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Pediatric endocrinology in obesity: pathogenesis, prevention and therapy

Toshkent tibbiyot akademiyasi

A.D.Alikulova

B.X Abdullayeva ,

Sh.S.Safaraliyeva

Kirish. Jahon sog‘liqni saqlash tashkilotining so‘nggi ma‘lumotlariga ko‘ra, so‘nggi 30 yil ichida bolalar orasida semizlik darajasi ikki barobar ortgan. Pediatric yoshdagi semizlik nafaqat modda almashinuvining buzilishi, balki yurak-qon tomir tizimi, reproduktiv salomatlik, ruhiy-psixologik holat va hatto umr davomiyligiga salbiy ta‘sir ko‘rsatadi. Ayniqsa, endokrin tizim bilan bog‘liq semizlik holatlari uzoq muddatli monitoring va murakkab terapiyani talab qiladi. Bugungi kunda endokrin sababli semizlik turlariga gipotiroidizm, insulin rezistentligi, giperkortitsizm (Cushing sindromi), leptin rezistentligi va genetik sindromlar (Prader–Willi sindromi) kiradi.

Tadqiqot maqsadi. Bolalarda endokrin sababli yuzaga kelgan semizlikning patogenezini tahlil qilish, klinik ko‘rinishlarini aniqlash, samarali profilaktika strategiyalarini ishlab chiqish va kompleks terapiya yondashuvlarini asoslash.

Materiallar va uslublar. Tadqiqotda 7-16 yoshdagi 85 nafar bolalar ishtirok etdi. Ular orasida tana massasi indeksi (BMI) ≥ 95 -percentilda bo‘lganlar tanlab olindi. Laboratoriya tahlillariga TSH, FT4, insulin, HbA1c, leptin, kortizol, lipid profili, OGTT va gormonlar bilan bog‘liq genetik testlar kiritildi. Shuningdek, har bir bolaning ovqatlanish odatlari, jismoniy faollik darajasi va oilaviy anamnezi (genetik moyillik) tahlil qilindi. Diagnostika mezonlari JSST va Endocrine Society tavsiyalariga asoslanib baholandi.

Tadqiqot natijalar. Tadqiqot natijalariga ko‘ra:

- a) 38% bolalarda gipotiroidizm aniqlandi. Ular orasida letargiya, soch to‘kilishi, quruq teri va sekin o‘shish asosiy belgilar sifatida kuzatildi.
- b) 27%da insulin rezistentligi, bu esa abdominal semizlik, qora akantoz (teri to‘q dog‘lari) va yuqori insulin ko‘rsatkichi bilan namoyon bo‘ldi.
- c) 11%da giperkortitsizm aniqlandi: yuzning dumaloqlashishi, qorin sohasida yog‘ to‘planishi, mushaklar zaifligi va striyalar kuzatildi.
- d) Leptin darajasi yuqori bo‘lgan bemorlarning 24%ida gormonal to‘yinganlik signallarining buzilishi aniqlandi.
- e) Shuningdek, 6% bolalarda Prader–Willi sindromi, Bardet–Biedl kabi genetik sindromlar aniqlandi.

f) kompleks terapiya (diyetoterapiya, metformin, L-tiroksin, jismoniy faollik dasturi, oilaviy psixologik yordam) qo'llanilganda 3 oy ichida 72% bemorlarda BMI pasayishi va umumiy holatning yaxshilanishi qayd etildi.

Xulosa. Pediatrik semizlik — bu murakkab, ko'p omilli kasallik bo'lib, ayniqsa endokrinologik sabablar fonida rivojlanganda uzoq muddatli va individual yondashuvni talab qiladi. Har bir semiz bola chuqur endokrin tekshiruvdan o'tkazilishi shart. Vaqtida aniqlangan gormonal disbalansni tuzatish, to'g'ri ovqatlanish va harakat rejimi, psixologik yordam va ota-onalarni jalb etgan holda kompleks yondashuv semizlik oqibatlarini kamaytiradi. Shu bilan birga, semizlikning oldini olishda sog'lom turmush tarzini targ'ib qilish, maktab va oilaviy ta'lim tizimida sog'lom ovqatlanish madaniyatini shakllantirish muhim strategik vazifadir.

PRAGMATIC ISSUES OF TRANSLATING ETHNOGRAPHS IN NOVELS FROM UZBEK INTO ENGLISH

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Abstract. This article provides a comprehensive analysis of the pragmatic issues encountered when translating ethnographisms from Uzbek into English, focusing on literary texts as the primary area of exploration. Ethnographisms—words and expressions that reflect a nation’s unique customs, social practices, and cultural traditions—are deeply embedded in the linguistic and cultural fabric of a society. They play a pivotal role in conveying the identity and worldview of a particular ethnic group. However, translating such culturally loaded terms poses significant difficulties due to disparities in cultural background, context, and the pragmatic functions of language in different societies.

Literary texts, in particular, require a nuanced approach to translation because they do not merely communicate information but also convey the cultural atmosphere, emotional undertones, and aesthetic values of the original work. The challenge lies in transferring these cultural meanings into the target language without losing the authenticity or emotional resonance of the source. The article investigates various strategies that can be employed to maintain pragmatic equivalence—ensuring that the translated term or expression evokes a similar response or understanding in the target audience. Such strategies include descriptive translation, cultural substitution, footnoting, and the use of transliteration when necessary. Ultimately, the study underlines the importance of the translator's cultural competence and sensitivity to context in preserving the integrity of the source text while making it accessible and meaningful to the target audience.

Keywords: Ethnolinguistics, ethnographisms, literary translation, cultural identity, pragmatic equivalence, translation strategies, Uzbek-English translation, cultural adaptation.

Annotatsiya. Mazkur maqola o‘zbek tilidan ingliz tiliga etnografizmlarni tarjima qilish jarayonida yuzaga keladigan pragmatik muammolarni tahlil qiladi. Asosiy e’tibor adabiy matnlar tarjimasiga qaratilgan, chunki bunday asarlar nafaqat axborot uzatadi, balki muallifning madaniy qarashlarini, milliy urf-odatlarini va estetik didini

ham aks ettiradi. Etnografizmlar — milliy anʼanalar, urf-odatlar va ijtimoiy hayotga xos soʻz va iboralar boʻlib, ular tilning madaniy qatlamini tashkil qiladi va xalqning oʻziga xosligini ifodalaydi.

Bunday soʻzlarni tarjima qilish jarayonida tarjimon madaniy kontekstlar, tilning maʼno qatlamlari va pragmatik vazifalaridagi farqlarni hisobga olishi lozim. Ayniqsa, adabiy tarjimada muallif uslubini, ifoda vositalarini va madaniy konnotatsiyalarni saqlab qolish muhim hisoblanadi. Maqolada pragmatik ekvivalentlikka erishish usullari, jumladan tavsifiy tarjima, madaniy moslashtirish, izohli tarjima, va kerak boʻlsa transliteratsiya kabi strategiyalar tahlil qilinadi.

Xulosa oʻrnida, tarjimonning madaniy kompetensiyasi, kontekstga nisbatan sezgirligi va original matnning mazmuniy hamda emotsional jihatlarini saqlab qolishga boʻlgan intilishi samarali tarjimaning asosi sifatida eʼtirof etiladi.

Kalit soʻzlar: Etnolingvistika, etnografizmlar, adabiy tarjima, madaniy identitet, pragmatik ekvivalentlik, tarjima strategiyalari, oʻzbekcha-inglizcha tarjima, madaniy moslashtirish.

It is widely recognized that communities sharing common traditions and values contribute significantly to the development and preservation of a people's culture. The study of customs and traditions is not only relevant to linguistics but also intersects with multiple scientific disciplines. One of the emerging branches of modern linguistics that has garnered scholarly interest in recent years is ethnolinguistics—a field that remains relatively underexplored.

Although ethnolinguistics is recognized as a distinct academic domain, M.S. Yangelova emphasizes its close relationship with ethnography and ethnology. In a more focused sense, ethnolinguistics is defined as a subfield of linguistics that investigates the relationship between language and national consciousness, folklore, and cultural expression. For instance, some ethnographic studies have examined naming customs for children, though such studies reflect only a small segment of the broader exploration of the ethnographic characteristics of various nations.

In both ethnolinguistics and ethnography, the term ethnographisms refers to lexical elements tied to cultural practices, traditions, and rituals. According to R. Kasimova, these lexical items—or ethnographisms—occupy an important place in a language, forming a significant layer within its vocabulary structure [2:28]. Thus, ethnolinguistics serves as the discipline dedicated to examining these culturally embedded lexical units.

Words that reflect national customs and traditions hold a central place within a language's vocabulary. The lexical-semantic characteristics of what is referred to as ethnographic vocabulary—those lexical items that convey a people's cultural values and traditional practices—have been the subject of scholarly attention. Notably, M.S. Yangelova categorized ethnographisms into two primary lexical-semantic groups:

- a) Material-cultural ethnographisms, such as *supra*, *table*, *kapgir*, *khontakhta*, and others;
- b) Spiritual-cultural ethnographisms, including terms like *wedding*, *khatna*, *mawlud*, *hinabandon*, etc. [6:35].

Comparative linguistics is closely intertwined with translation studies. While translation is commonly understood as a secondary yet creative process that bridges different linguistic and cultural systems, it is an oversimplification to think that the translator's task is merely to convert meaning from one language to another. Modern translation theory emphasizes the importance of pragmatic considerations alongside morphological, syntactic, and semantic elements. This article focuses specifically on the pragmatic dimensions of literary translation, with particular attention to how ethnographisms are translated into English using the concept of pragmatic equivalence. A range of problems arises when the unique pragmatic nuances of words that represent Uzbek national culture in literary texts are inadequately conveyed in English translations. These issues include:

- The absence of culturally appropriate equivalents in the target text (TT) compared to the original source text (AT);
- Failure to take into account the pragmatic context of ethnographic terms when translated literally;
- Misinterpretation of contextual and implied meanings;
- Lack of equivalents for certain religious or culture-bound ethnographic expressions in the TT;
- Overlooking the multiple meanings or connotations of ethnographic terms;
- Neglect of unique features in ethnographic units that are loanwords from other languages used in the AT;
- Literal translations of culturally significant occasionalisms and archaic ethnographic terms in literary texts.

One of the major challenges in literary translation lies in the absence of direct equivalents in the TT for ethnographisms found in the AT. To address this, translators often employ various techniques, such as:

- Assimilation, e.g., *dastarkhan* – a traditional cloth used for serving food;

- Transcription or transliteration, e.g., plov or pilaf;
- Hypo-hyperonymic translation, e.g., doira – a musical instrument;
- Descriptive translation, e.g – offering a thorough explanation of national-cultural terms.

However, even these methods may fall short of achieving a pragmatically faithful translation, especially when deeper cultural implications are not fully captured.

In Uzbek: *Qarshi quda bo‘lmoq uchun qizliq va o‘g‘ullik havlini uchratish va buning ustiga “naslu nasabda tekislik”, olinadig‘an kelinning silliqina bo‘lishi – ana shunday mushkilotlar orqasida ikki yil chamasi Naimaning umri sarg‘ayib o‘tdi. [3;32]*

In English: *She wanted to engage Naima with someone and then to find somebody for Mahdum from that family. In order to find an appropriate family **with good manner** which had both a son and a daughter. [4;28]*

The Uzbek language explanatory dictionary lists the following meanings for the word “silliq” (smooth):

- 1) Flat, hilly, undulating;
- 2) Slippery, glassy;
- 3) Smooth, polished;
- 4) Movable – s. t. Handsome, elegant, beautiful;
- 5) Mobile – flawless, fluent (about language, style, speech, etc.);
- 6) Pleasant, not harsh, gentle;
- 7) Without issue; as you wish, without obstacles; fluffy; careless;
- 8) Silent; without realising it;
- 9) Evenly, evenly, smoothly, noiselessly [7].

The phrase “kelinning silliqina bo‘lishi” in the aforementioned work extract has multiple connotations intended by the author. Although in SLT the author tried to convey (4), (6), and (7) meanings, in the English translation only meaning (6) is indicated. There are multiple reasons why we consider the term “*kelin*” to be an ethnographism. Firstly, its role and pragmatic implications in Uzbek culture differ significantly from the EngConceconcepts of “bride” or “daughter-in-law”. In Uzbek culture, a “*kelin*” is someone who serves her husband and his family, shows respect to all family members, takes part in household chores and child-rearing. In contrast, in English culture, she is considered a full member of the family with equal rights. Therefore, translators often interpret the term “daughter-in-law” more generally as “appropriate family” to capture its broader cultural context.

Considering that the term “kelin” in Uzbek language has varying meanings depending on context, it’s inaccurate to simply label it as a straightforward ethnographic lexeme. Its meaning can change based on context, carrying pragmatic effects and implied meanings. Thus, we suggest calling such terms “contextual ethnographisms”. We define contextual ethnographism as a word or phrase characteristic of a specific culture or tradition, which acts as an ethnographic term only in certain contexts, reflecting the cultural characteristics.

Given the contextual nature of the term “kelin” as a contextual ethnographism, to enhance its pragmatic impact on the reader, we recommend translating it as follows:

*She wanted Naima to marry with a man at the same time who also has a sister for Mahdum. It took her almost 2 years to find an appropriate family **with an ideal daughter who meets all of her criteria (including social status, appearance and behavior).***

Consequently, in order to achieve pragmatic equivalence, the translator must possess an impeccable understanding of the cultural components associated with the setting and be able to accurately represent each of these contextual characteristics in the translation.

A translator must carefully consider cultural nuances, how these are reflected in a literary work, and the extent to which the author has deliberately chosen specific linguistic elements. This attention helps avoid potential misinterpretations. It’s important to note that the cultural and social content of literary texts, particularly novels, may shift over time. For example, ethnographic terms that appeared in literary works centuries ago might now be outdated or no longer in use.

In A. Qadiri’s novel Mehrobdan Chayon (Scorpion from the Altar), terms like “*panjshanbalik*” and “*ozodliq*” are unique to this work, with no clear definitions or occurrences in other sources. Specifically, “*panjshanbalik oshlari*” appears six times, while *ozodliq (oshlari)* is mentioned nine times. Their meanings must be inferred from their contextual usage. However, when translated into English, “*panjshanbalik*” is often rendered simply as “Thursday” or “Thursdayship,” and *ozodliq* as “freedom” or is sometimes omitted altogether. This approach results in the loss of the contextual and pragmatic connotations, as well as the cultural flavor inherent in these occasionalisms. We argue that applying the method of expansion to explain such terms can more effectively convey the author’s intended meaning and preserve the original cultural essence for the target reader.

Based on the context, it is evident that the terms “panjshanbalik oshlari” and “ozodliq oshlari” refer not only to the traditional Uzbek dish osh or meals in general, but also convey additional meanings depending on usage:

A) As a form of money:

For instance, in the following excerpt, these terms symbolize financial contributions: “Let’s set that aside for now; even though Nigor Oyim educated twenty to thirty girls, she could not benefit from the money collected as ‘ozodliq’ and ‘panjshanbalik’ fees. She had to report all expenses daily to the esteemed Maxdum Pochcha.” (Page 8)

B) As a form of gift, particularly clothing:

The term can also imply a traditional gift, especially clothing, given in honor of certain occasions:

“However, when it came to ‘ozodliq,’ no child was exempt. If a wealthy student owed ‘ozodliq,’ it was demanded; even from poorer children, efforts were made to collect it. If students began studying Haftiyak, the Quran, or books like So’fi Olloyor, ‘ozodliq’ was mandatory. Even though it was customary for students graduating from school to host a feast and present attire to the teacher, many children would try to deceive the teacher and avoid this responsibility.”

C) As a type of meal:

In this case, the words refer specifically to special meals:

“They would go two weeks without seeing plov (with the exception of the special ‘ozodliq’ meals); most of their food consisted of ubra, tuppi, mastaba, or qo‘g‘urma soup.”

From these three examples, we can infer that “panjshanbalik” and “ozodliq” can refer to monetary contributions (example A), ceremonial gifts (example B), or special meals (example C), all shaped by the students’ educational environment. Hence, it is crucial to consider the context when translating these terms, as it significantly influences how the author’s message is conveyed to the target audience.

The Uzbek literary texts analyzed here reflect deeply rooted national customs and values. Translating such texts from Uzbek into English differs significantly from standard translation tasks and presents a complex challenge. Ensuring pragmatic equivalence requires attention to cultural context and the accurate interpretation of implied meanings (implicatures). Such fidelity to cultural nuance is essential for an adequate and faithful translation.

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YOSHLAR UCHUN MOTIVATSIYA, MAQSAD VA MUVAFFAQIYAT

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Annotatsiya. Maqolada yoshlarning kelajakga tayyorligini aniqlash, yoshlarga muvaffaqiyatga erishish uchun kerak boʻladigan goʻya va amallar haqida aytib oʻtilgan. Bugungi dunyoda tez oʻzgarayotgan ijtimoiy, iqtisodiy va texnologik sharoitlar yoshlarni oʻz orzu va maqsadlariga erishishda samarali yondashuvlarni izlashga majbur qilishi haqida yoritilib ular uchun motivatsiya berilgan.

Annotation. The article talks about determining the readiness of young people for the future, the actions and actions that young people need to achieve success. The rapidly changing social, economic and technological conditions in today's world force young people to look for effective approaches to achieving their dreams and goals.

Аннотация. В статье говорится об определении готовности молодежи к будущему, действиях и поступках, которые необходимы молодым людям для достижения успеха. Быстро меняющиеся социальные, экономические и технологические условия в современном мире заставляют молодых людей искать эффективные подходы к достижению своих мечтаний и целей.

Kalit soʻzlar: Potensial, Facebook, Motivatsiya, Chirigan tizim.

Keywords: Potential, Facebook, Motivation, Broken System.

Ключевые слова: потенциал, Фейсбук, мотивация, Сломанная система.

Hurmatli yoshlar, hozirda oʻqiyotgan maqolangiz sizni hozirgidan kuchliroq, hozirgidan bilimlirorq va hozirgidan samaralirorq boʻlishga undaydi. Birinchi oʻrinda motivatsiyaga toʻxtalsak. Motivatsiya — bu insonning oʻz maqsadlariga erishish uchun energiya va harakatni kuchaytiradigan ichki yoki tashqi kuch deb qarajak boʻladi. Sizlar uchun harakatdan toʻxtatmaydigon, qilayotgan ishingizga boʻlgan qiziqishingizni ortirishi uchun bir qancha motivatsiyon soʻzlar va iboralar keltirib oʻtaman. Yodingizda tursin: “hech narsa va hech qachon osonlik bilan amalga oshmaydi. Oʻz fikrida sobit turuvchilar, buni qila olmaganlar tomonidan tanqidga uchraydi. Chirigan tizim siz adashayotganingiz haqida qancha koʻp gapirsa, siz oʻz

maqsadingiz sari shuncha qat'iylik bilan harakat qilishingiz kerak". Bu Donald Tramp AQSh prezidenti tomonidan aytilgan so'z, siz uning negizida nima yotyatganiga e'tibor bering. Bunda yoshlarning muvaffaqiyatga erishish davomida kelgan qiyinchiliklarni yengishga, sabr qilishga, o'z maqsadingiz yo'lida sobit turishingizga va shundagina natijaning rohatini ko'rishga muvaffaq bo'lasiz. Endi esa maqsad haqida gapirsak: "Maqsad – bu siz katta nimaningdir bir qismi ekaningiz, siz bu dunyoga kerak ekaningiz va oldinda sizni faqatgina yaxshi narsalar kutayotganini tushunishdir. Maqsaddan haqiqiy baxt ham boshlanadi". Bu gaplar Facebook asoschisi Mark Tsukerbergga tegishli. Bundan hulosa qilish kerakki maqsad odamni yashashga, harakat qilishga va natijaga intilishga undaydi. O'zingizdan so'rang, sizni nima yaxshi qiladi va siz nimadan qo'rqasiz. Siz aynan shu yo'ldan ketishingiz lozim shundagina harakat qilayotganingizni his qilasiz. O'zingizni oddiy tahlil qilish hayotingiz ishini topishiga kafolat bermaydi. Siz nazariyadan amaliyotga o'tishingiz, o'qishingiz va real hayotni o'rganib borishingiz, tajriba orttirishingiz lozim. Agarda qandaydir ish sizni ilhomlantirsa, buni qilishda davom eting. Men taniydigan o'z ishining haqiqiy professionallari o'z ishlarini juda sevishadi. Ularga o'z maqsadini bilish motivatsiya beradi [1].

Hozirda jadal rivojlanayotgan ilm-fan, texnika sizni ulardan samarali va foydali tarzda ishlatishga undaydi. Hozirgi kunda biron malumot topish uchun hatto bitta telefonni o'zi kifoya qiladi. Bunday zamonda siz ham rivojlanishingiz, o'z ishingizda zamonaviy tenalogiyalardan unumli foydalanishingiz zarur, doimo zamon bilan hamnafas yashashingiz sizni rivojlanishingizda asosiy ro'l o'ynaydi. Tan oling, motivatsiyani his qilish, ehtimol, siz qila oladigan eng qiyin ishlardan biridir. Agar bu juda oson bo'lganida, har bir kishi oldinga siljib, o'z oldiga qo'ygan maqsadlariga erishgan bo'lardi.

Muvaffaqiyat esa, faqatgina ba'zi yutuqlar bilan bog'liq emas, balki insonning o'z potentsialini to'liq ochish, o'z hayotini ma'naviy va ruhiy jihatdan rivojlantirish jarayoni deb tushunsak bo'ladi. Muvaffaqiyat tushunchasi haqida qancha gapirilsa ham uni tariflash uchun yangi so'zlar chiqib kelaveradi. Jorj Pattonning fikricha: "Muvaffaqiyat bu — yerga urilgach, iloji boricha balandroqqa sakrash degani" [2].

Har kim muvaffaqiyat omilini o'zicha tasavvur qiladi. Kim uchun muvaffaqiyatning yagona siri odamlarning ko'ngliga yo'l topish bo'lsa, boshqalar uchun erta uyg'onish, qattiq mehnat qilish — bu muvaffaqiyatning tarkibi. Demak mulohaza qilsak muvaffaqiyat bu nisbiy tushuncha har kim muvaffaqiyatni nimagadur nisbatan o'lchaydi. Shunday ekan siz o'z muvaffaqiyatingizni kichik va mayda narsalarda emas balki ulkan ishlarning natijasida qarang shundagina siz anchagina masuliyat, g'ayrat

va shijoat bo‘ladi. Aksariyat muvaffaqiyatli insonlar hayotini sinchiklab o‘rgansangiz, hayot ularni qiyinchiliklar bilan qanchalar toblaganini ko‘rasiz. Ularning avvalgi va keyingi hayotlarini solishtirar ekansiz, tunning eng qorong‘u lahzalari tong otishidan bir necha daqiqa avvalroq sodir bo‘ladi, degan hikmatni anglaysiz. Siz muvaffaqiyat yetti marta qulab, sakkizinchi marotaba oyoqqa turish ekanini tushuna boshlaysiz. Shu pallada Pablo Pikassoning fikrini o‘qib ketsak: “Har qanday muvaffaqiyatning kaliti harakatdir”[3]. Demak hamma narsa o‘zingizning harakatingizga bog‘liq bo‘ladi. Bir ishda muvaffaqiyatga erishish uchun oldin shu ishga qiziqishingiz kerak. Bu ishda qilinishi kerak bo‘lgan barcha narsalarda o‘zingizni sinab ko‘rishingiz, bo‘lmagan taqdirda bo‘lishiga qarab harakat qilishingiz kerak bo‘ladi. Men o‘z muvaffaqiyatimga erishish uchun oldin o‘zimni shunday tarbiyalab borishim kerak. Hattoki o‘zimni “sulton”lardek tutish uchun ismimni ham Beksulton qilib o‘zgartirganman. Bu bilan sizlarga ismingiz yoki sharifingizni o‘zgartirish emas balki muvaffaqiyat yo‘lida o‘zingizni shunga munosibdek ko‘rishni tushuntirmoqchiman. Lekin shuni unutmang muvaffaqiyatga erishish uchun qiziqishni o‘zi kifoya emas albatta maqsad ham bo‘lishi kerak.

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EFFECTIVE CLEANING AND GINNING OF LOW-GRADE COTTON IN A SAW GIN

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Abstract. *To increase the gin's productivity by effectively cleaning low-grade cotton from small trash impurities in a saw gin, an industrial-experimental sample of a grate of a new design was produced. The manufactured industrial-experimental sample was installed on a 90-saw gin feeder at the "Boyovut techno cluster" LLC cotton ginning enterprise in the Bayavut district of the Syrdarya region, and the gin was improved. Comparative-research work was carried out on a 90-saw gin with a feeder with a mesh surface operating in the workshop with an improved gin. Experimental work was carried out with a distance of 16-18 mm between the spiked drum and the grate bars on the feeder and a distance of 8 mm between the grate bars on the grate bars.*

When cleaning cotton of the 2nd class of the III grade of Sultan breeding on the improved grate feeder of the saw gin at the above-mentioned intermediate distances, the contamination of the cleaned cotton averaged 1.3-1.35%, and the quality of the cotton improved by an average of 0.09 (abs)%-0.07 (abs)% compared to the cleaned cotton on the mesh surface feeder. The cleaning efficiency of the feeder during cotton cleaning averaged 21.7-18.7%, which is on average 2.9 (abs)%-2.3 (abs)% higher than the cleaning efficiency of the feeder with a mesh surface. The fiber contamination after ginning averaged 3.48-3.62%, which is on average 0.12-0.15 (abs)% less than the fiber contamination obtained from gin with a mesh surface feeder. When ginning cotton, the gin's productivity averages 863-916 kg/hour, which is 42-48 kg/hour higher than the existing spiked drum gin.

When cleaning the post-djin fiber on a 5VP cleaner, the fiber contamination averaged 2.93% and 3.0%, the fiber quality improved by an average of 0.21-0.19 (abs)% compared to the fiber produced on a mesh-surface post-djin cleaner, and according to the state standard UzSst 604:2016, grade III belongs to the "Superior" class. As a result of the research work carried out in production, it was studied that the improvement of the gin feeder cleaning with a grate with a long arc length and a

grate gap of 8 mm leads to an increase in the efficiency and productivity of cleaning the gin when cleaning low-grade cotton, improving the quality of the produced fiber.

Keywords: saw gin, feeder, mesh surface, grate, cleaning efficiency, productivity, cotton, fiber, dirt, quality.

Introduction. In order to improve the quality of fiber by effective cleaning and ginning of low-grade cotton, drawings of a prototype grate of a new design were prepared in the design department of JSC “Pakhtasanoat scientific center” and an industrial prototype was manufactured at the enterprise LLC “RIM workshop” (Fig. 1). The manufactured prototype was installed on the feeder of a 90-saw gin in the cotton ginning workshop of the “Boyovut techno cluster” LLC cotton ginning enterprise in the Bayavut district of the Syrdarya region, and the gin was improved (Fig. 2).



Figure 1. New construction colosnik grille

Based on the positive results obtained under laboratory conditions, production research was conducted at a distance of 16-18 mm between the spiked drum and the grate bars, with a grate spacing of 8 mm [1, 2]. Experimental work was carried out on cotton of the Sultan breed III grade 2 class with an initial moisture content of 13.4% and contamination of 9.6% [3]. In this case, the gin feeder is equipped with grade III 2 class cotton moisture content averaged 9.8%, contamination 1.76% and seed damage in the cotton composition averaged 2.22% [4].

During the research period, to study the cleaning efficiency of the gin feeder-cleaner, the degree of contamination of the cleaned cotton, and the quality of fiber and seeds produced from the gins, samples of fiber and seeds produced from the ginning of cotton from the cleaned cotton in both gin trays were taken and analyzed in the enterprise laboratory. The productivity of gins during cotton ginning was determined by the time study method. In this case, the fiber produced from each gin was taken separately, weighed on scales, and the hourly productivity of the gin was determined.



Figure 1. Appearance in the production of 90 saw gin with an improved colosnik grille

In a 90-saw gin with a mesh surface of the existing design, when cleaning the mesh surface at a distance of 16-18 mm with a spiked drum on the feeder-cleaner of cotton of the 2nd class of the III grade of Sultan selection, the contamination of the cleaned cotton averaged 1.43-1.47%, and the degree of seed damage in the cleaned cotton averaged 2.27-2.25%. In this case, the cleaning efficiency of the feeder-cleaner averaged 18.8-16.4% with the change in intermediate distances of the above-mentioned values (Fig. 3). When ginning cotton, the degree of seed fuzziness after ginning was practically the same with a change in the mesh surface of the spiked drum from 16 mm to 18 mm and averaged 11.2%. In this case, the degree of seed damage averaged 3.47-3.23%. The fiber contamination after ginning averaged 3.6-3.77%. When ginning cotton, the gin's productivity changed from an average of 821 kg/hour to 868 kg/hour. When cleaning the fiber produced from gin in a two-drum fiber cleaner of the 5VP brand, the fiber contamination averaged 3.14-3.19%, and the quality indicator of the produced fiber was III grade "Good" class according to the state standard UzSst 604:2016.

The degree of contamination of the cleaned cotton was on average 1.3-1.35%, and the quality of the raw cotton improved by an average of 0.09-0.07 (abs)% compared to the quality of the raw cotton cleaned on a feeder with an existing mesh surface, when cleaning cotton of the 2nd class of the III grade of Sultan breeding with a moisture content of 9.3% and contamination of 1.66% with a spiked drum on the feeder of a 90-saw gin at a distance of 16-18 mm. In this case, the degree of seed damage in the composition of cleaned cotton averaged 2.18-2.11%, and the quality of the seeds improved by an average of 0.09-0.14 (abs)% compared to the quality of the seeds in

the composition of cleaned cotton in the existing feeder-cleaner. The cleaning efficiency of the feeder during cotton cleaning averaged 21.7-18.7% with a change in intermediate distances from 16 mm to 18 mm. The existing mesh surface feeder selected for comparison showed an average increase in cleaning efficiency by 2.9-2.3 (abs)% (Fig. 3).

When

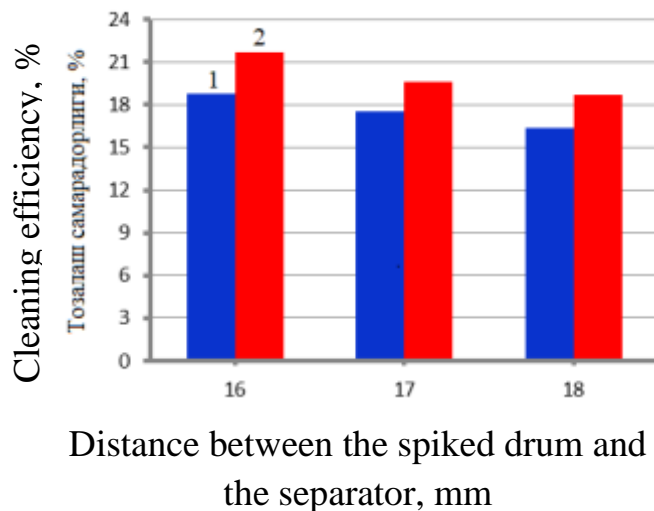


Figure 3. When cleaning Cotton of the Sultan select III class, the feeder pile depends on the intermediate distance of the separator from the drum, and the change in cleaning efficiency.

1-on the mesh surface, 2-on the windowsill with a colosnik

ginning cotton, the degree of seed fuzziness after ginning with a spiked drum and grate from 16 mm to 18 mm was practically the same, averaging 11.3%. In this case, the degree of seed damage averaged 3.31-3.12%, and the quality of the seeds improved by an average of 0.16-0.11 (abs)% compared to seeds produced from gin with a feeder with a mesh surface. The fiber contamination after ginning averaged 3.48-3.62%.), which is on average 0.12-0.15 (abs)% less than the fiber contamination produced from gin with an existing mesh surface feeder [5]. When ginning cotton, the gin's productivity averaged 863-916 kg/hour, which is 42-48 kg/hour higher than the gin's productivity with an existing feeder with a mesh surface.

When cleaning the fiber after ginning on a 5VP cleaner, the mass fraction of defective fiber and trash impurities in the fiber averaged 2.93% and 3.0%, and the quality of the fiber after ginning on a fiber cleaner with an existing mesh surface improved by an average of 0.21-0.19 (abs)% compared to the fiber produced and constituted grade III "Superior" class according to the state standard UzSst 604:2016.

As a result of the conducted research work, due to the improvement of the 90 saw gin feeder with a grate of a new design, an increase in cleaning efficiency and productivity of the gin, an improvement in the quality of the produced fiber and seeds, an effective cleaning and ginning process of low-grade cotton was carried out.

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СТАНДАРТЫ ЗАЩИТЫ ИНОСТРАННЫХ ИНВЕСТИЦИЙ В ДВУСТОРОННИХ ИНВЕСТИЦИОННЫХ СОГЛАШЕНИЯХ И ИХ РЕАЛИЗАЦИЯ В ПРАВОВЫХ СИСТЕМАХ РАЗВИВАЮЩИХСЯ СТРАН

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Аннотация: Автор рассматривает влияние двусторонних инвестиционных соглашений (BIT) на защиту иностранных инвестиций и баланс интересов между государствами и инвесторами. В статье анализируются различные подходы развивающихся стран, таких как Индия и Индонезия, к формулировке BIT, которые направлены на защиту государственного суверенитета и устойчивое экономическое развитие при привлечении иностранных капиталовложений. Рассматриваются ключевые элементы BIT, такие как механизмы разрешения споров, гарантии справедливого обращения и ограничения на экспроприацию, а также проблемы, связанные с защитой прав инвесторов и сохранением возможности для национального регулирования в стратегических сферах.

Ключевые слова: двусторонние инвестиционные соглашения (BIT), защита инвестиций, ISDS, справедливое и равноправное обращение (FET), принцип наибольшего благоприятствования (MFN), экспроприация, государственное регулирование, инвестиционные гарантии, развивающиеся страны, экономическое развитие.

Прямые иностранные инвестиции продолжают стремительно расти по всему миру. Тем не менее, многие многонациональные корпорации, вкладывающие эти средства, возможно, не осведомлены о значении и мерах правовой защиты, что обеспечиваются большим количеством международных соглашений, известными нам как BITs (двусторонние инвестиционные соглашения). BITs не только требуют от принимающих стран гарантировать определённую защиту иностранных инвестиций, но и предоставляют инвесторам правовые инструменты для подачи иска против принимающего государства, если оно не выполняет свои обязательства. В то время как в большинстве стран BITs предполагают защиту прав инвесторов, включая защиту от экспроприации, обязательство обеспечения справедливого и равного обращения и доступ к

механизмам разрешения споров между инвесторами и государствами (ISDS), важным аспектом становится баланс между обеспечением прав инвесторов и сохранением суверенитета принимающих стран. В последние годы многие государства, в том числе развивающиеся, начали пересматривать свои подходы к этим соглашениям, внедряя в них исключения и уточнения, направленные на защиту прав государства на регулирование. Эти изменения отражают стремление развивающихся стран адаптировать ВІТs к своим внутренним нуждам и интересам, обеспечивая устойчивость экономического развития при привлечении иностранных инвестиций. Важно рассмотреть, как стандарты ВІТs, включая их ключевые положения и механизмы защиты, могут влиять на отношения между инвесторами и принимающими странами, а также как государства могут использовать эти соглашения для стимулирования долгосрочных и ответственных инвестиционных потоков.

Одна из ключевых гарантий, предоставляемых ВІТ, заключается в предоставлении иностранным инвесторам прав, аналогичных правам местных предприятий и другим иностранным инвесторам. Согласно ВІТ, иностранные компании обязаны получать такое же благоприятное отношение, как и их местные конкуренты. Это означает, что инвесторы могут рассчитывать на защиту от дискриминации, когда речь идет о национальном режиме или режиме наибольшего благоприятствования MFN. Эти режимы обеспечивают иностранным инвесторам равные условия для ведения бизнеса, предоставляя им те же права и преимущества, что и национальным компаниям, или лучшее из условий, предоставляемых другим иностранным инвесторам. Например, в 3 статье ВІТ между Узбекистаном и Российской Федерацией говорится, что инвестиции иностранных инвесторов будут получать не менее благоприятный режим, чем инвестиции местных или третьих стран. Этот принцип «наибольшего благоприятствования» MFN позволяет инвесторам получать условия, равные тем, что предоставляются другим инвесторам, включая налоговые льготы, правовые привилегии или другие формы поддержки. Данная формулировка является достаточно распространённой и в других ВІТ [1].

Однако на практике их реализация сталкивается с проблемами: формальное равенство не всегда означает реальное (местный бизнес может получать скрытую поддержку), инвесторы злоупотребляют РНБ для "договорного шопинга" (выбора наиболее выгодного соглашения через третьи страны, как в деле *Maffezini v. Spain*), а государства сталкиваются с ограничением своего регуляторного пространства, когда даже нейтральные законы (например,

экологические) оспариваются как дискриминационные, что требует более детализированных исключений в ВІТs для сохранения баланса между инвестиционной защитой и суверенитетом принимающих стран [2].

Важным аспектом защиты иностранных инвестиций является ограничение прав правительств принимающих стран на проведение экспроприации. ВІТ устанавливают четкие ограничения на этот процесс, гарантируя, что экспроприация может происходить только в соответствии с международным правом. Это означает, что экспроприация должна быть проведена в общественных интересах, недискриминационным образом, с соблюдением надлежащей правовой процедуры и обязательным предоставлением «быстрой, адекватной и эффективной компенсации».

Однако термин «экспроприация» не ограничивается только физическим изъятием имущества. В более широком смысле, экспроприация может включать в себя различные меры, которые могут лишить инвестора экономической ценности его вложений, такие как постановления или акты, направленные на ограничение или изменение условий ведения бизнеса. Это расширение термина позволяет избежать злоупотреблений со стороны государственных органов и предотвращает ситуации, в которых инвесторы могут быть вынуждены отказаться от своих прав на инвестиции без должного возмещения ущерба.

Двусторонние соглашения о защите инвестиций также предусматривают дополнительные гарантии, направленные на обеспечение справедливого обращения с иностранными инвесторами. Принимающие страны обязуются обеспечивать «справедливое и равноправное обращение» (FET) в отношении иностранных инвестиций, что означает, что государственные органы не могут дискриминировать или проводить произвольные действия в отношении иностранных инвесторов. Также устанавливается гарантия «полной защиты и безопасности» (FPS), что означает обязательство государств принимать меры для защиты инвесторов от незаконных действий третьих лиц, таких как вандализм, насилие или другие формы нарушения прав. Кроме того, ВІТ включают обязательства, направленные на предотвращение произвольных или дискриминационных решений. Такие гарантии помогают создать стабильную правовую среду для иностранных инвесторов и снижают риски, связанные с политической нестабильностью или непредсказуемостью правительственных решений.

Одной из важнейших характеристик, предусмотренных ВІТ, является обеспечение права иностранных инвесторов на перевод средств в страну и из

страны приема без задержек и по рыночному обменному курсу. Это включает в себя переводы, связанные с инвестициями, такие как доходы от ликвидации, проценты, репатриированная прибыль, а также дополнительные финансовые средства, вносимые инвестором после первоначальных вложений. Право на свободный перевод средств способствует созданию предсказуемой финансовой среды, позволяя инвесторам перемещать капитал в соответствии с рыночными условиями без излишних ограничений.

Кроме того, ВТ ограничивают возможности правительств принимающих стран вводить меры, которые могут нарушить международную торговлю. Например, требования, такие как местное содержание или экспортные квоты, часто запрещены в рамках соглашений. Такие меры могут исказить рыночную конкуренцию и создать неоправданные барьеры для иностранных инвесторов, ограничивая их возможности по приобретению необходимых ресурсов или продаже продукции на местных рынках. Таким образом, ВТ обеспечивают иностранным инвесторам свободу в вопросах импорта и экспорта товаров и услуг, что является важным для их успешной деятельности на зарубежных рынках [3].

В национальных законодательствах развивающихся государств стандарты ВТ часто получают асимметричное воплощение – формально закрепляя вышеизложенные принципы (запрет экспроприации, FET, FPS и т.д.), но допуская вариативность в механизмах реализации. Это наблюдается в особенностях формулировок исключений, порядке разрешения споров и трактовке ключевых понятий, что отражает попытку адаптировать универсальные нормы к местным экономическим и правовым реалиям.

Данную дихотомию целесообразно рассмотреть эволюцию подходов к оформлению инвестиционных гарантий в рамках национальных моделей ВТ, где особенно показателен пример одной из крупнейших развивающихся экономик, радикально пересмотревшей свою договорную практику в ответ на вызовы глобализации. Таким образом новая модель ВТ Индии, опубликованная в 2015 году, содержит множество различных инновационных положений, включая исключение положения о режиме наибольшего благоприятствования (MFN) - базового стандарта защиты в международных инвестиционных соглашениях. В свою очередь замену стандарта "справедливого и равноправного обращения" (FET) конкретным перечнем государственных обязательств, а также введение широких исключительных оговорок и явного раздела об обязанностях инвесторов, дополненных положениями о корпоративной социальной

ответственности и соблюдении законодательства принимающего государства, что отражает стремление Индии усилить контроль над иностранными инвестициями и сбалансировать права инвесторов с государственными интересами [4].

Таким образом реформа ВІТ 2015 года значительно усилила регуляторные возможности индийского правительства. За счёт введению широких исключений и конкретизации государственных обязательств, власти получили свободу действий в реализации ключевых социально-экономических программ[7]. Это важно для таких стратегических сфер как экологическая политика, трудовые отношения и защита прав потребителей, где ранее угроза инвестиционных исков через механизм ISDS могла сдерживать необходимые реформы.

С одной стороны, новая модель ВІТ способствовала притоку более ответственных инвесторов, ориентированных на долгосрочное партнерство. Крупные транснациональные корпорации, особенно в секторах высоких технологий, положительно оценили четкие требования к соблюдению местного законодательства и переработанных стандартов. В свою очередь это послужило для более стабильного инвестиционного сотрудничества, где обе стороны - и инвестор [8], и принимающая страна - имеют четкие взаимные обязательства. С другой стороны, реформа вызвала настороженность у части традиционных иностранных инвесторов, особенно в требующие больших капиталовложений отраслях. Снижение уровня защиты через отказ от стандартов MFN и FET, а также ограничения по механизму ISDS привели к временному сокращению инвестиционных потоков в некоторые сектора. Многие инвесторы потребовали дополнительных гарантий и переходного периода для адаптации к новым правилам игры, что отразилось на динамике инвестиций в первые годы после реформы [5].

Индонезия, в свою очередь, в своей модели двустороннего инвестиционного соглашения (ВІТ), которая включает широкие оговорки об исключениях и уточнения, направленные на защиту права государства на регулирование[8]. По данным ЮНКТАД, модель ВІТ также будет содержать определение "инвестиций" на основе теста Салини, требующего, чтобы инвестиции способствовали развитию принимающего государства. Кроме того, механизм разрешения споров между инвестором и государством (ISDS) будет включён, но его применение будет возможно только при наличии конкретного согласия принимающего государства [6].

Индонезийская модель двустороннего инвестиционного соглашения демонстрирует более сбалансированный подход между защитой интересов государства и обеспечением привлекательности для инвесторов по сравнению с индийской моделью. Включение четких исключений и уточнений, направленных на защиту права государства на регулирование, позволяет Индонезии сохранять суверенитет в стратегически важных областях. Определение "инвестиций" на основе теста Салини, требующего вклада в экономическое развитие принимающего государства, принятия инвестором рисков и самого непосредственно вложения капитала, позволяет Индонезии сосредоточиться на привлечении инвестиций, способствующих устойчивому развитию. Это ограничивает возможность подачи исков по незначительным или спекулятивным инвестициям, снижая риск злоупотреблений со стороны инвесторов. Однако спорным остается само основание взятия за основу теста Салини для модели ВІТ. Индийский опыт показывает, что чрезмерно протекционистский подход может отпугнуть потенциальных инвесторов. Для привлечения инвестиций необходимо создать модель ВІТ, которая обеспечивает достаточную защиту прав инвесторов, включая чётко определённые стандарты [9] справедливого и равноправного обращения (FET) и режима наибольшего благоприятствования (MFN), при этом сохраняя за государством право на регулирование в общественных интересах[10].

В условиях глобальной конкуренции за инвестиции развивающимся странам необходимо выстраивать договорную политику в сфере ВІТ с учетом как международных стандартов защиты инвесторов, так и приоритетов внутреннего развития. Универсальное применение стандартов режима наибольшего благоприятствования (MFN), справедливого и равноправного обращения (FET), а также гарантии беспрепятственного перевода средств может повысить инвестиционную привлекательность. Особое внимание при разработке ВІТ следует уделять механизмам разрешения споров[10]. Развивающиеся страны нередко сталкиваются с ситуациями, когда инвестиционные арбитражи используются в ущерб государственным интересам, особенно в сферах охраны окружающей среды. Для минимизации подобных рисков необходимо либо предусматривать обязательное предварительное обращение к национальным судам, либо включать положения о предварительном согласии на применение ISDS, как это реализовано в индонезийской модели. Таким образом, развивающимся странам следует стремиться не столько к количественному расширению сети ВІТ, сколько к качественному пересмотру их содержания.

Модель инвестиционного соглашения должна быть направлена на достижение реального баланса между необходимостью привлечения иностранных вложений и сохранением пространства для национального регулирования. Внедрение гибких, но чётко структурированных норм, исключений и процедур позволит выстроить систему, способную обеспечить устойчивое экономическое развитие без ущерба для государственного суверенитета и интересов общества.

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ODDIY DIFFERENSIAL TENGLAMALARNI MAPLE MATEMATIK PAKETI YORDAMIDA YECHISH USULLARI

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Differensial tenglamalarning har xil sinfidagi masalalarini yechish uchun, aynan formula bo'yicha hisoblash, tenglamalar sistemasini yechish, belgili va sonli differensial tenglamalarni yechish amaliy jihatdan juda muhim masala hisoblanadi.

Ushbu maqolada Maple matematik paketidan foydalanib, differensial tenglamalarni yechish keltirilgan. Maple paketi orqali differensial tenglamalarni yechish jarayoni qoidaga mos holda ta'lim berish uchun qiziqarli misollar yordamida tasvirlangan. Maple paketining har bir turdagi masalani yechishga qo'llanilishi ketma-ket tarzda keltirilgan, ya'ni differensial tenglamalarni yechishda misollarga quyidagicha tavsif berilgan: hisoblash formulasi, analitik va sonli yechimi, shuningdek, differensial tenglamalarning grafigi keltirilgan.

n - chi tartibli o'zgarmas koeffitsiyentli birjinsli differensial tenglamalarni qarab chiqamiz [7].

$$a_0 y^{(n)} + a_1 y^{(n-1)} + \dots + a_n y = 0 \quad (1)$$

tenglamaga n - chi tartibli o'zgarmas koeffitsiyentli birjinsli differensial tenglama deyiladi. Bu yerda a_0, a_1, \dots, a_n o'zgarmas sonlar.

Tenglamaning xususiy yechimi $y = e^{\lambda x}$ ko'rinishda bo'lib, u

$$a_0 \lambda^n + a_1 \lambda^{n-1} + \dots + a_n = 0 \quad (2)$$

λ - xarakteristik tenglamaning ildizi bo'lishi kerak. Yechim ko'rinishi (2) xarakteristik tenglama ildizlariga bog'liq:

a) (2) tenglamaning barcha ildizlari haqiqiy va har xil.

Bu holda $y_1 = e^{\lambda_1 x}, y_2 = e^{\lambda_2 x}, \dots, y_n = e^{\lambda_n x}$ yechimlar tenglamaning fundamental yechimlar sistemasini tashqil etadi, chunki ular yordamida tuzilgan Vronskiy determinanti noldan farqli.

1-misol. $y'' - 7y' + 12y = 0$.

Xarakteristik tenglamani tuzamiz

$$\lambda^2 - 7\lambda + 12 = 0.$$

$\lambda=3, \lambda=4$ bu tenglamaning ildizlaridir. Demak, $y_1 = e^{3x}, y_2 = e^{4x}$ tenglamaning hususiy yechimlari va $y = c_1 e^{3x} + c_2 e^{4x}$ berilgan tenglamaning umumiy yechimi bo'ladi.

1-misolni Maple paketi orqali yechamiz [5]:

> **restart;**

> **d:=diff(y(x),x\$2)-7*diff(y(x),x)+12*y(x);**

$$d := \left(\frac{d^2}{dx^2} y(x) \right) - 7 \left(\frac{d}{dx} y(x) \right) + 12 y(x)$$

> **dsolve({d},y(x));**

$$\{y(x) = _C1 e^{(3x)} + _C2 e^{(4x)}\}$$

b) (2) tenglamaning ildizlari orasida kompleks yechim mavjud.

Xarakteristik tenglama haqiqiy koeffitsiyentli bo'lganligi sababli ildizga qo'shma bo'lgan son ham ildiz bo'ladi. Bu ildizlar $\lambda_1 = \alpha + \beta i, \lambda_2 = \alpha - \beta i$, bo'lsin. Bu ildizlarga (1) tenglamaning $y_1 = e^{\lambda_1 x} \cos \beta x, y_2 = e^{\lambda_2 x} \sin \beta x$ ko'rinishdagi ikkita yechim mos keladi.

2-misol. $y'' + 4y' + 13y = 0$.

Xarakteristik tenglama $\lambda^2 + 4\lambda + 13 = 0$. U $\lambda_{1,2} = -2 \pm 3i$ ildizlarga ega, demak, $y_1 = e^{-2x} \cos 3x, y_2 = e^{-2x} \sin 3x$ berilgan tenglamaning xususiy yechimlari bo'lib, ular chiziqli bog'lanmagan va

$$y = c_1 e^{-2x} \cos 3x + c_2 e^{-2x} \sin 3x$$

tenglamaning umumiy yechimi bo'ladi.

2-misolni Maple paketi orqali yechamiz:

> **restart;**

> **d:=diff(y(x),x\$2)+4*diff(y(x),x)+13*y(x);**

$$d := \left(\frac{d^2}{dx^2} y(x) \right) + 4 \left(\frac{d}{dx} y(x) \right) + 13 y(x)$$

> **dsolve({d},y(x));**

$$\{y(x) = _C1 e^{(-2x)} \sin(3x) + _C2 e^{(-2x)} \cos(3x)\}$$

c) Xarakteristik tenglamaning ildizlari orasida karrali ildiz mavjud.

Masalan, λ_1 tenglamaning r karrali ildizi bo'lsin, bu holda (1) tenglama r ta

$$y_1 = e^{\lambda_1 x}, y_2 = x e^{\lambda_1 x}, \dots, y_r = x^{r-1} e^{\lambda_1 x} \quad (3)$$

ko‘rinishdagi hususiy yechimga ega bo‘ladi. Bu yechimlarni chiziqli bog‘lanmaganligini bevosita Gram determinantidan foydalanmasdan aniqlash mumkin.

$$(c_1 + c_2x + \dots + c_r x^{r-1})e^{\lambda_1 x} = 0 \quad (4)$$

tenglik barcha x lar uchun o‘rinli bo‘lsin, u holda

$$c_1 + c_2x + \dots + c_r x^{r-1}$$

ko‘phad aynan nolga teng bo‘ladi, bu esa ko‘phadning barcha koeffitsiyentlari nol bo‘lgandagina bajarilishi mumkin. Demak, (4) tenglik faqat $c_1 = c_2 = \dots = c_r = 0$ bo‘lganda bajariladi va bundan (3) chiziqli bog‘lanmagan funksiyalar sistemasini tashqil etadi.

3-misol. $y'''+3y''+3y'+y=0$.

Xarakteristik tenglama $\lambda^3 + 3\lambda^2 + 3\lambda + 1 = 0$. U $\lambda_{1,2,3} = 1$ uch karrali ildiz bo‘lganligi sababli tenglamaning xususiy yechimlari e^x, xe^x, x^2e^x bo‘ladi.

Shunday qilib, tenglamaning umumiy yechimi quyidagi ko‘rinishga ega

$$y = (c_1 + c_2x + c_3 x^2)e^x.$$

3-misolni Maple paketi orqali yechamiz:

> **restart;**

> **d:=diff(y(x),x\$3)+3*diff(y(x),x\$2)+3*diff(y(x),x)+y(x);**

$$d := \left(\frac{d^3}{dx^3} y(x) \right) + 3 \left(\frac{d^2}{dx^2} y(x) \right) + 3 \left(\frac{d}{dx} y(x) \right) + y(x)$$

> **dsolve({d},y(x));**

$$\{ y(x) = _C1 e^{(-x)} + _C2 e^{(-x)} x + _C3 e^{(-x)} x^2 \}$$

O‘zgarmas koeffitsiyentli bir jinsli chiziqli differensial tenglamalar uchun qo‘yilgan Koshi masalasi yechish uchun

$$a_0 y^{(n)} + a_1 y^{(n-1)} + \dots + a_n y = f(x) \quad (5)$$

tenglamani qaraymiz. Bu yerda a_0, a_1, \dots, a_n - o‘zgarmas sonlar, $f(x) \ x \in [a, b]$ da aniqlangan va uzluksiz funksiya.

$$a_0 y^{(n)} + a_1 y^{(n-1)} + \dots + a_n y = 0 \quad (6)$$

tenglamaga n - chi tartibli o‘zgarmas koeffitsiyentli chiziqli birjinsli differensial tenglama deyiladi. Bu yerda a_0, a_1, \dots, a_n o‘zgarmas sonlar.

O'zgaras koeffitsiyentli birjinsli chiziqli differensial tenglamalar uchun Koshi masalasi $y(x_0) = y_0, y'(x_0) = y'_0, \dots, y^{(n-1)}(x_0) = y_0^{(n-1)}$ shartlarni qanoatlantiruvchi yechimni topishdan iboratdir [1,2].

5-Misol. $y'' - 3y' + 2y = 0$ differensial tenglamaning $y(0) = -1, y'(0) = 3$ boshlang'ich shartni qanoatlantiruvchi xususiy yechimini toping.

Yechish: Xarakteristik tenglamani tuzamiz $r^2 - 3r + 2 = 0$, uning ildizlari $r_1 = 1, r_2 = 2$ haqiqiy har xil sonlar, shuning uchun tenglamaning umumiy yechimi

$$y = c_1 e^x + 2c_2 e^{2x} \quad (*)$$

ko'rinishda bo'ladi. c_1 va c_2 ning qiymatlarini topish uchun $x = 0$ da, $y = -1$ boshlang'ich shartlardan foydalanib quyidagi tenglamani tuzamiz

$$c_1 + c_2 = -1$$

(*) differensiallab, topamiz

$$y' = c_1 e^x + 2c_2 e^{2x},$$

bundan $y'(0) = 3$ dan foydalanib, $c_1 + 2c_2 = 3$ ni hosil qilamiz. Shunday qilib c_1 va c_2 larni topish uchun quyidagi sistemani topdik.

$$\begin{cases} c_1 + c_2 = -1 \\ c_1 + 2c_2 = 3 \end{cases},$$

buni yechib $c_1 = -5, c_2 = 4$ topamiz. Umumiy yechimga c_1 va c_2 larning qiymatini qo'yib, berilgan tenglamaning xususiy yechimini topamiz:

$$y = -5e^{-x} + 4e^{2x}.$$

5-misolni Maple paketi orqali yechamiz:

> **restart; Order:=6;**

> **d:=diff(y(x),x\$2)-3*diff(y(x),x)+2*y(x);**

$$d := \left(\frac{d^2}{dx^2} y(x) \right) - 3 \left(\frac{d}{dx} y(x) \right) + 2 y(x)$$

Differensial tenglamaning umumiy yechimi quyidagicha bo'ladi:

> **dsolve({d},y(x));**

$$\{ y(x) = _C1 e^x + _C2 e^{(2x)} \}$$

Endi boshlang'ich shartlarni kiritamiz:

> **cond:=y(0)=-1, D(y)(0)=3;**

$$cond := y(0) = -1, D(y)(0) = 3$$

Tenglamaning boshlang‘ich shartlarni qanoatlantiruvchi xususiy yechimi quyidagiga teng:

> **dsolve({d,cond},y(x));**

$$y(x) = -5 e^x + 4 e^{(2.x)}$$

> **y1:=rhs(%):**

> **dsolve({d,cond},y(x), series);**

$$y(x) = -1 + 3x + \frac{11}{2}x^2 + \frac{9}{2}x^3 + \frac{59}{24}x^4 + \frac{41}{40}x^5 + O(x^6)$$

Topilgan yechimning grafigini quyidagicha bo‘ladi:

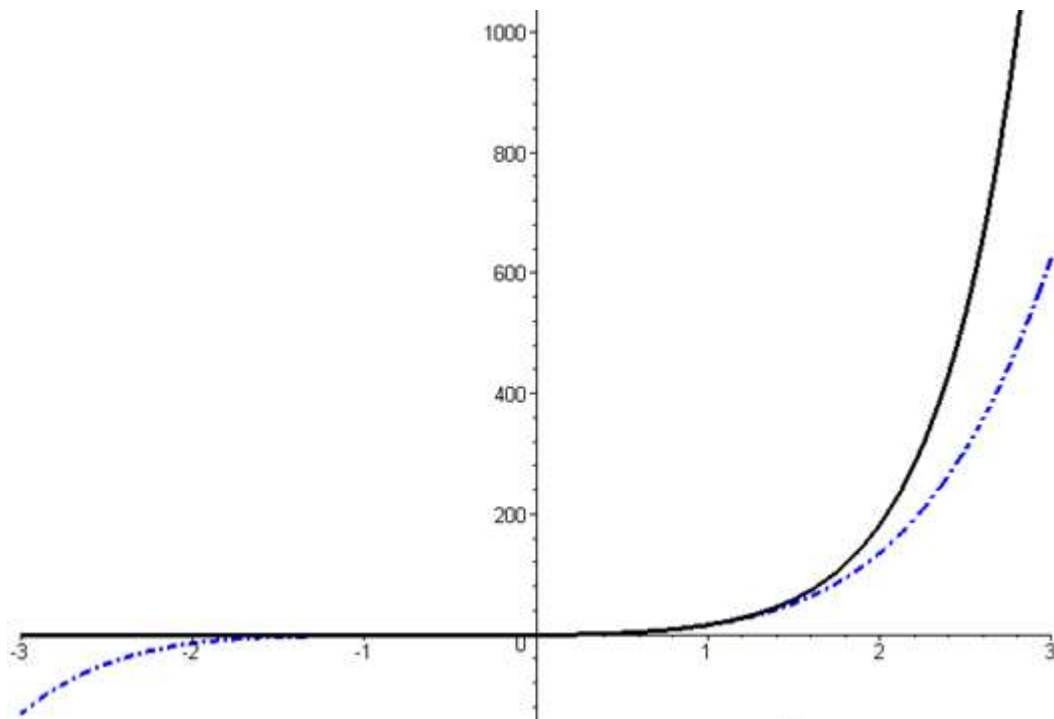
> **convert(% ,polynom): y2:=rhs(%):**

> **p1:=plot(y1,x=-3..3,thickness=3,color=black):**

> **p2:=plot(y2,x=-3..3, linestyle=4,thickness=3,color=blue):**

> **with(plots): display(p1,p2);**

Warning, the name changecoords has been redefined



6-misol.
$$\begin{cases} y^{(IV)} - 5y'' + 10y' - 6y = 0, \\ y(0) = 1, y'(0) = 1, y''(0) = 1, y'''(0) = 0, y^{(4)}(0) = 1. \end{cases}$$
 o‘zgaras koeffitsentli

chiziqli bir jinsli differensial tenglamani va unga qo‘yilgan Koshi masalasini yeching. Yechimni maple paketi orqali topamiz [6]:

> **restart; Order:=6:**

> **d:=diff(y(x),x\$4)-5*diff(y(x),x\$2)+10*diff(y(x),x)-6*y(x);**

$$d := \left(\frac{d^4}{dx^4} y(x) \right) - 5 \left(\frac{d^2}{dx^2} y(x) \right) + 10 \left(\frac{d}{dx} y(x) \right) - 6 y(x)$$

Differensial tenglamaning umumiy yechimi quyidagicha bo'ladi:

> **dsolve({d},y(x));**

$$\{ y(x) = _C1 e^{(-3x)} + _C2 e^x + _C3 e^x \sin(x) + _C4 e^x \cos(x) \}$$

Endi boshlang'ich shartlarni kiritamiz:

> **cond:=y(0)=1, D(y)(0)=1, (D@@2)(y)(0)=1, (D@@3)(y)(0)=0, (D@@4)(y)(0)=1;**

$$\begin{aligned} cond := y(0) = 1, D(y)(0) = 1, (D^{(2)})(y)(0) = 1, (D^{(3)})(y)(0) = 0, \\ (D^{(4)})(y)(0) = 1 \end{aligned}$$

Tenglamaning boshlang'ich shartlarni qanoatlantiruvchi xususiy yechimi quyidagiga teng:

> **dsolve({d,cond},y(x));**

$$y(x) = \frac{1}{68} e^{(-3x)} + \frac{3}{4} e^x + \frac{1}{17} e^x \sin(x) + \frac{4}{17} e^x \cos(x)$$

> **y1:=rhs(%):**

> **dsolve({d,cond},y(x), series);**

$$\begin{aligned} y(x) = \frac{5}{6} x^3 \left(1 + \frac{1}{4} x^2 - \frac{1}{12} x^3 + \frac{31}{840} x^4 - \frac{5}{336} x^5 + O(x^6) \right) \\ - \frac{1}{8640} x^2 \left(17280 + 7200 x^2 - 2880 x^3 + 1488 x^4 - \frac{4800}{7} x^5 + O(x^6) \right) \\ - \frac{1}{576} x \left(-576 - 480 x^2 + 240 x^3 - \frac{744}{5} x^4 + 80 x^5 + O(x^6) \right) \\ - \frac{1}{144} \left(-144 - 360 x^2 + 240 x^3 - 186 x^4 + 120 x^5 + O(x^6) \right) \end{aligned}$$

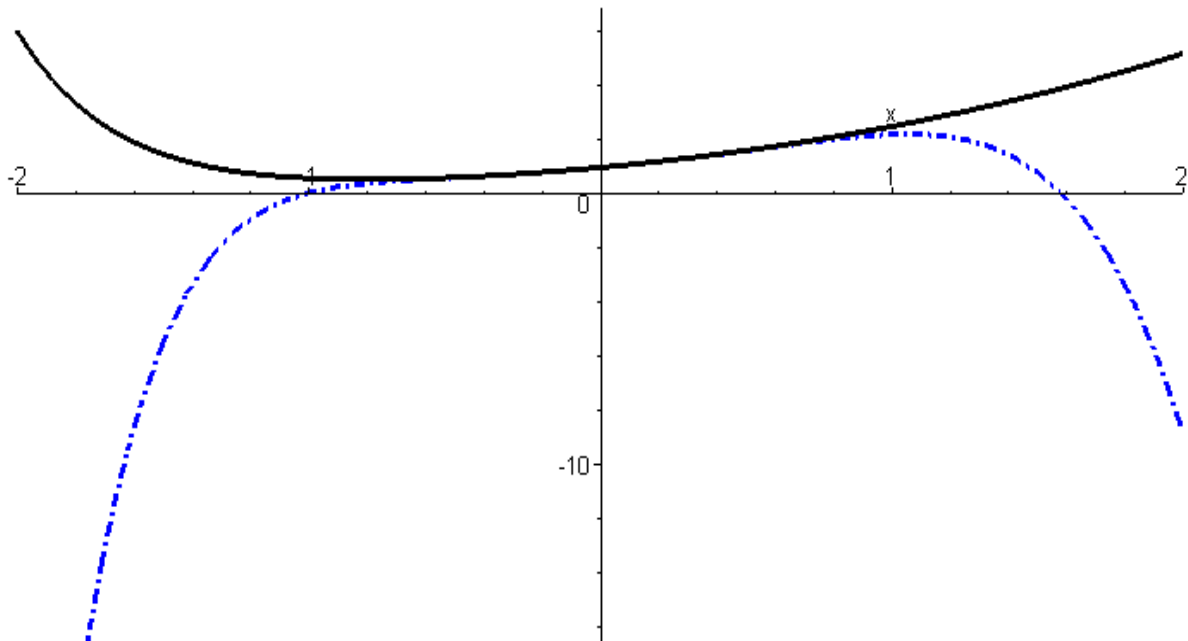
Topilgan yechimning grafigini quyidagicha bo'ladi:

> **convert(% ,polynom): y2:=rhs(%):**

> **p1:=plot(y1,x=-2..2,thickness=3,color=black):**

> **p2:=plot(y2,x=-2..2, linestyle=4,thickness=3,color=blue):**

> **with(plots): display(p1,p2);**



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The Effects of Intensive Reading on English for Specific Purposes (ESP) Students

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Abstract: This paper explores the multifaceted effects of intensive reading on English for Specific Purposes (ESP) students. It examines how this focused reading approach contributes to enhanced comprehension, specialized vocabulary acquisition, improved grammatical accuracy, and the development of critical thinking and metacognitive reading strategies. Drawing upon relevant theoretical frameworks, the paper discusses the pedagogical implications for ESP instruction, highlighting the necessity of integrating intensive reading to bridge the gap between receptive and productive skills in professional contexts. Challenges associated with its implementation are also addressed, alongside recommendations for future research.

Keywords: Intensive Reading, English for Specific Purposes (ESP), Reading Comprehension, Vocabulary Acquisition, Grammar, Metacognition, Second Language Acquisition.

Introduction

English for Specific Purposes (ESP) is a field of English language teaching that focuses on developing the specific language skills required by learners in particular academic, professional, or vocational contexts (Dudley-Evans & St. John, 1998). Unlike General English (GE), ESP instruction is needs-driven, concentrating on the linguistic and communicative demands of a specific discipline or occupation. Within this specialized paradigm, reading comprehension stands as a foundational skill, enabling access to a vast body of knowledge and professional discourse.

Reading strategies are broadly categorized into extensive reading and intensive reading. While extensive reading emphasizes reading for general understanding and pleasure, promoting fluency and a positive attitude towards reading (Day & Bamford, 1998), intensive reading involves a meticulous, detailed analysis of a text with specific learning objectives. This paper argues that for ESP students, whose linguistic needs are highly specialized and precise, intensive reading plays a particularly crucial role in fostering the depth of understanding necessary for academic and professional success.

This article aims to systematically delineate the cognitive and linguistic benefits derived from the integration of intensive reading practices within ESP curricula.

Theoretical Framework

The efficacy of intensive reading for ESP students can be understood through several theoretical lenses in second language acquisition (SLA) and cognitive psychology:

- **Input Hypothesis (Krashen, 1985):** While Krashen primarily focused on comprehensible input for acquisition, intensive reading provides highly structured and scaffolded input that is often slightly beyond the learner's current competence ($i+1$), facilitating explicit attention to linguistic forms that might be overlooked in extensive reading. The focused nature of intensive reading ensures that the input is not just comprehensible but also deeply processed.
- **Schema Theory (Carrell & Eisterhold, 1983):** This theory posits that comprehension is an interactive process between the reader's prior knowledge (schemata) and the text. ESP texts often activate specific, specialized schemata. Intensive reading allows learners to explicitly connect new information in the text to their existing domain-specific knowledge, refining and expanding their conceptual frameworks, thereby improving comprehension of complex technical or professional discourse.
- **Cognitive Load Theory (Sweller, 1988):** Intensive reading, when properly scaffolded, can optimize cognitive load by breaking down complex texts into manageable units for deep processing. By focusing on specific linguistic features or content areas, it reduces extraneous cognitive load, allowing learners to allocate more cognitive resources to germane load (schema construction and automation) and intrinsic load (inherent complexity of the material).
- **Noticing Hypothesis (Schmidt, 1990):** This hypothesis suggests that learners must consciously "notice" a linguistic feature in the input for it to be acquired. Intensive reading activities, by design, draw learners' attention to specific vocabulary, grammatical structures, and discourse markers within authentic ESP texts, promoting this crucial noticing process.

The detailed engagement with texts characteristic of intensive reading yields several significant benefits for ESP learners:

Enhanced Comprehension and Critical Analysis. Intensive reading mandates a comprehensive understanding of the text's content, not just its main ideas. ESP students are required to analyze sentence-level meaning, infer implicit information, identify logical relationships between ideas, and discern the author's stance or purpose. This

level of scrutiny fosters deep comprehension essential for fields where precision is paramount (e.g., legal documents, medical reports). Furthermore, the analytical demands of intensive reading cultivate critical thinking skills, enabling students to evaluate information, identify biases, and synthesize complex ideas, which are transferable skills vital in any professional domain.

Specialized Vocabulary Acquisition and Retention. One of the primary objectives of ESP is to equip learners with the specialized lexis of their field. Intensive reading provides an optimal environment for the acquisition of technical and professional vocabulary. Through repeated encounters with new terms in context, coupled with explicit vocabulary exercises (e.g., identifying definitions, analyzing collocations, distinguishing synonyms/antonyms within a specific domain), learners move beyond passive recognition to active production. The focused attention on these terms enhances their retention and allows for a nuanced understanding of their precise usage and connotations within specialized discourse (Nation, 2001).

Grammatical Accuracy and Syntactic Awareness. ESP texts often feature complex grammatical structures, such as intricate noun phrases, passive voice constructions, nominalizations, and various forms of subordination. Intensive reading activities direct learners' attention to these structures, allowing them to observe how grammatical forms convey specific meanings and functions within the professional context. This explicit focus helps learners to deconstruct complex sentences, improving their syntactic awareness. Consequently, this leads to an enhanced ability to both interpret and produce grammatically accurate and stylistically appropriate language in their own professional writing and speaking. It shifts grammar learning from abstract rules to functional application.

Development of Metacognitive Reading Strategies. Intensive reading is not merely about understanding a text; it is also about understanding *how* to understand a text. Through guided intensive reading, ESP students develop and refine a repertoire of metacognitive reading strategies. These include:

- **Pre-reading strategies:** activating prior knowledge, predicting content based on headings/visuals.
- **During-reading strategies:** identifying main ideas and supporting details, monitoring comprehension, re-reading difficult sections, making inferences, summarizing paragraphs.
- **Post-reading strategies:** self-questioning, synthesizing information, reflecting on what was learned. By consciously employing these strategies, learners become more

autonomous and effective readers, capable of approaching novel, complex texts in their professional lives with confidence.

Transfer to Productive Skills. The detailed analysis of authentic texts through intensive reading provides a rich model for learners' productive skills (writing and speaking). By observing the rhetorical patterns, discourse organization, and linguistic features employed by expert communicators in their field, ESP students can internalize these conventions. This enables them to produce more coherent, cohesive, and stylistically appropriate professional documents, presentations, or discussions. For instance, analyzing the structure of a research article through intensive reading can directly inform the writing of a lab report or thesis.

Pedagogical Implications. Given these benefits, integrating intensive reading into ESP curricula is crucial. This can be achieved through:

- **Careful Text Selection:** Choosing authentic, relevant, and appropriately challenging texts that align directly with the learners' specific needs and professional contexts.
- **Explicit Strategy Instruction:** Teaching students *how* to read intensively, including techniques for vocabulary analysis, grammatical deconstruction, and critical evaluation.
- **Scaffolding:** Providing support for complex texts through pre-reading activities, guided questions, glossaries, and collaborative tasks.
- **Task-Based Activities:** Designing intensive reading tasks that require active engagement and analytical output, rather than passive comprehension (e.g., précis writing, text annotation, discussion of specific textual features).
- **Integration with Other Skills:** Linking intensive reading activities to speaking (e.g., presenting findings from a text), writing (e.g., summarizing, critiquing), and listening (e.g., following a lecture related to the text).

Discussion. Despite its advantages, intensive reading presents certain challenges. It is inherently time-consuming and can be cognitively demanding, potentially leading to learner fatigue if not managed effectively. The selection of suitable authentic materials can also be difficult, as texts must be sufficiently challenging without being overwhelmingly so. Furthermore, the effectiveness of intensive reading is contingent on the instructor's ability to facilitate deep engagement and provide meaningful feedback, requiring specialized pedagogical training.

Conclusion.

Intensive reading serves as an indispensable component of ESP instruction, offering a robust framework for developing the precise linguistic and cognitive skills necessary

for success in specialized academic and professional domains. Its profound effects on comprehension, vocabulary acquisition, grammatical accuracy, metacognition, and the transfer to productive skills underscore its value. Future research could explore the optimal balance between intensive and extensive reading in different ESP contexts, investigate the long-term impact of intensive reading on career progression, and examine the effectiveness of technology-enhanced intensive reading environments for ESP learners. By recognizing and leveraging the "unpacking power" of intensive reading, educators can better equip ESP students to confidently and competently navigate the complex communicative landscapes of their chosen fields.

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STAGES OF POTASH ORE BENEFICIATION PROCESS

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Abstract

Potash ore beneficiation is a crucial process in the extraction and purification of potassium compounds, particularly potassium chloride (KCl), which is vital for fertilizer production. The beneficiation of potash ores, primarily composed of silvinit (KCl + NaCl), requires a systematic approach to separate the valuable sylvite from associated gangue minerals, primarily halite. This thesis presents a comprehensive overview of the sequential stages involved in potash ore beneficiation, including crushing and grinding, desliming, flotation, dewatering, and drying. Each stage is optimized based on ore mineralogy, particle size distribution, reagent chemistry, and environmental conditions. Emphasis is placed on flotation, the most efficient separation method, along with supportive techniques such as selective crystallization and brine recycling. The thesis also explores advancements in process automation and control technologies. The outlined beneficiation stages provide a framework for enhancing recovery, improving product purity, and reducing environmental impact in potash processing operations.

Keywords. Potash ore, beneficiation, sylvite, halite, flotation, desliming, potassium chloride, mineral processing, separation techniques.

Аннотация

Обогащение калийной руды является важнейшим процессом в извлечении и очистке соединений калия, в частности хлорида калия (KCl), который жизненно важен для производства удобрений. Обогащение калийных руд, в основном состоящих из сильвинита (KCl + NaCl), требует системного подхода для отделения ценного сильвина от сопутствующих минералов пустой породы, в первую очередь галита. В данной диссертации представлен всесторонний обзор последовательных стадий, вовлеченных в обогащение калийной руды, включая дробление и измельчение, обесшламливание, флотацию, обезвоживание и сушку. Каждая стадия оптимизирована на основе минералогии руды, распределения размеров частиц, химии реагентов и условий окружающей среды.

Особое внимание уделяется флотации, наиболее эффективному методу разделения, а также вспомогательным методам, таким как селективная кристаллизация и рециркуляция рассола. В диссертации также рассматриваются достижения в области автоматизации процессов и технологий управления. Описанные стадии обогащения обеспечивают основу для повышения извлечения, улучшения чистоты продукта и снижения воздействия на окружающую среду при переработке калийных руд.

Ключевые слова. Калийная руда, обогащение, сильвин, галит, флотация, обесшламливание, хлористый калий, переработка полезных ископаемых, методы разделения.

Introduction. The global demand for potassium-based fertilizers continues to rise due to the intensification of agriculture and the need for sustainable food production. Potash ores, particularly those containing sylvite (KCl), serve as a primary raw material in the production of potassium fertilizers. However, the extraction of potassium from naturally occurring ores such as silvinit is not straightforward, as these minerals are often found as fine-grained intergrowths with halite (NaCl) and insoluble impurities. Therefore, an efficient beneficiation process is essential to isolate the potassium component and produce high-purity potassium chloride suitable for agricultural use.

In this context, the beneficiation of potash ore refers to a series of physical and chemical processes designed to increase the concentration of sylvite while minimizing losses and environmental degradation. The stages of beneficiation must be tailored to the specific characteristics of the ore body, including its mineral composition, grain size distribution, and the presence of clay or carbonate impurities. The principal goal is to maximize KCl recovery and concentrate grade while maintaining operational efficiency.

This thesis examines the critical stages of the potash ore beneficiation process, focusing on the technical, environmental, and economic considerations at each phase. It integrates industrial practices with recent scientific advancements to outline a modern, efficient beneficiation framework.

Main part. The potash ore beneficiation process comprises several interdependent stages, each contributing to the final quality and yield of the potassium chloride product. The primary stages include:

1. **Comminution (Crushing and Grinding):** The initial step involves reducing the ore to a manageable size to liberate sylvite crystals from the halite matrix. Jaw crushers and rod mills are commonly used. The target size range is usually below 1 mm to ensure adequate mineral liberation for subsequent flotation.
2. **Desliming and Classification:** After grinding, the slurry undergoes desliming to remove fine clays and insoluble particles that could interfere with flotation. Hydrocyclones or spiral classifiers are used to separate the coarse and fine fractions. Efficient desliming improves flotation selectivity and reduces reagent consumption.
3. **Flotation Separation:** Flotation is the key stage in potash beneficiation. In this step, sylvite is floated while halite is suppressed using depressants such as starch, tannins, or polyacrylamides. Cationic amine-based collectors are used to selectively attach to sylvite surfaces. The flotation is conducted in saturated brine to prevent salt dissolution, which could otherwise reduce recovery.
4. **Reagent Control and Optimization:** The performance of flotation is highly dependent on pH, reagent dosage, and temperature. Recent innovations include the use of modified collectors, frothers, and real-time process monitoring using pH sensors and online analyzers. These allow for dynamic optimization of flotation circuits.
5. **Dewatering and Filtration:** The flotation concentrate is then thickened and filtered to reduce moisture content. Belt filters, centrifuges, or vacuum disc filters are typically used. Recovered brine is recycled to reduce water consumption and minimize environmental discharge.
6. **Drying and Product Handling:** The final stage involves thermal drying of the filtered concentrate to reduce residual moisture to acceptable levels for packaging and transportation. Fluidized bed dryers or rotary dryers are commonly employed.
7. **Environmental Considerations and Waste Management:** Modern beneficiation plants implement closed-loop water systems and dry tailings disposal to minimize environmental impact. The use of energy-efficient equipment and environmentally benign reagents is increasingly prioritized.

These stages form an integrated system aimed at maximizing KCl recovery while optimizing energy usage, water recycling, and minimizing environmental footprint. Additionally, digitization and machine learning models are being gradually incorporated for process automation, further enhancing efficiency and consistency.

Conclusion. The beneficiation of potash ore is a complex but essential process in the global fertilizer industry. Understanding and optimizing each stage of the process—from crushing to flotation, and from dewatering to drying—is vital to achieve high

recovery rates and product purity. This thesis has outlined the main steps involved in the beneficiation of silvinitic-type potash ore, emphasizing the central role of flotation as well as the importance of supportive steps like desliming and drying.

Technological improvements such as the use of high-efficiency collectors, closed water circuits, and process automation are enhancing the sustainability and profitability of potash production. By implementing integrated process control and predictive maintenance tools, beneficiation plants can achieve greater operational stability and lower environmental impact.

Ultimately, a well-structured beneficiation process contributes not only to the economic viability of potash mining operations but also to national goals of agricultural self-sufficiency and resource efficiency. Continued research and innovation in this area are essential to meet the challenges of future food production and sustainable resource utilization.

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***МОБИЛ ДАСТУРЛАР ИШЛАБ ЧИҚИШНИНГ ЗАМОНАВИЙ
ВОСИТАЛАРИ***

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Ҳозирги кунда кўпчилик фойдаланувчилар шахсий компьютерлардан воз кечган ҳолда шахсий мобил қурилмалардан фойдаланишни афзал кўришмоқда. Ўз навбатида шахсий мобил қурилмалар фойдаланувчига 24/7 режимида доимий алоқада бўлиш имкониятини яратиб беради. Шахсий компьютердан фарқли равишда, мобил телефонлар ва планшетлар фойдаланувчиларнинг шахсий қурилмалари ҳисобланади. Ушбу қурилмаларда фойдаланувчиларнинг шахсий расмлари, пластик карта рақамли ва кодлари, жамиятлик тармоқларидаги аккаунтлари ва фойдаланувчининг шахсан ўзига тегишли бўлган шахсий маълумотлари сақланади.

Сўнгги йилларда мобил қурилмалар учун жуда кўплаб дастурлар ишлаб чиқилмоқда ва бундай дастурлар сони кундан-кунга кўпайиб бормоқда. Ушбу дастурлар ҳилма – хиллиги билан бир-бирларидан ажралиб туради. Мисол тариқасида айрим дастурлар фойдаланувчига ўз вақтини режалаштиришга ёрдам беришни таклиф қилса, бошқа бир дастур эса унга спорт билан шуғулланиш вақтини эслатиб туради. Кундан- кунга мобил қурилмалар ва улардан фойдаланувчилар сони нафақат дунё миқёсида, шунингдек юртимизда ҳам жуда тез суръатларда ўсиб бормоқда. Ушбу мақолада биз ҳозирги кунда дунёда кенг тарқалган Android, iOS ҳамда Windows Phone амалиёт тизимлари учун мобил дастурлар тузиш учун зарур бўлган замонавий дастурлаш муҳитлари ва воситалари ҳақида тўхталиб ўтамиз.

Мобил қурилмалар учун замонавий дастурлаш муҳитлари ва воситалари ҳақидаги мулоҳазамизни Android амалиёт тизимидан бошлаймиз. Ҳозирги кунда Android амалиёт тизими учун дастур тузишда кенг қўлланиладиган икки IDE(Integrated Development Environment) муҳит мавжуд бўлиб, булар Eclipse ҳамда JetBrains компанияси томонидан ишлаб чиқилган IntelliJ IDEA дастурлаш муҳитлари ҳисобланади.

Eclipse дастурлаш муҳити очик кодли лойиҳа ҳисобланади. Ушбу IDE дастурчи учун осон созланиши, зарур дастурий компонентлари ҳисобланадиган SDK

(Software Development Kit) Android, NDK Android (Native Developer Kit) ҳамда JAVA машиналари билан осон интеграция қилиниши билан ажралиб туради. Дастурлаш муҳити учун зарур бўлган компонентлар муваффақиятли интеграция қилингандан кейин дастурчи томонидан ўзининг биринчи лойиҳасини яратишда ҳеч қандай қийинчиликларга дуч келмайди. Дастурчи томонидан Android учун лойиҳа танлангандан кейин, автоматик равишда бўш “Hello world” лойиҳаси яратилади ва ушбу лойиҳани виртуал қурилмада ишлатиб кўриш мумкин. Eclipse муҳити асосий дастурлаш тили сифатида Java дастурлаш тили фойдаланади. Ушбу IDE фойдаланишга жуда қулай ва осон созланиши туфайли кўпчилик дастурчилар томонидан мобил қурилмаларга дастур ёзишни ушбу муҳитдан бошлашни тавсия қилишади.

JetBrains компанияси томонидан ишлаб чиқилган IntelliJ IDEA муҳити асосан тажрибали дастурчиларга мўлжалланган ҳисобланади. Чунки кўпчилик дастурчилар JetBrains компанияси маҳсулотларини «Ақлли IDE» деб номлашади. Сизнинг эътиборингизни тортмаслиги мумкин бўлган, шарт операторларидан кейин тушиб қолдирилган қавсларни автоматик ёпилиши, турли хил усулларнинг гуруҳларга ажратилиши ва (Interface, Singleton) каби синфлар учун автоматик равишда синфларнинг пайдо қилиниши бир кўринишда муҳим саналмаслиги мумкин. Лекин, статистика бўйича йил давомида фақатгина ‘rename’ жараёнинг ўзида дастурчининг 120 соат иш вақти тежалиши аниқланган. Дастурчиларни қийнайдиган энг мураккаб масалалардан бири дастурда ўзгарувчиларни номлаш масаласи ушбу муҳитда жуда самарали ҳал қилинган. Масалан, агар сизда “Item” номли асосий синф бўлса ва сиз ушбу синфдан фойдаланиб массив яратсангиз, дастурлаш муҳити ушбу элементларни “Items” деб номлашни таклиф қилади. Ушбу мисол сиз учун жуда жўндек туюлиши мумкин, лекин ушбу амалдан амалиётда фойдаланиш жуда фойдали ва дастурчининг кўп вақтини тежашга ёрдам беради. Ушбу муҳитда ҳам бошқа дастурлаш муҳитлари каби тузилган дастурнинг қандай натижа берганини муҳит томонидан танланган виртуал қурилмаларда кўриш имконияти мавжуд.

Android Studio муҳити JetBrains ва Google компаниялари билан биргаликда ишлаб чиқилган бўлиб, асосан Android амалиёт тизими учун дастурлар ишлаб чиқишга мўлжалланган муҳит ҳисобланади. Google компанияси Android қурилмаларига дастур тузишда айнан Android Studio муҳитидан фойдаланишни тавсия қилади.

XCode муҳити iOS амалиёт тизимида ишловчи дастурлар ёзиш учун яратилган муҳит бўлиб, ушбу муҳит iOS амалиёт тизими учун дастурлар ёзиш учун энг

кулай муҳит ҳисобланади. XCode фойдаланиш учун ягона workplace-window майдонидан фойдаланади ҳамда ушбу ягона ойнада дастурчи учун зарур бўлган барча воситалар жуда тушунарли кўринишда жойлаштирилган бўлиб, дастурчи ўзи учун зарур бўлган воситани топишда ҳеч қандай қийинчиликга дуч келмайди. SDK iOS доимий равишда XCode учун қўшимча воситалар, компиляторлар ва фреймворкларни қўшиб бормоқда ва ушбу қўшимчалар муҳитнинг имкониятларини кенгайтириб бормоқда. Дастурлаш муҳитида асосий дастурлаш тили сифатида Objective-C – объектга-йўналтирилган дастурлаш тилидан фойдаланади.

Microsoft Visual Studio муҳитига Windows Phone SDK плагини ўрнатилган кейин, ушбу муҳит дастурчи учун Windows Phone амалиёт тизимида ишловчи дастурлар ёзиш учун тайёр бўлади.

Плагинниг энг сўнгги версиясида дастурчилар дастур тузиши ва ушбу тайёр дастурларни бепул Windows Phone Marketplaceга жойлаштириш имконияти ҳам жойлаштирилган. Муҳитда дастурни тузиш ва уни виртуал симуляторларда тестлаш имкониятлари ҳам мавжуд. Асосий дастурлаш тили сифатида C# дастурлаш тилидан фойдаланилади.

Хулоса қилиб шуни айтиб ўтиш керакки, ушбу мақолада биз ҳозирги кунда дунёда энг кенг тарқалган мобил қурилмаларда фойдаланилаётган Android, iOS ва Windows Phone амалиёт тизимлари учун дастур ёзиш мумкин бўлган муҳитлар ҳақида тўхталиб ўтдик. Юқори номи келтирилган дастурлаш муҳитларидан ташқари, Xamarin, Unity3D, Cocos2Dx, Marmelade, Phonegap кабу кроссплатформали дастурлаш муҳитлари ҳам мавжуд. Кроссплатформали муҳитлардан асосан қисқа вақт ичида кенг жамоатчиликни жалб қилиш учун тузиладиган дастурларда фойдаланилади. Ушбу муҳитда яратилган дастурлар мобил қурилманинг асосий ресурсларидан фойдаланиш имкониятини бермайди. Шу сабабли, мобил қурилмалар учун дастур тузишда юқори номи келтирилган IDE муҳитларидан фойдаланиш тавсия этилади.

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YANGI OYNA YUVISH MEXANIZMINI ANALITIK TAXLIL QILISH VA UNI ISHLASH SAMARADORLIGINI OSHIRISH.

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Annotatsiya: *Mazkur maqolada avtomobillarda oynalarni yuvish tizimining yangi konstruksiyasi taklif etiladi va uning samaradorligini oshirish usullari yoritiladi. Yangi mexanizm mavjud tizimlarga nisbatan kamroq suv sarfi, tezkor tozalash va barqaror ishlash xususiyatlariga ega. Eksperimental sinovlar orqali tizimning samaradorligi baholanadi hamda mavjud modellar bilan solishtirma tahlil keltiriladi.*

Kalit so'zlar: *oyna yuvish tizimi, avtomobil, samaradorlik, suv sarfi, innovatsion mexanizm.*

Abstract: *This article proposes a new windshield cleaning system for vehicles and explores methods for improving its operational efficiency. The proposed mechanism features lower water consumption, faster cleaning, and more stable performance compared to existing systems. Experimental tests were conducted and comparative analysis with conventional models is presented.*

Key words: *windshield cleaning system, vehicle, efficiency, water consumption, innovative mechanism.*

Аннотация: *В данной статье предлагается новая конструкция системы очистки стекол автомобилей и рассматриваются методы повышения её эффективности. Новая система характеризуется меньшим расходом воды, более быстрой очисткой и устойчивой работой по сравнению с существующими аналогами. Проведены экспериментальные испытания и сравнительный анализ с традиционными моделями.*

Ключевые слова: *система очистки стекол, автомобиль, эффективность, расход воды, инновационный механизм.*

Avtomobilsozlik sanoatida har bir tizimning funksional samaradorligi haydovchi xavfsizligi va qulayligi uchun muhim ahamiyat kasb etadi. Shunday tizimlardan biri bu – oyna yuvish tizimi bo'lib, u ob-havo sharoitlaridan qat'iy nazar avtomobil old oynasini toza holatda saqlash orqali haydovchi ko'rish qobiliyatini ta'minlaydi.

An'anaviy yuvish tizimlari o'z funksiyalarini bajarishga qodir bo'lsada, ular ko'plab kamchiliklarga ega, jumladan, yuqori suv sarfi, notekis purkash, kam quvvat va samaradorligi pastdir. Hozirgi jadal Suratgarh bilan rivojlanayotgan davr talabiga mos yuqori sifatli texnologiyalarni rivojlantrish kerak.

Mazkur ilmiy maqolada avtomobillar uchun mo'ljallangan yangi turdagi oyna yuvish mexanizmi taklif qilinadi. Ushbu mexanizm yordamida suvni tejash, tez va sifatli tozalash, hamda tizimning ekspluatatsion ishonchliligini oshirish mumkin. Taklif etilayotgan mexanizmning konstruktiv tuzilmasi, ishlash prinsipi, tajriba asosidagi sinov natijalari va amaldagi modellarga nisbatan ustunliklari batafsil yoritiladi.

ASOSIY QISM

Nazariy asoslar va mexanizmning konstruksiyasi.

Avtomobil oynasini yuvish tizimlarining samaradorligini oshirish asosan uchta omilga bog'liq:

1. suvning purkash burchagi va bosimi,
2. purkagichlar joylashuvi,
3. suv sarfining miqdori va taqsimoti.

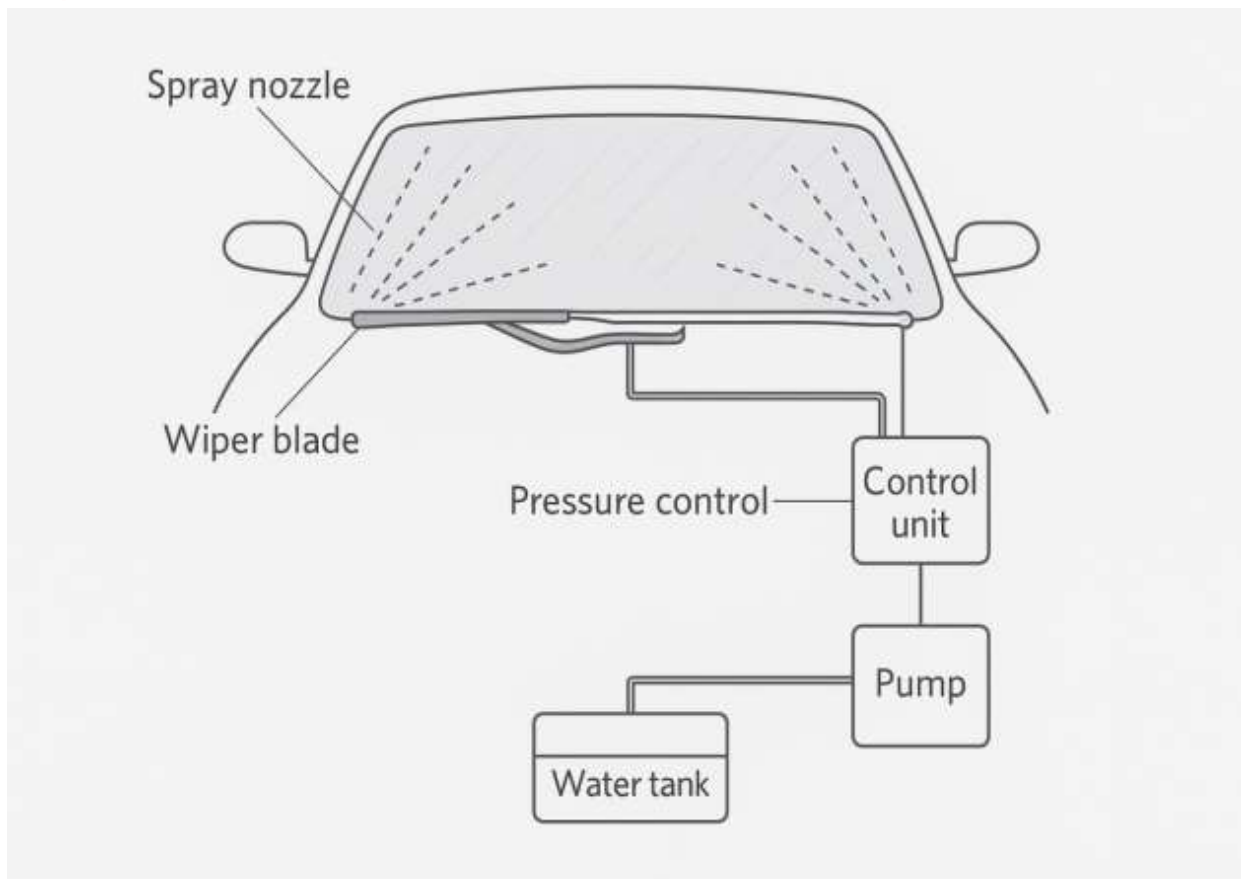
An'anaviy tizimlarda purkagichlar kapot (motor qopqog'i) qismida joylashgan bo'lib, ular suvni aniq yo'naltira olmaydi va bu holat notekis tozalashga sabab bo'ladi. Shuningdek, suvning yuqori sarfi ekologik va texnik jihatdan muammo tug'diradi.

Taklif etilayotgan yangi mexanizm quyidagi asosiy yangiliklarni o'z ichiga oladi:

- Integratsiyalashgan purkagichli yo'rgaklar: Tozalagich rezinkalariga birlashtirilgan mikro-purkagichlar yordamida suv to'g'ridan-to'g'ri axloqsiz nuqtalarga yetkaziladi. Bu suv isrofini kamaytiradi va tozalash tezligini oshiradi.
- Avtomatik bosim nazorati: Sensorlar yordamida old oyna ifloslanish darajasi aniqlanadi va unga mos ravishda suv bosimi avtomatik tarzda boshqariladi.
- Optimallashtirilgan burchakli taqsimot: Suv purkash yo'nalishi avtomobilning harakat yo'nalishi va shamol qarshiligiga moslashtirilgan.

Ushbu konstruksiya yuqorida keltirilgan nazariy jihatlarga tayangan holda ishlab chiqilgan bo'lib, u foydalanuvchiga qulaylik, yuqori samaradorlik va resurs tejash imkonini beradi.

Yangi oyna yuvish mexanizmining samaradorligini ifodalovchi asosiy formulalar quyidagilar bo'lishi mumkin:



1. Suv sarfi (Q) formulasi.

Suv sarfi hajmi suv oqimi tezligi va vaqtga bog‘liq:

$$Q = A \cdot v \cdot t$$

•Q — suv sarfi, litr (L) yoki kub metr (m³)

•A — purkagich chiqish maydoni, m²

°V — suvning chiqish tezligi, m/s

t — purkash vaqti, s

2. Tozalash samaradorligi (η) formulasi.

Tozalash samaradorligi yuzaning qancha foizi tozalanganiga bog‘liq:

$$n = St : Sv \cdot 100\%$$

n — tozalash samaradorligi, %

St — tozalangan yuzaning maydoni, m²

Sv — umumiy ifloslangan yuzaning maydoni, m²

3. Suv bosimi (P) formulasi.

Suvning purkagichdan chiqishi uchun zarur bosim Bernulli tenglamasi asosida ifodalanadi:

$$P = \frac{1}{2} \rho v^2$$

p — suv bosimi, Pa (Paskal)

p — suv zichligi, kg/m³ (odatda 1000 kg/m³)

v — suv tezligi, m/s

XULOSA VA TAKLIFLAR.

O‘tkazilgan tadqiqotlar va amaliy sinovlar asosida quydagi xulosani bildirish mumkin, taklif etilgan yangi oyna yuvish mexanizmi an’anaviy tizimlarga nisbatan bir qator ustunliklarga ega. Xususan:

- Suv sarfini sezilarli darajada kamaytiradi, bu esa ekologik va iqtisodiy jihatdan foydalidir.
- Tozalash sifati va tezligi oshadi, bu haydovchi xavfsizligini ta’minlashga xizmat qiladi.
- Tuzilishi kompaktdir va mavjud avtomobillarga integratsiya qilish imkoniyati mavjud.
- Ekstremal ob-havo sharoitlarida ham barqaror ishlashi kuzatildi.

Ushbu tizimning sanoat miqyosida joriy etilishi avtomobillarning texnik xizmat ko‘rsatish tizimini yangi bosqichga olib chiqishi mumkin. Shu sababli quyidagi takliflar ilgari suriladi:

1. Tizimni turli rusumdagi avtomobillarga sinov tarzida o‘rnatish va ishlab chiqaruvchilar bilan hamkorlikda sertifikatlashtirish ishlarini yo‘lga qo‘yish.
2. Mexanizmda qo‘llanilayotgan materiallar va sensor texnologiyalarini yanada takomillashtirish orqali uni energiya tejovchi qurilmaga aylantirish.
3. Yangi tizimni avtomatik ob-havo aniqlovchi modullar bilan integratsiyalash orqali to‘liq aqlli boshqaruvga o‘tkazish.

Yuqoridagilarga asoslanib, taklif etilayotgan oyna yuvish mexanizmi avtomobil sanoatida innovatsion yondashuv bo‘lib, texnikaviy, ekologik va funksional afzalliklarga ega ekani isbotlandi va bu avtomobil sanoatida katta islohot bo‘ladi.

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***METALLARNI KESISH KUHLARI VA KESISH QUVVATINI ANALITIK
TAXLIL QILISH HAMDA KESISH SAMARADORLIGINI OSHIRISH.***

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АННОТАЦИЯ

В данной статье проводится аналитическое исследование сил резания, возникающих при механической обработке металлов, и их влияние на режущую мощность. Силы резания играют важную роль в управлении технологическим процессом, поскольку позволяют точно определять оптимальные параметры обработки. Исследование охватывает изменение сил в зависимости от свойств различных металлов, углов резания, коэффициента трения, материала инструмента и скорости вращения. Применяя аналитические методы, автор предлагает математические модели для расчета сил резания и разработки эффективных режимов обработки. В статье рассматриваются пути снижения затрат на производство за счёт применения современных станков с ЧПУ, износостойких инструментов и энергоэффективных подходов. Также обсуждается использование автоматизированных систем мониторинга, которые позволяют в режиме реального времени отслеживать силы резания, оптимизировать энергопотребление, продлевать срок службы оборудования и повышать качество продукции. Полученные результаты представляют научно-практическую ценность и могут быть применены в промышленных условиях, научных исследованиях и образовательных учреждениях, специализирующихся на металлообработке.

Ключевые слова: Резание металлов, силы резания, энергоэффективность, аналитический анализ, технологические процессы.

ANNOTATSIYA

Mazkur maqolada metallarni kesish jarayonida yuzaga keladigan kuchlar va ularning kesish quvvatiga ta'siri analitik jihatdan chuqur o'rganiladi. Metallarni mexanik ishlov berishda hosil bo'ladigan kuchlar ishlab chiqarish jarayonining asosiy parametrlaridan biri bo'lib, ularni to'g'ri aniqlash va tahlil qilish texnologik jarayonning samaradorligini oshirishga xizmat qiladi. Tadqiqotda turli metallarga nisbatan kuchlarning o'zgarishi, kesish burchaklari, ishqalanish koeffitsiyenti, asbob materiali va aylanish tezligining ta'siri o'rganiladi. Shuningdek, analitik usullar yordamida kesish kuchlarini matematik modellashtirish va optimal kesish rejimlarini

ishlab chiqish yo‘llari ko‘rib chiqiladi. Zamonaviy CNC stanoklari, kesish asboblarning qattiqligi va bardoshliligi kesish quvvatining kamayishi bilan ishlab chiqarish xarajatlarini kamaytirishga imkon beradi. Avtomatlashtirilgan monitoring tizimlari orqali kesish kuchlarini real vaqt rejimida kuzatish, energiyani tejash, ishlab chiqarish sifati va uskuning xizmat muddatini uzaytirish imkonini beradi. Maqolada taqdim etilgan natijalar metallga ishlov berish sohasida amaliy ahamiyatga ega bo‘lib, ilmiy-tadqiqot, sanoat hamda ta‘lim yo‘nalishlarida foydalanilishi mumkin.

Kalit so‘zlar: Metallarni kesish, kesish kuchlari, energiya samaradorligi, analitik tahlil, texnologik jarayonlar.

ABSTRACT

This article presents an analytical study of cutting forces generated during metal machining and their impact on cutting power. Cutting forces are among the most critical parameters in the machining process, directly affecting the efficiency, quality, and energy consumption of production. The research examines how various factors—such as material properties, cutting angles, friction coefficients, tool material, and spindle speed—influence cutting forces. Using analytical methods, mathematical models are developed to calculate forces and identify optimal machining regimes. The paper also explores how modern CNC machines and durable cutting tools contribute to reducing cutting power and operational costs. Furthermore, real-time force monitoring through automated systems is discussed as a means of improving energy efficiency, extending tool life, and ensuring higher product quality. These monitoring systems allow for dynamic adjustments in machining conditions, supporting smarter and more sustainable manufacturing. The findings of this research have practical implications for industrial applications, academic research, and engineering education. They provide valuable insights for improving process control in metal cutting operations and can be integrated into digital manufacturing frameworks.

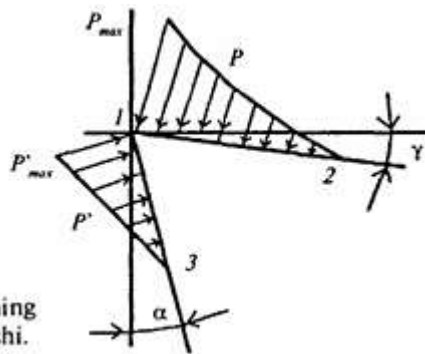
Keywords: Metal cutting, cutting forces, energy efficiency, analytical analysis, technological processes.

Zamonaviy sanoat ishlab chiqarish jarayonlarida metallarni mexanik ishlov berish keng qo‘llanilmoqda. Ayniqsa, metallarni kesish texnologiyasi mashinasozlik, aviatsiya, avtomobilsozlik va boshqa ko‘plab sohalarda asosiy jarayonlardan biri hisoblanadi. Mazkur jarayonning asosiy ko‘rsatkichlaridan biri bu — kesish kuchlari va ular bilan bog‘liq bo‘lgan kesish quvvatidir. Ushbu parametrlar texnologik rejimlarning tanlanishi, asbobning mustahkamligi, energiya sarfi hamda tayyor mahsulot sifatiga bevosita ta‘sir ko‘rsatadi. So‘nggi yillarda ishlab chiqarish samaradorligini oshirish, energiya tejash, uskunalarning ishlash muddatini uzaytirish va mahsulot sifatini yaxshilash dolzarb masalaga aylandi. Bunday sharoitda kesish

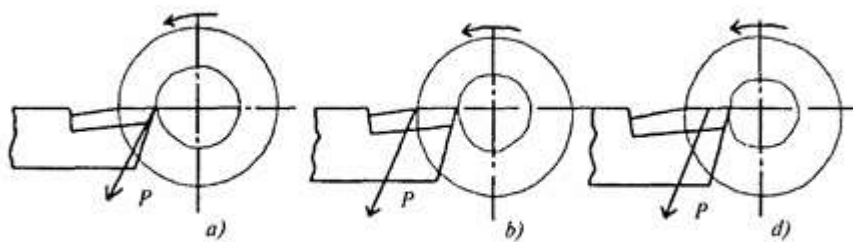
kuchlarini chuqur o'rganish, ularni analitik asosda taxlil qilish va modellashtirish zaruriy bo'lib qolmoqda. Shuningdek, kesish jarayonida hosil bo'ladigan kuchlarni real vaqt rejimida kuzatish imkonini beruvchi avtomatlashtirilgan monitoring tizimlarining joriy etilishi ishlab chiqarish jarayonlarini optimallashtirishga xizmat qilmoqda.

Ushbu maqolada metallarni kesish kuchlarining hosil bo'lish mexanizmi, ularni aniqlash va tahlil qilish usullari, matematik modellashtirish yo'llari, hamda ularning samarali boshqaruvi bo'yicha takliflar bayon etiladi.

Kesish jarayonida kesuvchi asbobning tig'iga asbobning ishchi harakat yo'nalishida surilishiga qarshilik kuchlari ta'sir e'tadi. Bu kuchlar teng ta'sir etuvchisi kesish kuchi deb ataladi. (P harfi bilan belgilanadi N yoki kN bilan o'lchanadi).



4.1-rasm. Bosim kuchlarining kesichning old va orqa yuzalar bo'yicha taqsimlanishi.



4.2-rasm. Keltirilgan kesish kuchi P_p ning asosiy kesuvchi tig'ga qo'yilish sxemasi.

Kesish kuchini paydo qiluvchi opmillar quyidagicha.

1. *Ishlanayotgan materiallarning qirindi hosil bo'lishidagi plastik deformatsiyalarga qarshiligi*
2. *Plastik deformatsiyalangan metallning yangi yuzalar paydo bo'lish joylarida buzilishga qarshiligi*
3. *Kesilayotgan qirindining qo'shimcha egilishiga va sinishiga qarshiligi va boshqalar bo'lishi mumkin.*

METALLARNI KESISH JARAYONIDA YUZAGA KELADIGAN ASOSIY MUOMMOLAR

1. kesish kuchlarining oshib ketishi

Yuqori kesish kuchlari asbobning tez eskirishiga, uskuna tebranishiga va ortiqcha energiya sarfiga olib keladi.

Kuchlarning notekis taqsimlanishi natijasida kesish aniqligi kamayadi.

2. Asbobning eskirishi va ishdan chiqishi

Uzoq muddatli ishlovda asbob uchining qizib ketishi va yeyilishi kuzatiladi.

Bunga noto 'g'ri tanlangan kesish rejimi yoki noqulay material sababi bo 'lishi mumkin.

3. Issiqlik ajralishi va sovitish muammolari

Kesish jarayonida katta miqdorda issiqlik hosil bo 'ladi.

Agar sovitish yetarli bo 'lmasa, bu termik deformatsiyalarga va mahsulot sifatining yomonlashishiga olib keladi.

4. Vibratsiyalar (tebranishlar)

Kesish paytida yuzaga keladigan noxush tebranishlar asbobning uzog'i bilan aloqasiga, yuzaning pürüzlilikiga va aniqlikning yo 'qolishiga sabab bo 'ladi.

5. Sifat muammolari

Tugallangan buyum sirtining silliqligi yetarli bo 'lmasligi.

Chuqurchalar, mikroyoriqlar, qirralarning notekisligi.

6. Materialning notekisligi yoki qattiqligi

Geterojen struktura yoki qattiq aralashmalar asbobga zarar yetkazadi yoki kesish sifatini pasaytiradi.

7. Energiya sarfining yuqoriligi

Noto 'g'ri tanlangan kesish rejimlari energiya tejamkorligiga to 'squinlik qiladi

**METALLANI KESISH JARAYONIDA YUZAGA KELADIGAN MUOMMOLARGA
YECHIM SIFATIDA QUYIDAGILARNI KELITIRISHIMIZ MUMKUN**

1. Kesish kuchlarini oshib ketishi

Metallni kesish paytida kesish kuchlarining me'yordan ortib ketishi asbobning erta eskirishiga, energiya sarfini oshishiga va mahsulot sifatining yomonlashishiga olib keladi. Buning oldini olish uchun kesish tezligi, oziqlanish tezligi va kesish chuqurligi kabi parametrlar optimal darajada tanlanishi kerak. Shuningdek, yuqori sifatli va qattiq asbob materiallaridan foydalanish, kesish burchaklarini to'g'ri sozlash ham kuchlarning kamayishiga xizmat qiladi.

2. Asbobning tez eskirishi

Bu muammo asbob materialining chidamsizligi yoki noto'g'ri ishlash rejimlari bilan bog'liq bo'lishi mumkin. Uni bartaraf etish uchun qoplamali (titan nitridli) asboblardan foydalanish, muntazam texnik ko'rik o'tkazish, va avtomatik ishlov berish tizimlariga o'tish tavsiya etiladi.

3. Issiqlik ajralishi va sovutish muammolari

Kesish jarayonida ortiqcha issiqlik yuzaga keladi va bu termik deformatsiyalarga sabab bo'ladi. Bunga qarshi sifatli sovutish suyuqliklari (emulsiya, moy) qo'llanishi, sovutish tizimi doimiy ishlash holatida bo'lishi, va asbob issiqlikka chidamli materialdan tanlanishi lozim. Shunga o'xshash yechimlar bo'lishi mumkin

Metallarni kesish kuchlarining hosil bo'lish mexanizmi

Metallarni kesish jarayonida asbob (kesuvchi qism) ish parchasining yuzasiga nisbatan harakatlanar ekan, materialning yuqori qatlamida plastik deformatsiya yuzaga keladi. Bu deformatsiyalangan qatlam o'z ichida kesish zonasi hosil qiladi va natijada kesish kuchlari shakllanadi. Bu kuchlar quyidagi uchta asosiy komponentdan iborat bo'ladi:

- 1. Asosiy (kesish) kuch – F_c : Bu kuch materialni kesishga sarflanadi va asbobning harakat yo'nalishida yo'naltirilgan.*
- 2. Oziqlanish kuchi – F_f : Ishlov berish paytida asbobni oziqlantirish (oldinga harakatlantirish) uchun talab qilinadigan kuch.*
- 3. Tikka kuch – F_n : Asbob yuzasiga perpendikulyar ravishda ta'sir qiladigan bosim kuchi.*

Ushbu kuchlar ishlov jarayonining geometriyasi, materialning qattiqligi, ishqalanish koeffitsiyenti, asbob burchaklari va kesish tezligi kabi omillarga bog'liq.

Kesish kuchlarini aniqlash va tahlil qilish usullari

Kesish kuchlarini o'lchashda bir necha usullardan foydalaniladi:

- 1. Dinamometrik usul – maxsus kuch o'lchov qurilmalari (trio-komponent dinamometrlar) orqali kuchlarning real vaqt rejimida o'lchab olinishi.*

2. **Strain-gauge (deformatsion datchik) usuli** – stanokning yoki asbob tutqichining deformatsiyasi orqali kuchni aniqlash.
3. **Matematik-analitik usul** – oldindan berilgan fizikaviy parametrlar asosida hisob-kitoblar orqali kesish kuchlarini baholash.

Bundan tashqari, yuqori tezlikli kameralar va termografik uskunalar orqali issiqlik zonalarining ta'siri ham o'rganiladi.

Kesish kuchlarini matematik modellashtirish yo'llari

Matematik modellashtirish orqali kesish kuchlarini oldindan aniqlash va boshqarish mumkin. Eng ko'p qo'llaniladigan modellar:

1. **Merchant nazariyasi (Merchant's Circle Diagram):**
 Bu nazariyaga ko'ra, kesish kuchlari kesish zonasi geometriyasi va ishqalanish burchagi asosida quyidagicha ifodalanadi:

$$F_c = \frac{\tau \cdot A_s}{\cos(\varphi - \alpha)} \quad (1)$$

Bu yerda:

- τ — materialning kesish qarshiligi,
- A_s — kesish yuzasi maydoni,
- φ — kesish burchagi,
- α — asbobning oldingi burchagi.

Oxirgi elementlar beruvchi raqamli metod. Bu usul kuchlarning taqsimlanishini, deformatsiya va harorat o'zgarishini aniq ko'rsatadi. **Regressiya va statistic modellar** Tajriba natijalariga asoslangan ko'p omilli regressiya tahlillari orqali kesish kuchlariga ta'sir etuvchi omillar aniqlanadi.

Rus olimi K.A.Zvorikin kesish kuchining nazariy tenglamasini tuzadi. Bu tenglama quyidagi ko'rinishga ega.

$$P = \frac{ab\tau \left[(1 - f_1^2) \cos \gamma + 2 f_1 \sin \gamma \right]}{\sin \theta \left[(1 - f_1 f_2) \cos(\gamma - \theta) + (f_1 + f_2) \sin(\gamma - \theta) \right]}$$

Bu tenglamani biz soddaroq qilib quyidagicha yozsak bo'ladi.

$$\tau_{eff} = \frac{\tau*(\cos\gamma+k*\sin\gamma)}{\cos(\gamma-\theta)} \quad (2)$$

Bu yerda:

γ — oldingi burchak (radian yoki gradus),

θ -kesish burchagi (shear angle),

τ — materialning asl kesish qarshiligi,

k — ishqalanishni aks ettiruvchi empirik koeffitsiyent (odatda $1 \leq k \leq 2$).

(2) ifodaning quyidagicha afzalliklari bor

Sodda va intuitiv: Muammoli fizik tushunchalarni bitta parametr (τ_{eff}) orqali ifodalaydi.

Moslashuvchan: Har xil materiallar, ishqalanishlar va burchaklar uchun moslashtiriladi.

Raqamli tizimlarga mos: Dasturiy modellashtirish va sanoat avtomatlashtirish tizimlari uchun juda qulay.

Eksperimental qo‘llashga yaroqli: Laboratoriya sharoitida aniqlangan qiymatlar osongina joylashtiriladi.

Hulosa qilib shuni aytganda metallarni kesish jarayonida hosil bo‘ladigan kuchlarning fizik-mexanik mohiyatini chuqur tahlil qilish, ularni aniqlash usullari va matematik modellar orqali ifodalash metallga ishlov berish texnologiyasining samaradorligini oshirishda muhim ahamiyat kasb etadi. O‘rganilgan murakkab tenglama (ishqalanish koeffitsiyentlari, kesish burchagi va asbob burchaklari ishtirokida) kesish kuchini aniq modellashtirishga xizmat qiladi, biroq uni amaliy hisob-kitoblar uchun soddalashtirish zarur.

Soddalashtirilgan va yangicha ko‘rinishda taklif etilgan formula — kesish kuchini effektiv qarshilik orqali aniqlash — bu boradagi hisoblarni osonlashtiradi, ayniqsa dasturiy modellashtirish, real vaqt monitoringi va avtomatlashtirilgan boshqaruv tizimlarida qo‘llash uchun juda qulay. Bu model trigonometriyaga asoslangan

an'anaviy formulalarga qaraganda ko'proq moslashuvchanlikka ega bo'lib, tajriba asosidagi empirik koeffitsiyentlar yordamida kesish shart-sharoitlariga tez moslashadi.

Yakuniy xulosa shuki, nazariy va soddalashtirilgan modellarni birgalikda qo'llash orqali kesish kuchlarini ishonchli aniqlash, energiya samaradorligini oshirish va asboblarning xizmat muddatini uzaytirishga erishiladi. Bu esa, o'z navbatida, metallga ishlov berishning ilmiy asoslangan, raqamli va barqaror rivojlanishiga yo'l ochadi.

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