в первую очередь зависит от экономической ситуации и стратегических целей, которые преследуют государство.

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# DEVELOPMENT OF STUDENTS' FUNCTIONAL LITERACY WITHIN THE FRAMEWORK OF INTERNATIONAL ASSESSMENT SYSTEMS (PISA, TIMSS).

**Boymirzayev Otabek Nomonjonovich**
University of Business and Science 2nd stage master's student of pedagogy and psychology

***Abstract.*** *This article is devoted to the development of students' functional literacy within the framework of international assessment systems (PISA and TIMSS). Functional literacy refers to the development of skills such as problem solving, analysis, and reasoning in accordance with the requirements of modern society. In this article, analytical and statistical methods were used to study the content of PISA and TIMSS assessment systems and their impact on the literacy level of students.*
***Keywords.*** *PISA, TIMSS, functional literacy, international assessment, education system, competence, student achievement.*

## INTRODUCTION.

International assessment programs, in particular, PISA (Programme for International Student Assessment) and TIMSS (Trends in International Mathematics and Science Study), are considered as an effective tool for assessing the educational level and competencies of students. These systems measure students' not only their academic knowledge, but also their ability to solve real-life situations. Development of functional literacy, that is, teaching students to apply concrete, mathematical and scientific knowledge in practice, is one of the important tasks of today's education system.

**Literature analysis**. Functional literacy and international assessment systems have been researched by many Uzbek, CIS countries and foreign scientists. Uzbek scientists M. Karimov and A. Usmanov conduct research on the role of international standards in improving students' literacy and emphasize that programs such as PISA and TIMSS are important in introducing international best practices to improve the quality of education. Russian scientists T. Melikhova and Y. Ivanov from the CIS, based on the results of PISA and TIMSS, conducted research on improving functional literacy in mathematics and science in Russia. They suggest adapting the approaches of assessment systems to the local educational system. Foreign scientists D. Johnson and A. Fraser, conducting research on the comparative analysis of

international assessment systems, note that PISA and TIMSS are considered the main indicators for measuring not only the level of knowledge of students, but also their critical and analytical thinking skills.

**Methodology.** This article focuses on the analysis of PISA and TIMSS assessment systems and their impact on improving students' functional literacy. The following steps were used in the methodology:

The content and indicators of international evaluation systems were studied through literature analysis.

PISA and TIMSS results and their relationship with students' functional literacy were checked using statistical analysis.

**Results were presented through tables and diagrams.**

Discussion and analysis. The tasks and methods of international assessment systems aimed at developing students' functional literacy are listed below.

The PISA system is conducted every three years among 15-year-old students and is aimed at assessing their level of literacy (mathematics, natural sciences, reading literacy). Within the framework of this program, the ability of students to apply knowledge acquisition skills in real-life conditions, for example, critical analysis, and the ability to express opinions based on evidence, is evaluated.

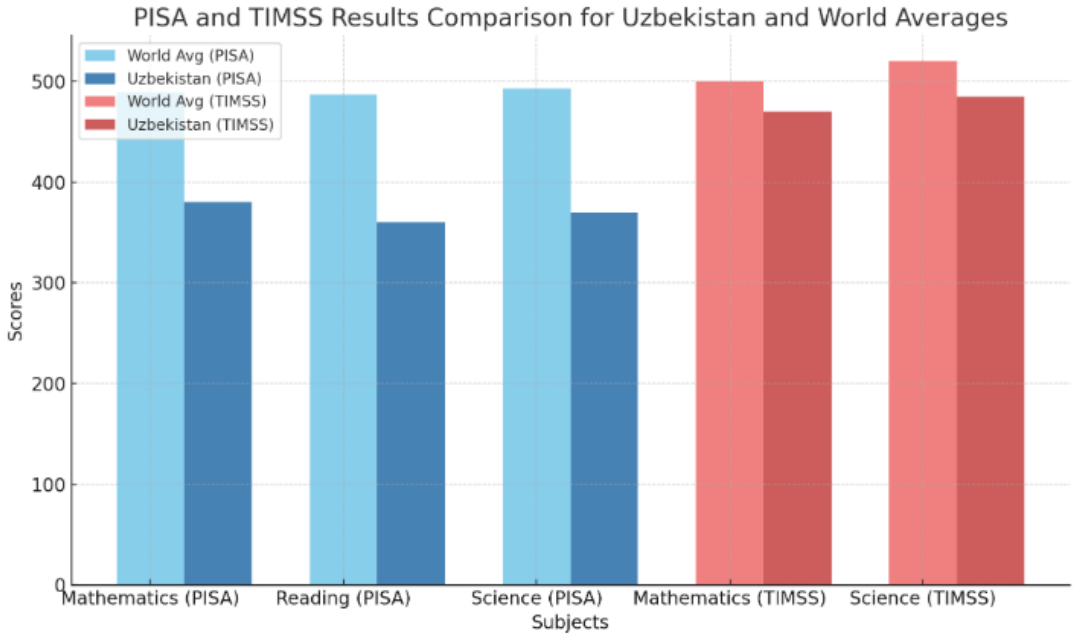
The TIMSS assessment system is administered to primary and secondary school students (4th and 8th grade) and measures their level of knowledge in mathematics and science. The main purpose of TIMSS is to assess how well students have mastered foundational knowledge, that is, knowledge acquired during elementary and secondary school.

**Analyzes and results.** Through tables and diagrams, we show the results of PISA and TIMSS, as well as the status of Uzbek students in international rankings.

**Analysis of PISA and TIMSS Results**

| System | Assessment area | Average score by country (2018) | Ball of Uzbek students | The world is average |
|---|---|---|---|---|
| PISA | Mathematics | 460 | 380 | 489 |
| PISA | Reading | 450 | 360 | 487 |
| TIMSS | Mathematics | 520 | 470 | 500 |
| TIMSS | Natural sciences | 540 | 485 | 520 |

It can be seen from the above table that Uzbekistan is below the average results in PISA and TIMSS ratings. This highlights the need for increased capacity to ensure that students are strong in terms of application of knowledge and functional literacy.




This chart compares PISA and TIMSS results with Uzbekistan and world averages. It can be seen in the diagram that Uzbek students recorded lower PISA results than the world average. In TIMSS results, Uzbek students have closer to the average results in mathematics and science, but are still slightly lower compared to the world average.

This diagram shows the need to prepare for international assessment programs in improving the functional literacy of students and helps to determine the directions of development in the education system. With the help of this diagram, it is possible to determine the differences in the results of students and the level of functional literacy across countries. .

**Conclusions and recommendations**. The results of PISA and TIMSS clearly show the level of development of students' literacy and serve the development of the educational system. In order for Uzbekistan to show high results in international assessment programs, the following recommendations are given:

1.Improving the quality of education: in order to show high results in international assessment systems such as PISA and TIMSS, it is necessary to align educational programs with international standards.

2. Development of practical knowledge: Paying more attention to activities that develop practical and critical thinking in order to improve students' functional literacy.

3. Training of teachers: organization of training for teachers on international educational methodologies and assessment methods.

4. Introduction of the national evaluation system: creating the necessary conditions for raising the position in international ratings by creating a national evaluation system in Uzbekistan.

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# CHANGES IN THE PROPERTIES OF ELASTICITY IN THE TECHNOLOGICAL PROCESSES OF SPINNING YARN FROM COTTON FIBER AND WEAVING FABRIC

***Abdujabbarov Muslimbek Zohidjon ugli***
*Doctoral student, Namangan Institute of Textile Industry, Republic of Uzbekistan, Namangan, E-mail: muslim199527@gmail.com*
***Alieva Dilbar Ganievna***
*doc. tech. Sciences, Associate Professor, Namangan Institute of Textile Industry, Republic of Uzbekistan, Namangan, E-mail: dilbaraliyeva57.@gmail.com*
***Karimov Rakhim Karimovich***
*Can. tech. Sciences, Associate Professor, director of research center LLC "ART SOFT HOLDING", Republic of Uzbekistan, Namangan, E-mail: raxim.textil@mail.ru*

***Abstract:*** *This study examines the changes in the elasticity properties of cotton fibers during the technological processes of spinning yarn and weaving fabric. It analyzes how mechanical stresses, such as drafting, twisting, tension, and friction, alter fiber elasticity and affect the quality of the final textile product. Spinning processes lead to reductions in fiber elasticity due to molecular realignment and compression forces, while weaving introduces additional deformation through tension and friction. The cumulative effects result in up to a 30% reduction in fiber elasticity. Strategies for optimizing process parameters, such as controlling twist levels, drafting ratios, and weaving tensions, are explored to preserve fiber elasticity. This research emphasizes the importance of process optimization in enhancing fabric performance and ensuring the sustainability of cotton textiles.*
***Keywords:*** *Cotton fiber, elasticity, yarn spinning, fabric weaving, textile processes, fiber deformation, mechanical stresses, process optimization.*

Cotton, a natural and versatile fiber, has been a cornerstone of the textile industry for centuries. One of its critical properties is elasticity, which significantly influences yarn and fabric quality [1-2]. Elasticity determines how fibers stretch and recover under mechanical forces, affecting the performance and comfort of the final fabric. However, the technological processes of spinning yarn and weaving fabric introduce mechanical stresses that alter the fibers' elastic properties. This essay explores how

these processes influence cotton fiber elasticity, highlighting their cumulative effects and implications for textile manufacturing [3-4].

*The Role of Elasticity in Cotton Fiber*

Elasticity in cotton fibers plays a pivotal role in ensuring that yarns and fabrics can withstand mechanical stresses during manufacturing and end use. Fibers with higher elasticity can recover from deformation, contributing to better fabric resilience, comfort, and longevity. However, cotton fibers are not inherently as elastic as synthetic counterparts like polyester, making it crucial to preserve their elasticity during processing. The spinning and weaving stages are critical, as they subject fibers to forces that can degrade their mechanical properties [5].

*Elasticity Changes During Spinning*

Spinning transforms raw cotton into yarn through drafting, twisting, and winding processes. Each step applies tension, shear, and compression forces that impact fiber elasticity. The drafting process, which elongates the fibers to form a continuous strand, reduces molecular cohesion within the fibers. As fibers are stretched and aligned, some of their natural elasticity is lost due to the rearrangement of cellulose chains [6].

Twisting, another essential stage, imparts strength and coherence to the yarn. However, it also introduces lateral compressive forces that can reduce elasticity. The degree of twist plays a significant role; lower twist levels retain more elasticity but may compromise yarn strength, while higher twists create stronger but less elastic yarns. Adjusting parameters such as drafting ratios and spinning speeds can mitigate these effects to some extent [7].

*Impact of Weaving on Elasticity*

Once yarns are spun, they are woven into fabric through interlacing warp and weft threads. This process exposes yarns to additional mechanical stresses, including tension, friction, and shear. Weaving machines, especially high-speed looms, exert considerable tension on the warp threads to maintain fabric structure. This tension stretches the yarns beyond their elastic limit, causing permanent deformation and further reducing elasticity [8].

Friction between yarns during the interlacing process also degrades elasticity by abrading the fibers. The type of weave structure can influence the extent of elasticity loss; for instance, plain weaves tend to retain more elasticity compared to twill or satin weaves, which involve more complex interlacings and higher thread mobility.

*Cumulative Effects on Fiber Elasticity*

When combined, the spinning and weaving processes result in a significant reduction in fiber elasticity. Studies indicate that cotton fibers can lose up to 25–30% of their initial elasticity by the time they are converted into fabric. This loss is attributed to the cumulative effects of drafting, twisting, tensioning, and friction. Longer staple fibers are less affected due to their better load distribution properties, while shorter fibers experience more pronounced degradation [9].

*Optimizing Processes to Preserve Elasticity*

To minimize elasticity loss, textile engineers have developed various strategies. In spinning, optimizing twist levels and drafting ratios can help preserve fiber cohesion and elasticity. Advanced spinning techniques, such as compact spinning, reduce air gaps between fibers, enhancing elasticity retention. During weaving, lowering loom tension and using specialized lubricants to reduce friction can mitigate the adverse effects of mechanical stresses [10].

Innovations in material science, such as blending cotton with more elastic fibers like elastane, also offer solutions. These blends combine the comfort and breathability of cotton with the enhanced elasticity of synthetic fibers, creating fabrics that perform well in demanding applications.

## Conclusion

The technological processes of spinning and weaving introduce significant changes to the elasticity properties of cotton fibers. While these changes are inevitable due to the mechanical stresses involved, careful optimization of process parameters can mitigate their impact. Preserving fiber elasticity is essential for producing high-quality yarns and fabrics that meet performance standards. As the textile industry evolves, continued research and innovation in fiber processing techniques will play a crucial role in enhancing the mechanical properties of cotton fabrics, ensuring their competitiveness and sustainability in the global market.

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UDK 631.315.4

# DETERMINATION OF THE TENSION FORCE OF THE PRESSURE SPRING GIVEN TO THE BINDER WHEN SOFTENING THE CRUSH BETWEEN COTTON ROWS

***Abdualiev Nuriddin Habibovish, Assoc., PhD.,***
*Head of the Department of "General Engineering Sciences" MTU Bukhara Institute of Natural Resources Management, Bukhara city, Republic of Uzbekistan.*
*Email: n.abdualiyev.91@mail.ru*
***Egamov Nodirbek Murodilloyevish.***
*Senior lecturer of the Department of "General Engineering Sciences" of MTU Bukhara Institute of Natural Resources Management "TIQXMMI", Bukhara city, Republic of Uzbekistan. Email: negamovnodirbek01@mail.ru*

**Abstract:** The article presents the results of a theoretical study on determining the tension force of the pressure spring applied to the bobbin in loosening the knot between the rows of cotton. In this case, it was determined using analytical expressions that the tension force of the pressure spring of the parallelogram mechanism with the roller should be in the range of 353-358 N in order for it to sink to the specified depth.

**Key words:** roller, loosening of roller, depth of immersion of roller into the soil, parallelogram mechanism, large diameter of roller, pressure spring, weight force, tension force.

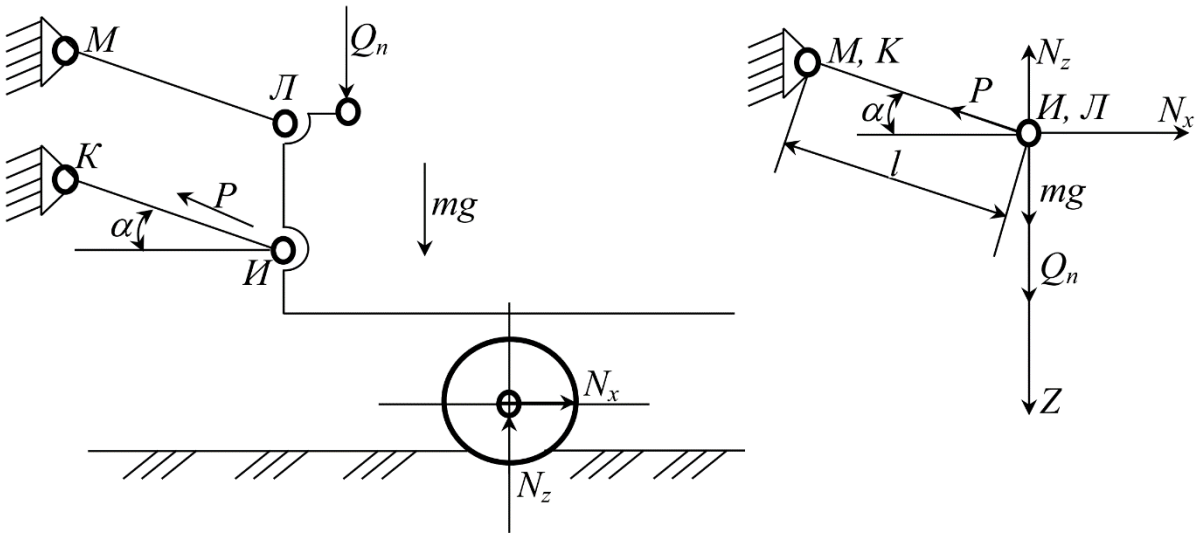
It is known from the conducted studies that the degree of softening of the slag is explained by the increase in the impact of working bodies on the slag as the speed of movement increases. At the same time, the increase in aggregate movement speed causes an increase in the traction resistance of the working bodies. At the same vertical load and movement speed, the working bodies sink into the soil to a greater depth [1, 2, 3, 4]. Taking these into account, in our example, it is important to provide a uniform vertical load to the roller in order to ensure that it is continuously softened to the desired level.

In the process of work, the following forces affect the coil ( Fig. 1).

- weight force $mg$ (where $m$ is the mass of the working section of the cotton cultivator with the parallelogram mechanism and gryadili, kg; $g$ is the acceleration of free fall, m/s $^2$ );

- $Q_n$ is the tension force of the pressure spring of the parallelogram mechanism, N ;
- $N_x$ , $N_z$ are the longitudinal and vertical components of the reaction force $N_ч$ exerted by the soil on the coil, respectively , N. These forces are placed at the center of rotation of the coil.
- $P$ is the pulling force exerted on the roller by the parallelogram mechanism, N. This force is directed parallel to the parallelogram mechanism's longitudinal pulls.

It is known from the literature [5, 6] that when the working bodies are connected to the machine frame by means of a parallelogram mechanism, all the forces acting on them can be considered as being placed on the moving hinges I and L of the parallelogram mechanism, and the mathematical pendulum depicted in Fig. 1, b can be accepted as a calculation scheme.




a) general scheme b) accounting scheme

**Figure 1. Scheme of forces acting on the coil**

We determine the tension force of the pressure spring of the parallelogram mechanism installed on the roller using the calculation scheme in Fig. 1, b. For this, we create the balance equation of the forces acting on the coil

$$P\cos\alpha - N_x = 0; \quad (1)$$

$$mg + Q_n - P\sin\alpha - N_z = 0; \quad (2)$$

$$(mg + Q_n - N_z)l\cos\alpha - N_x\sin\alpha = 0, \quad (3)$$

in this $\alpha$ – the angle of deviation of the parallelogram mechanism's longitudinal pulls from the horizon, °;

*l – the length of* the parallelogram mechanism's longitudinal pulls, m .

the expression (3) with respect to $Q_n$

$$Q_n = N_z + N_x tg\alpha - mg. \quad (4)$$

$N_x = \mu N_z$ (where $\mu$ – rolling resistance coefficient of the coil) [7, 8, 9, 10] expression (4) takes the following form.

$$Q_n = N_z(1 + \mu tg\alpha) - mg. \quad (5)$$

$N_z = Q$ considering that

$$Q_n = \frac{2}{3} q_0 (1 + K_v V_ч^2)(R_1 - R_2) b_p B(1 + \mu tg\alpha) - mg. \quad (6)$$

, $K_v$, $R_1$, $V_ч$, $R_2$ $b_p$ and $B$ values given above $\mu$ into this expression $q_0$ and =0.2, $\alpha$ =10 °and m = 62 kg, we determine that the tension force of the pressure spring of the parallelogram mechanism installed with the roller at the speed of movement of 1.7 - 2.2 m/s should be in the range of 353 - 358 N for it to sink to the specified depth.

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# СТАТИЧЕСКИ НЕОПРЕДЕЛИМЫЕ ЗАДАЧИ НА РАСТЯЖЕНИЕ И СЖАТИЕ

**Бобоев Х.Х**
Алмалыкский филиал ТГТУ им. И. Каримова декан факультета «Энергетика и машиностроения» доцент
**Мамиров Ш.Ш.**
Алмалыкский филиал ТГТУ им. И.Каримова кафедра «Технология машиностроения» зав.каф. «Тех.маш.» доцент
**Хасанов Б.Б.**
ст. преп. кафедры «Тех.маш.» Алмалыкского филиала ТГТУ им. И. Каримова
**Акрамова З.Р.**
Зам директор по делам молодёжи, инженер педагог. Профессиональное училище №2 Зангиатинского района.

Стержень ступенчато-переменного сечения, жестко закрепленный с двух сторон, находится под действием сосредоточенных осевых нагрузок (рис.1.). Требуется построить эпюры продольных сил, нормальных напряжений и осевых перемещений. В расчётах принять $E = 2 \cdot 10^5$ МПа $= 2 \cdot 10^6$ кГ/см$^2$.

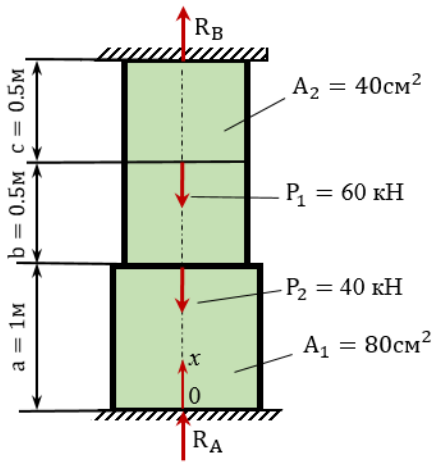

Рис.1. Схема стержня

Спроектируем приложенные к стержню нагрузки и опорные реакции на его ось:

$$\sum F_{kx} = 0, \qquad R_A + R_B - 40 - 60 = 0$$
$$R_A + R_B = 100$$

Для определения опорных реакций этого уравнения недостаточно. Стержень один раз статически неопределим, и для его расчёта необходимо составить дополнительное уравнение, исходя из характера деформации стержня.

Отбросим любое из опорных закреплений стержня, например верхнее, и влияние его замены искомой опорной реакцией $x = R_B$ (рис.2.).

Образованная таким образом статически определимая система называется основной.

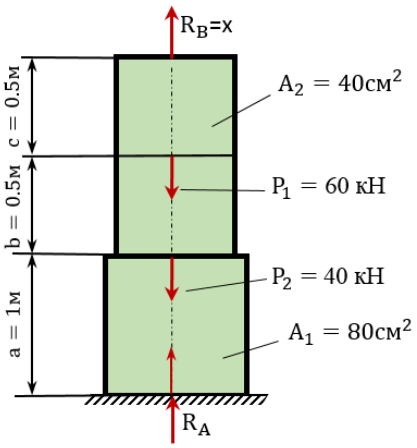


Рис.2. Основная система

Поставим условие, что деформации основной и заданной систем совпадают. Длина жестко закрепленного с двух сторон стержня после действия нагрузок измениться не может ($\Delta l = 0$). Следовательно, для основной системы на основании принципа независимости действия сил можно записать:

$$\Delta l = \Delta l_p + \Delta l_x = 0$$

Где $\Delta l_p$ – деформация основной системы под действием заданных нагрузок,

$\Delta l_x$ – деформация основной системы под действием искомой опорной реакции $x = R_B$.

Вычисляем значения $\Delta l_p$ и $\Delta l_x$ и раскрываем дополнительное уравнение:

$$\Delta l_p = -\frac{6000 \cdot 50}{2 \cdot 10^6 \cdot 40} - \frac{6000 \cdot 100}{2 \cdot 10^6 \cdot 80} - \frac{4000 \cdot 100}{2 \cdot 10^6 \cdot 80} = -0{,}01 \text{ см}$$

$$\Delta l_x = \frac{x \cdot 100}{2 \cdot 10^6 \cdot 40} + \frac{x \cdot 100}{2 \cdot 10^6 \cdot 80} = 1{,}875 \cdot 10^{-6} \cdot x$$

$$\Delta l = \Delta l_p + \Delta l_x = -0{,}01 + 1{,}875 \cdot 10^{-6} \cdot x = 0$$

$$x = R_B = 5333 \text{ кГ} = 53{,}3 \text{ кН}$$

Статическая неопределимость задачи раскрыта. Вычисляем значения продольных сил и нормальных напряжений в характерных сечениях стержня, начиная со свободного конца основной системы.

1. Сечение: $x = 2$ м

$N = x = R_B = 53{,}3$ кН (растяжение)

$$\sigma = \frac{5333}{40} = 133 \frac{\text{кГ}}{\text{см}^2} = 13{,}3 \text{ МПа}$$

2. Сечение: $x = 1{,}5 + 0$

$N = 53{,}3$ кН, $\sigma = 13{,}3$ МПа

3. Сечение: $x = 1{,}5 - 0$

$N = 53{,}3 - 60 = -6{,}7$ кН (сжатие)

$$\sigma = \frac{-670}{40} = -17 \text{кГ/см}^2 = -1{,}7 \text{ МПа}$$

4. Сечение: $x = 1 + 0$

$N = -6{,}7$ кН, $\sigma = -1{,}7$ МПа

5. Сечение: $x = 1 - 0$

$N = -6{,}7 - 40 = -46{,}7$ кН (сжатие)

$$\sigma = \frac{-4670}{80} = -58 \text{ кГ/см}^2 = -5{,}8 \text{ МПа}$$

6. Сечение: $x = 0$

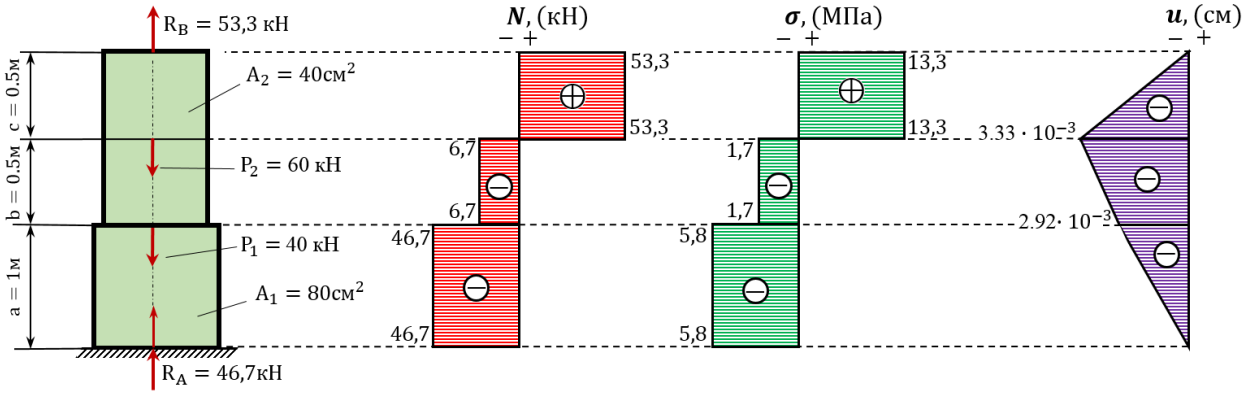


Рис.1.2. Эпюры $N, \sigma$ и $u$

$N = -46{,}7$ кН, $\sigma = -5{,}8$ МПа

По вычисленным значениям строим эпюры N и σ. Отметим наличие скачков на эпюре N в сечениях, где приложены сосредоточенные силы. В пределах участков N и σ постоянны по величине.

Вычисляем абсолютные деформации участков стержня:

$$\Delta l_1 = \frac{-4670 \cdot 100}{2 \cdot 10^6} = -2{,}92 \cdot 10^{-3} \text{ см (укорочение)}$$

$$\Delta l_2 = \frac{-670 \cdot 50}{2 \cdot 10^6} = -4{,}1 \cdot 10^{-4} \text{ см (укорочение)}$$

$$\Delta l_3 = \frac{5333 \cdot 50}{2 \cdot 10^6} = 3{,}33 \cdot 10^{-3} \text{ см (удлинение)}$$

Абсолютная деформация всего стержня должна быть равна нулю. Проверим выполнение этого условия:

$$\Delta l = \Delta l_1 + \Delta l_2 + \Delta l_3 = -2{,}92 \cdot 10^{-3} - 4{,}1 \cdot 10^{-4} + 3{,}33 \cdot 10^{-3} = 0$$

Вычисляем осевые перемещения характерных сечений стержня, начиная с нижнего закрепленного сечения:

1. Сечение: $x = 0$ $u = u_0 = 0$

2. Сечение: $x = 1$ м $u_1 = u_0 + \Delta l_1 = -2{,}92 \cdot 10^{-3}$см

3. Сечение: $x = 1{,}5$ м $u_2 = u_1 + \Delta l_2 = -2{,}92 \cdot 10^{-3} - 4{,}1 \cdot 10^{-4} = -3{,}33 \cdot 10^{-3}$см

4. Сечение: $x = 2$ м $u_3 = u_2 + \Delta l_3 = \Delta l = 0$

Эпюра осевых перемещений представлена на Рис.1.2. Осевые перемещения меняются по линейному закону. Все сечения стержня перемещаются в отрицательном направлении оси *x*, т.е. вниз.

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# THE IMPORTANCE OF EEFECTIVE STRATEGIES FOR IMPROVING LANGUAGE SKILLS

**Narimanova Jamola Yuldashbayevna**
jamola.narimanova@mail.ru
English teacher at Uzbekistan State World Languages University,
Tashkent City, Uzbekistan
**Malikova Shakhnoza:** student of Uzbekistan state world language university

**Abstract:** Enhancing language skills is crucial for communication, cultural understanding, and career advancement. This article discusses proven strategies for language improvement, covering vocabulary building, speaking, listening, reading, and writing practices, supported with practical examples for each. By following these strategies, learners can achieve fluency and confidence in their target language.
**Keywords:** Language improvement, vocabulary building, speaking practice, listening skills, reading comprehension, writing practice, language strategies.

Learning a new language can be challenging, but also rewarding and fun. Whether you want to travel, work, or communicate with people from different cultures, knowing another language can open up new opportunities and perspectives. However, not all language learning strategies are equally effective. In this article, we will explore some of the most effective language learning strategies for adults, based on linguistic research and practical experience.

Good language skills are essential for effective communication with others within the same linguistic group(s), and beyond. It is crucial to justify why everyone should develop their language skills.

- Languages are the entry to the world of wisdom.
- Languages serve as a valuable roadmap of cultures.
- Persons with limited language knowledge have limited global scope in our world of opportunities.
- It improves analytical skills. So, people can synthesize and evaluate information gleaned from different sources.
- Impressive language skills help in career development abroad.
- Language abilities help in oral and written communications.
- Learning a new language improves our ways of thinking.

Learning language skills is crucial throughout life. It helps in securing good grades at academic levels. It is vital for effective professional communication and builds crucial life skills.

In a world where multilingual abilities are increasingly valuable, mastering a language offers significant advantages. However, improving language skills is a gradual process that requires strategic planning and commitment. This article explores effective strategies for enhancing language proficiency, supported by examples that can be applied in everyday learning.

If we come to say about building vocabulary, it is very important for learners. A broad vocabulary is essential for expressing ideas clearly. To expand vocabulary, try learning five new words daily. For instance, if you're learning English, use each word in a sentence and create flashcards to reinforce them. Apps like Anki are helpful for spaced repetition, which helps retain words over time. Additionally, exploring synonyms and antonyms enhances understanding and allows for nuanced expression. For example, knowing that “happy,” “joyful,” and “content” convey similar feelings but with different shades of meaning enhances descriptive skills.

Next one is about practicing speaking.

Speaking practice is essential for gaining fluency. Start with easy phrases and move to more complex sentences. One effective way is to record yourself describing daily activities, then listen for improvements. Alternatively, practice with native speakers on language exchange platforms like Tandem. For example, role-playing scenarios, like ordering food at a restaurant, can help improve your comfort in real-life conversations. You can also practice pronunciation with Forvo, a site that offers audio recordings by native speakers.

The next essential strategy is enhancing listening skills.

Listening to native speakers helps understand pronunciation, intonation, and colloquial expressions. For instance, you can listen to podcasts or TED Talks on topics you enjoy, then summarize key points. Watching movies or TV shows with subtitles also provides exposure to natural dialogue, helping you recognize common expressions and slang. Listening exercises like transcribing dialogues from podcasts develop active listening, which is essential for accurate comprehension.

The fourth strategy is reading regularly.

Reading exposes learners to sentence structures and advanced vocabulary. Beginners might start with children’s books or graded readers, while advanced learners can tackle novels or academic articles. For example, reading a short news article each day and highlighting new words is a practical method. Re-reading

difficult sentences and summarizing main ideas enhance comprehension. Moreover, reading aloud improves pronunciation and helps with understanding word flow in sentences.

The fifth one is writing practice.

Writing hones grammar, vocabulary, and sentence structure. Begin by keeping a journal, noting daily activities or reflections, then expand to writing essays on diverse topics. Writing platforms like Lang-8 allow learners to receive feedback from native speakers. For example, writing a 200-word essay on a recent event can improve descriptive skills, while seeking feedback helps identify grammar mistakes. Consistent writing practice gradually builds confidence and fluency in expressing ideas.

The next one is immersion techniques.

Immersing yourself in the language can accelerate learning. Try changing your device's language settings or labeling items around your home in the target language. Another effective technique is to participate in online communities or watch cooking shows, tutorials, or news in the language you're learning. These practices create an environment where you regularly encounter the language in practical, everyday contexts.

The last one is consistency and patience.

Language learning is a journey, and progress requires patience and steady effort. Setting realistic goals, such as learning 100 new words a month, can keep you motivated. Using habit-tracking apps or language platforms like Duolingo to mark daily progress helps sustain momentum. Celebrate small successes, like holding your first conversation, to build confidence.

In conclusion, improving language skills demands dedication and a well-rounded approach. Starting with vocabulary building, learners should focus on acquiring a strong foundation of words that they can use in various contexts. Speaking practice, even in simple phrases, helps build fluency, while listening to native resources like movies or podcasts trains the ear for natural conversation. Reading daily is beneficial not only for vocabulary but also for understanding different sentence structures, and writing allows for active engagement with new grammar and vocabulary.

Consistency is key in language learning. By practicing a little every day and celebrating small achievements, learners can make steady progress. The use of technology, such as language apps and platforms, also provides accessible tools for practicing each skill area. Immersing oneself in the language through online

communities, changing device language settings, and watching native content helps keep language exposure high, which is crucial for retention. With these strategies and a growth mindset, anyone can achieve fluency and enjoy the rewards of mastering a new language. This approach not only builds language skills but also fosters cultural appreciation and opens doors to greater opportunities.

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