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## GENERAL REVIEW OF THE CONCEPT OF VICTIMOLOGY

**Abstract:** In this article, the author has provided a general overview of the concept of victimology. The theoretical prerequisites for the emergence of this branch of criminology were given. The article gives a definition to the subject of victimology, victimization, analyzes the concept of victim.

**Key words:** victimology, victim, criminology, crime, criminal law.

**Language:** Russian

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## ОБЩИЙ ОБЗОР ПОНЯТИЯ ВИКТИМОЛОГИИ

**Аннотация:** В данной статье автор провел общий обзор понятия виктимологии. Были даны теоритические предпосылки зарождения данной отрасли криминологии. В статье дается определение предмету виктимологии, виктимности, проводится анализ понятия жертвы.

**Ключевые слова:** виктимология, жертва, криминология, преступление, уголовное право.

### Введение

#### Введение в историю вопроса

В соответствии со Стратегией действий по пяти приоритетным направлениям развития Республики Узбекистан в 2017 — 2021 годах 14 мая 2018 года была принята **Концепция совершенствования уголовного и уголовно-процессуального законодательства Республики Узбекистан** [1].

Одной из основных задач данной Концепции является приведение в соответствие с передовыми международными стандартами и зарубежными практиками. В этом смысле изучение основ виктимологии является очень актуальным и важным.

Исследование уголовно-правовой и криминологической литературы показывает, что учение о потерпевшем от преступления в качестве самостоятельного научного направления в криминологии начало оформляться лишь в 40-е гг. XX века с появлением работ **Ганса фон Гентига** и **Бенджамина Мендельсона**, которые заложили основы виктимологии: определили ее предмет,

методы исследования и выработали соответствующую терминологию.

Термин «виктимология» впервые прозвучал в докладе **Б. Мендельсона «Новые психосоциальные горизонты: виктимология»**, сделанном в 1947 г. на конференции психиатров в Бухаресте.

Позднее, в 1949 г. американский психиатр **Фредерик Уэртхем** выступил за создание «науки **виктимологии**», посвященной социологическому анализу поведения жертвы преступления [2].

В этот же период, в своей монографии «**Преступник и его жертва. Исследование по социобиологии преступности**», выпущенной в 1948 г., **Г. Гентиг** отмечал, что между преступником и жертвой преступления существует негласное взаимопонимание и «имеет место интеракция, взаимодействие и обмен элементами причинности». В этой работе Г. Гентиг развил основные положения нового направления в криминологической науке: определил предмет виктимологии, типичные

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виктимологические ситуации и типы жертв преступлений.

Ученый называл преступление процессом, «в котором антиобщественные элементы пожирают друг друга», где «взаимоотношения между преступником и потерпевшим, вероятно, соответствуют взаимоотношениям между хищными; и травоядными животными. Разница в отношениях между хищными и травоядными животными в мире животных и в отношениях между преступником и потерпевшим заключается в том, что хищным: зверям приходится самим охотиться за добычей; в то время как жертва преступника во многих случаях, по-видимому, сама активно вводит в искушение преступника» [3].

Термин «виктимология», происходящий от латинского слова «victima» (жертва) и древнегреческого «logos» (учение), в переводе означает «подробно о жертве», или «учение о жертве».

### Общее понятие виктимологии

Отрасль криминологической науки, предметом которой являются жертвы различных преступлений, называют **криминальной виктимологией**.

Научные исследования в этой области убедительно показали, что знания о жертве преступлений являются не менее значимыми, чем знания о личности преступника, и более того, необходимы для объективного изучения причин и условий, способствующих совершению преступлений, определения степени вины его участников и выработки мер по их предупреждению.

Совершение преступления - это динамический процесс, в ходе которого между правонарушителем и потерпевшим еще в момент предпреступной ситуации могут складываться сложные связи, образующие целый комплекс отношений, приводящих в итоге к криминальному конфликту [4].

Таким образом, изначально возникнув из идеи изучения жертв преступлений, виктимология развивалась как направление в криминологии. Однако со временем представления о ней несколько изменились, возникли различные позиции относительно ее предмета и научного статуса [5], а именно:

виктимология развивается в рамках криминологии, ее отрасль, частная теория;

виктимология - междисциплинарная дисциплина, существует параллельно с криминологией, вспомогательная для уголовного права, уголовного процесса и криминалистики;

виктимология - самостоятельная наука, имеющая предметом исследования жертву любого

происхождения, как криминального, так и не связанного с преступлением.

«Время ответит на вопрос о том, станет ли виктимология комплексной наукой о жертвах, виктимности и виктимизации во всем их спектре или параллельно сформируются научные дисциплины каждая со своим предметом (криминальными и некриминальными жертвами). За термином «виктимология» стоят отнюдь не мнимые, а реальные проблемы, изучение которых в интересах борьбы с преступностью, в целом защиты жертв, обеспечения их безопасности совершенно необходимо» [6].

### Предмет виктимологии

Различные направления виктимологии объединяет предмет исследования. Анализ доктринальных основ предмета виктимологии [7] позволяет выделить его ключевые элементы, а именно: виктимность как специфическое биопсихологическое и социальное явление, виктимизация как процесс превращения лица в жертву, типология и особенности виктимного поведения жертв преступлений, их количественные и качественные показатели, виктимогенные факторы и ситуации, влияющие на совершение преступлений, взаимоотношения личности жертвы и личности преступника, виктимологическая профилактика преступлений, формы и методы защиты возможных жертв преступлений и порядок возмещения вреда, прогнозирование виктимности и виктимизации.

Таким образом, сформировавшиеся взгляды ученых о предмете криминальной виктимологии позволяют выделить главное:

- криминальная виктимология - хотя и новое, но уже сформировавшееся в рамках криминологии ее самостоятельное научное направление;

- составная часть предмета криминальной виктимологии и весь круг проблем, рассматривающихся данной наукой, сосредоточены в сфере преступности и ее предупреждения;

- криминальная виктимология, с одной стороны, обогащает виктимологической информацией положения о потерпевшем, разработанные уголовным и уголовно-процессуальным правом, криминалистикой и теорией оперативно-розыскной деятельности, другими науками, а с другой - с учетом возникновения обратных связей сама черпает познания указанных наук для своего развития;

- криминальная виктимология за короткий период практического обращения к виктимологическому аспекту борьбы с преступностью разработала комплекс мер и рекомендаций, направленных на снижение виктимности граждан как потенциальных жертв преступлений, заложив основу для осуществления нетрадиционного вида профилактической деятельности - виктимологической

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профилактики преступлений;

– криминальная виктимология выступает научной и методологической основой осуществления профилактики криминальной виктимности, т.е. виктимологической профилактики преступлений.

### Потерпевший – жертва как центральный субъект виктимологии

Личность потерпевшего от преступления интересует не только криминологию, но и уголовное право, и уголовный процесс. Однако каждая из отраслей права определяет потерпевшего от преступления, исходя из своих целей и задач.

Согласно статье 3 Закона Республики Узбекистан «О профилактике правонарушений» потерпевший от правонарушения — лицо, пострадавшее от правонарушения вследствие причинения физического, морального или имущественного вреда [8].

Но жертва в виктимологии — это не то же самое, что потерпевший в уголовном праве и тем более в уголовном процессе. Потерпевший в уголовном процессе «появляется» после того, как он официально будет признан таковым. Согласно статье 54 УПК, «при наличии доказательств, дающих основание полагать, что преступлением, а равно общественно-опасным деянием невменяемого причинен моральный, физический или имущественный вред лицу, оно признается потерпевшим. О признании потерпевшим дознаватель, следователь, прокурор выносит постановление, а суд — определение» [9].

Таким образом, потерпевший с точки зрения уголовного процесса - лицо, которому вред причинен реально, и после официального его признания таковым он имеет установленные для него, как участника уголовного судопроизводства, права и обязанности.

Потерпевший в уголовном праве, рассматривается, как участник уголовных правоотношений, как элемент общественных отношений, охраняемых уголовным правом.

Виктимологическое понятие жертвы преступления по содержанию шире, так как включает в себя не только лицо, которому непосредственно был причинен вред, но и родственников либо близких, которым вред причинен опосредованно.

Виктимология изучает потерпевшего на двух уровнях, которые соотносятся между собой как преступления и преступность.

На основании изложенного, можно сделать следующий вывод, что понятие «жертва преступления» шире по своему содержанию понятия «потерпевший от преступления», поэтому для виктимологии исходным

теоретическим положением является понятие жертвы, а для уголовного права и уголовного процесса – потерпевший.

### Виктимность как основной элемент виктимологии.

Понятие «виктимность» введено в научный оборот Л.В.Франком, однако в науке оно трактуется по-разному. Основу для полемики составляют различия, касающиеся структурных элементов виктимности, ее видов, их соотношения и взаимозависимости.

По мнению Л.В. Франка, виктимность есть реализованная преступным актом «предрасположенность», способность стать при определенных обстоятельствах жертвой преступления, или, другими словами, неспособность избежать опасности там, где она не объективно была предотвратима [10].

В последующем Л.В. Франк совместно с С.С. Остроумовым несколько изменяет свою точку зрения и отмечает, что индивидуальная виктимность - это не только реализованная, но и потенциальная способность в силу ряда субъективных и объективных обстоятельств становиться «мишенью» для преступных посягательств [11].

Д.В. Ривман в работе «Виктимология и виктимность» говорит о том, что «виктимность отдельного лица - это объективно присущая человеку (реализованная преступным актом или оставшаяся в потенции), но отнюдь не фатальная способность, «предрасположенность» стать при определенных обстоятельствах жертвой преступления» или неспособность противостоять преступнику, обусловлена совокупностью факторов, делающих ее объективной (независящей от жертвы) или оставляющих ее на уровне субъективного «нежелания или неумения» [12].

В.Я. Рыбальская считает, что виктимность - это совокупность стабильных типичных и социальных психологических свойств личности, повышающая ее способность стать жертвой преступления [13].

### Заключение

Подводя итог, хотелось бы отметить следующие теоретические и практические предложения:

1. Практическая деятельность правоохранительных органов по осуществлению виктимологической профилактики вызывает необходимость уточнения понятийного аппарата виктимологии.

2. Целесообразно проводить фундаментальные исследования в вопросах



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виктимологии отдельных видов преступлений. Принимая во внимание, что насильственные преступления, в отечественной науке, в разрезе виктимологии [14-16], были изучены довольно

широко, однако например, вопросы противодействия коррупции, легализации преступных доходов [17] не были объектом всестороннего анализа с данной точки зрения.

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## USING STRONG COMPARISONS WITH BIRD NAMES IN KARAKALPAK FOLK DASTANS

**Abstract:** The article discusses the Karakalpak stable comparisons, the use of stable comparisons with the names of birds, in the linguoculturological aspect. In Turkic studies, stable comparisons are considered poorly studied. In Karakalpak linguistics, there are no special studies on the topic under study. This testifies to the urgency of this problem in modern Karakalpak linguistics. The analysis of the use of stable comparisons of this category is carried out on the material in the Karakalpak folk dastans.

**Key words:** comparisons, stable comparisons, semantics, phraseological units, cultural linguistics.

**Language:** Russian

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### УПОТРЕБЛЕНИЕ УСТОЙЧИВЫХ СРАВНЕНИЙ С НАЗВАНИЯМИ ПТИЦ В КАРАКАЛПАКСКИХ НАРОДНЫХ ДАСТАНАХ

**Аннотация:** В статье рассматриваются каракалпакские устойчивые сравнения, употребление устойчивых сравнений с названиями птиц, в лингвокультурологическом аспекте. В тюркологии устойчивые сравнения считается малоизученным. В каракалпакском языкознании нет специальных исследований по изучаемой теме. Это свидетельствует об актуальности данной проблемы в современном каракалпакском языкознании. Проводится анализ употребления устойчивых сравнений данного разряда на материале в каракалпакских народных дастанах.

**Ключевые слова:** сравнения, устойчивые сравнения, семантика, фразеологизмы, лингвокультурология.

#### Введение

Сравнение является древнейшим приёмом познания окружающей действительности, в основе которого лежит сопоставление двух понятий, явлений с целью выявления общего для них признака, что позволяет человеку познать неизвестные реалии за счёт атрибута известного ему предмета либо явления.

Сравнение употребляется для выражения отношений между явлениями, предметами и для обозначения средства воплощения этих отношений.

Сравнение как логический приём определяет отношения между объектами, для обозначения

таких отношений в лингвистике существует термин «подобие».

Сравнения могут передавать мироощущение своих носителей: установки и нравы, устремления и склонности. По-видимому, не случайно сравнения наряду с фразеологизмами приводятся в аспекте выявления культурных констант – составляющих национальной картины мира. Национально-культурная специфика сравнений связана с культурной информацией, хранимой в их внутренней форме.

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Реакции-сравнения, опережающие черты характера (ленивый, как кот, глупый, как курица) в большинстве своем являются идеальными объектами, имеющими несколько иную, чем у физических предметов, природу. Свое отражение в сознании носителей языков они находят путем воздействия на органы чувств опосредованно, через наблюдение за целыми комплексами действий, поступков, высказываний человека. При этом сужаются объективные условия для возникновения ассоциаций в основе сравнения черт характера с объектами реального мира, природных явлений, растений, животных.

Устойчивые сравнения довольно емко отражают мировосприятие говорящего, его национальную культуру, убеждения и верования. (3.48)

Устойчивые сравнения являются особым пластом фразеологии каждого народа. К числу языковых единиц, способствующих более детальному изучению национальной картины мира того или иного народа, безусловно, относятся сравнения. Представляя собой устойчивые структуры с особой внутренней формой, признаками и способами выражения, они являются образным средством, которое позволяет войти в национальную языковую сферу. Устойчивые сравнения являются лексическими единицами языка. Сравнение называют «первым шагом в познании мира». Одной из основных функций любого национального языка считают фиксацию и хранение всего комплекса знаний и представлений данного языкового сообщества о мире. Такое знание является результатом работы коллективного сознания и фиксируется в языке, прежде всего в его лексическом и фразеологическом составе. Устойчивые сравнения признаны одним из самых многочисленных разрядов фразеологических единиц, которые благодаря своему стабильному характеру позволяют передавать ценностную и культурную информацию от поколения к поколению, обеспечивая преемственность этнических представлений. Особенно ярко ценностная картина мира проявляется в сравнениях, субъектом которых является человек.

Профессор С.И.Ройзензон считает, что сравнивая что-то с чем-то на основании какого-либо признака, человек осваивает окружающую его действительность, делает определенную маркировку реалий, дает характеристику. (3:127)

Так человеку проще понять и осмыслить то, что происходит вокруг. Сравнивать можно все: человека, человеческую деятельность, его поведение, мир животных, рыб, птиц, предметы, явления, мысли, чувства, эмоции и т.д.

В процессе активного освоения окружающего мира человек постоянно сравнивает одни предметы и явление с другими,

проводит параллели и выделяет основные и второстепенные признаки. По мнению В.М.Огольцова устойчивые сравнения это готовые языковые единицы. (4:159)

Устойчивые сравнения являются основным и устойчивым пластом фразеологизма.

Многие из устойчивых сравнений всем известны: как слон, как жар-птица, как соловей, как орёл. Их можно назвать «знакомыми незнакомцами», потому что, с одной стороны, они хорошо известны и понятны, а с другой стороны, они очень разные, у большинства из них несколько значений.

Существует две категории образных сравнений:

1. Сравнения индивидуально-творческие или свободные,

2. Сравнения общенародные или устойчивые.

Устойчивые сравнения-это особая система языковых единиц. Эта система характеризуется многообразными и сложными взаимосвязями.

Устойчивые сравнения, которые непосредственно соотносятся с понятием «человек», «человек-птица» в народном дастане «Гулнахар» например: «Перед Гулнахаром, как соловей поет его язык». Кустай көкке енеди.-Как птица, поднимающая ввысь.

В народных дастанах птица является эталоном красоты, нежности и свободы.

Птица орёл является эталоном силы, физической возможности, зоркости и бдительности.

Например:

Бүркіттей пәнже салады.-Нападает как орёл.

2.Ат үстінде бүркіттей,

Пәнже енди урады.

3.Ашбүркіттей талпынып,

Шығалмастауға өрлейсең,

Алатугын арысландай.

Ыңырасаң гүрлейсең. [Дастан «Гулнахар» стр.256]

В древнетюркском языке глагол «бур» обозначает «держат крыльями». Из этого и появилось название птиц Буркит-орёл [1. 42]

Птицы-охотники. Одна из таких птиц "Кыргыз", которая встречается часто в народных дастанах.

Например:

Шымшық қашан қанқырғыйдай,

Қағып алды қолынан.[Дастан «Гулнахар» стр.256 ]

Ещё пример: как жар-птица. Так говорят о красивой девушке, у которой длинные красивые волосы, а также о девушке, которая ходит, шагает, широко и статно.

«Жар-птица» с персидского языка обозначает «маленькое, хрупкое», «красивое, милое» создание.

Например:

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Изиндеги синдилер,  
Тотыдайын таранып,  
Сапарын кырдың тиледи.  
Тоты кустай таранып,  
Хүр кырындай үпилдер,  
Басындағы орамал.[Дастан «Гулнахар» стр.  
260]

Устойчивые сравнения с названиями птиц используются не только для описания внешности человека, но и используются для описания его эмоционально-психологического состояния.

Например: Кеўлиң мысал ушқан кустай-твоя душа свободна, как птица,

Адасқан ғаздай табысып,- как заблудивший гусь.

### Заклучение

В устном народном творчестве образы птиц занимают особое место. Они встречаются в народных сказках, дастанах, народных песнях.

Следует отметить, что исследование семантики устойчивых сравнений с названиями птиц в народных дастанах не только интересно, но и необходимо для дальнейшего развития лингвистики.

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## CHRONOTOP AS AN AESTHETIC CATEGORY

**Abstract:** *The article illustrates the notion of chronotop, its theoretical and methodological basis and nature. The comments are made to the forms and types of art time. The problem of art time, forms, types and methods of art time are jointly studied on scientific and theoretical point of view. Art time is not a glance to the problem of time, but also exposure and description of time itself in art time. Aforesaid problem is thoroughly analysed in this article. Chronotop is being concerned as the literary-aesthetic category in the world literary studies, expressing the scope of the universe interpretation, the author's outlook and imagination regarding the world foundation, defining personages, the composition means of expressing the sequence and duration of the events. A creative comprehension of the chronotop as a means arranging the work composition, structure, and constructing an epic field of the text demands a special approach to understanding the aesthetic character of the work. Since the chronotop includes all the elements of a fictional work, it is impossible to present the plot, composition, conflict, system of characters, feelings and the mood of the characters without the description of the chronotop.*

**Key words:** *chronotop, literary space, the forms of chronotop, lyric type of time, dramatic type of time, epic type of time, chronotop, continuum, chronos, copyright time, plot time, composition time, conflict time, hero time, historical, dramatic, lyric, psychological, biographical, tragic times, denouement time, symbolism of artistic poetical time.*

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### Introduction

Since any category of philosophy has always been a theoretical-methodological basis for all system and types of science the universal categories of space and time, for instance, can be considered the creative-aesthetic categories too. "Each substance, from nature to man, to human behavior and ideas (even abstract notions) has an ability to see time, to read the signs of time flow" [1, 204-205] which is specific to any big poetry word of art. In the following development of the scientific-theoretical thought in the world, the chronotop is accepted to be one of the poetic means to demonstrate the reality as well as to be a literary process that is basic for the expression of the reality in the compositional construction and illustration of the plot relying on the writer's intention and the ideological conception of the literary work. The literary time enables to cognate the literary world

picture created by the author in terms of the descriptive subject and object of the work. Therefore, one of the topical tasks of the modern Uzbek literary studies is to describe a historical evidence, event, the life of outstanding people, the chronology of the near past based on the literary time; on the example of the creative works of a certain period, creators or an individual writer are analyzed in separate or comparative-typological aspect.

The chronotop "is not a look at the problem of time, but it is the time itself, how it is revealed and describe in a work of art. It is not the research of the time conception to be told by this or that author, but the research of this time itself which is more important for understanding the aesthetic nature of literature". [5, 210] As a literary weaving event of a creative work [5, 200] it is directly connected with all features of

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literature, with its images system, its entire poetic structure.

### Problem development status.

Scientific-theoretical problems of the chronotop have been studied in the world literary critical studies by European (H.Meyerhof, A.James, W.Heffernan, A.Rodriguez, .Vukanovićand, L.Grmuša, N.Bemong, P.Borghart, J.Culler, M.Atkins), Russian (M.Bakhtin, D.Likhatchev, N.Gey, N.Shutaya, A.Nikolayev, Z.Turayeva, B.Meylach, E.Meletinskiy, V.Khalizev) and Uzbek (N.Shodiev, Kh.Boltaboev, B.Karimov, E.Abutalieva, A.Tuychiev, D.Quronov, G'.Murodov, A.Nosirov, A.Tuychiev, U.Juraqulov, S.Mirzayeva, K.Qodirov, M.Umarova, U.Karshibaeva, U.Nazarov) scholars.

### Analysis of Subject Matters

These theorists not only have studied the literary time as a scientific-aesthetical problem but also have paid great attention to the interrelationship between the literary time and the literary space. «In literature, the interrelationship of fictionally transferred time and space is named chronotop (time-space) – mentioned M.M. Baxtin – ...Chronotop – the category of meaning and form» [1]. The time in literature is qualified differently by the word of art, it is a time in movement, it is a time system developed creatively and aesthetically. To put it differently, the chronotop as means of literary modeling is a “fourth coordinate” of the literary world, it is considered to express the existence of the literary personage, expression of descriptive subject. The existence of the literary personage is a conceptual time (it is the background of literary events, outside reality modeled in a literary form for a reader). The existence of subject’s description is a perceptual time<sup>1</sup>.

The chronotop depends on creative modeling, genre features of the creative work, literary style, author’s imagination-notions as well as on literature direction in which the work has been created. For this reason, the system of chronotop is distinguished by such diverse features as forms, types, categories, and even by styles derived from the creative-ideas and desires of the author. It might be changeable, conditional and diverse. For the time flow the “model” in a literary work is based on author’s point of view which is a core compositional associative power of time relations in a literary text. Because of this foundation “all changes in a literary piece is collected in the universal line development connected with the general direction of the art of word” [6, 127].

The chronotop being a poetic weaving event of the word of art transforms the time “model” of the world into a chronotop “model”. The form of a

conditional symbolic unit is a discreet attribute of literary world as a chronotop of the creative-aesthetic development, occurrence of a literary event, a form of existence, its creative discovery, a provider of its complete aesthetic perception, organizer of a literary piece, its composition, the time itself in the status of creative aesthetic category to be changed into an important characteristics of a literary image, its revelation and description in the work, a conceptually whole literary –aesthetic system of the “fourth coordinate” of time consisting of diverse harmonious systems subject to change from structurally complicated, many folded short moment, from origin to eternity, from the internal to the external time.

It is true that the chronotop displaying author’s creative individuality in a literary piece of work is a whole system of structurally complicated and mutually diverse systems derived from the ideological-aesthetic conception of a creative work. An aesthetic journey to writes creative intention makes a complete system of the chronotop in the harmony of causative-time relations in the dialect of each form, type, category and style of the time system. An entire poetics of chronotop in a literary piece of work is developed from such complete system of the time relations. The entire system is composed of the forms, types, categories and styles of the chronotop.

**1. Forms of chronotop.** The time relations as a form of continuous change of events and substances are studied by the grammatical category of the verb presented by the Past Tense, the Present Tense and the Future Tense of the Verb. These grammatical categories are also three tense forms of chronotop at the moment. In the world of literature there are also these three times represented by the literary past tense, literary present tense and literary future tense, which in one chronotop layer may pass from the first to the second or to the third ( and vice versa). The mutual dialectic change of time is peculiar to the poetics of a literary piece of work which is a necessity of development from the creative intention of a writer. Such aesthetic necessity, naturally, requires creative activity of the chronotop form. The creative activity of the current chronotop not only determines the specifics of the structure of the fiction, but also connects the present time with the past, or the present time with the future. It does not only represents the creative activity of one of the time forms, but also involves in the embrace of a piece either the present, or the past or the future or has both the past and the future which lies in the “embrace” of the present. It is particular for this reason that the present tense as a governing principle develops a unit of the stylistics and poetics of a literary work (expressions from grammatical forms to the devices of literary

<sup>1</sup> In the perceptual time the existing real objects are placed in a different relation system where animals have intelligence, obtain human features.

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description). Each image, particularly, the leading personages reveal themselves completely in the present tense. From this point of view the present tense has a principle, leading, governing status: it covers in itself all categories and forms of the chronotop. To put it more scientifically, “the present tense is a support pillar of each type of time illusion”. [3, 33; 2, 114-115] The literary-poetic weave of each piece of work is composed of a complicated mixture of time forms and types. In other words, in the poetics of the chronotop the present time is considered nucleus in most of the presentations. “In the language of science it is expressed as such: in the present time we encounter with the treads of the past time and hints of the future time. But this very present time, truly, is reality because it is just such how it is now”. [4, 243] It is true that in a big epic work the literary present time as the grammatical present tense does not only expands the border being described, but also provides a continuous compositional harmony of causative-time development of the line of the plot and events as well as determines the relations of the past and future with the present at the same moment. Just like the past, present and future tense mixing with the forms of the past, present, future tense forms it creates its complicated synthetic “landscape”.

Of course, each literary work has its own literary poetic time. It is natural that in lyrics the present tense, in prose or in playwriting one of the forms of tense plays a priority role. But there are such lyric-epic, prose, playwriting works they are composed of the syntheses of diverse forms of chronotop of poetics. In the big epic works all three forms of the chronotop organizes an entire epic time in the dialectics of causative-time relations.

Creating independent, complicated whole unit of the world of creative time such dialectics of the time forms present themselves through subject’s wishes as the intentions of an author. Regardless of what kind of work an author creates, about what period or whom he writes, he approaches them all from the heights of his time. Such a position in the creation of a man of art is reasoned by the existence of the elements of the present tense determining the chronotop poetics. Moreover, such position makes the spirit of the entire work “modernized”, it means in the materials of the past and that of the future an author seeks literary answers to the important present day questions which might settle the destiny, fate of mankind.

The grammatical categories of the verb composed of three verbal tenses are the universal, absolute forms of time. In the material world they form a unit, have definite limits. But in the world of literary fiction these limits are relative. In this sense the world of art has its times and tenses. Only they are not absolute, but relative. A master of literature creates his own world of chronotop driving from his creative-aesthetic intention, from specifics of work’s genre and idea-literary conception. In this world the

present tense remains as a root-nucleus time in any case. For it saves in its “embrace” both the past and the future tense. The chronotop forms are a *complicated universal complete system* determined by causative – time relations of the past and future tenses around the nucleus of this very present tense.

**2. Types of chronotop** are based on different types and genres of the art of word. For they are connected directly with literary types (genres) presented by a lyric type of time, a dramatic type of time and an epic type of time.

The lyric type of time forms the basis of time poetics of lyric and lyric-epic genres and is distinguished by its too much conditionality. It is a free address to the lyric chronotop which covers from a blink of seconds to limitless eternity which exists outside of the time. In the lyric poetry the complicated mixture of time layers depends on the nature of coverage. Such interweave of time takes a poetic form in the content of past and future, the future and present, the present- future and present, the present and future. But in lyrics there may not be an absolute image of time.

**The lyric time** is the time of feelings of a lyric personage, the time of expressing his hearts and souls, in a blink of seconds flooded by emotional, tender feelings.

In lyrics, as usual, the time aspect of the literary world is relatively developed. In it the distance between a poet and a personage is not only minimally short but in the lyric poetry this distance is almost zero: the poet and the lyric heroic “person” become united. And this natural harmony – the harmony of feeling and thought grows into a an emotional time out of the tense, not sensed or recognized by the tense having turned out to be the time of a lyric personage of the poet’s lyric time. This time marks the waves of feelings and foams of showering passion which pass in a moment of seconds - the time of landscapes wheeling inside the so called heart which would harmonize not only in the coordination of the present, past and future tenses, but also the image of conditional-symbolic images of the lyric time and lyric space become united fully in the poetry. Thus, the conditional-symbolic time of a poet and a lyric personage presents a lyric poetic time status. Such a time dynamics in a poetic text is created on the account of the grammatical tense of the verb. In all cases the lyric time is mostly conditional, very often it might be even abstract.

**A dramatic type of time** is distinguished by its conditional feature. The conditionality is characterized by its connection with the dialogue which “proceeds” at the time of the theater-watchers and those of the personages – participants of the scene as it is mainly intended for the scene of the drama theater. Of course, each play-writer has his own chronotop image. But for all of them the common character of the chronotop conditionality always

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remains unchanged: no matter how important role the scenes might play in a playwriting piece, how little the event might be described, how it might be separated into little scenes, speeches (dialogues) of personages pronounced with a loud voice remains as a closed time of the drama and depends on the text of their internal speech.

**An epic type of time.** The epic types of the chronotop are often addressed freely: their epic time is many-folded, large scoped, thick, urgent (tens of real years could be passed fast within ten days or in a blink of eyes), complicated, even, interesting. For example, they are observed in novels, specifically in epic prose pieces. Very often the genre-compositional specifics of a big epic prose work depend on literary expression of events' time scope being described. "The chronotop is considered a development category of events, and first of all, appears in a specific order of events". [7, 54] Here it depends whether the content weight of time is consistent with the order of plot events of the description procedure. In cases when they are inconsistent the different forms of time( past, today, tomorrow) types (dramatic, lyric, epic) as well as categories (psychological, biographic, lyric, background time) and etc intertwined with each other, in the description the time layers which pass from one plane to the other, combine and melt with each other. The epic coverage provides an opportunity for literary research of the whole period and actions. The very epic of the content consists of diverse tense activities and reveals itself in syntheses of different time forms. The requirement of novel and epic genres, the literary construction principle of time forms being a means of expanding the limits of time and space of a book are composed of one or several novels including dialogues, trilogies, and epopees which organize the structure of the complicated poetic time.

The time in epic works, for example, the time of a novel and historical time are direct forms of the description. They reflect mainly two types of the epic time in the historical time content. **The first type** is people's struggle and fate for centuries which reflect the literary epic struggle and fate of the people depicted, developed in the form of novels. They cover large and complicated layers of the epic historical time. **The second type** is an epic work which describes a comparatively short historical period. Though the period (time) coverage is limited historically, but in this relatively short time personages' entire destiny paths are literalized. Thus, the poetic time of the epic works, though their coverage possess different and diverse tenses, remains as an epic time composed of different layers of chronotop, synthesized forms of complicated styles, types and categories, their dialectical mixture.

No matter to what literary type of genre the literary work might belong; it is based on its type of chronotop . Though the types are firmly "limited" by forms and genres, they can not be limited by the circle of one type only as required by aesthetic laws driven from essence of conditionality and universality of the chronotop poetics. The peculiarities of lyric type of time may penetrate into the structure of the remaining two types of chronotop poetics, and vice versa, the specifics of dramatic and epic types may enrich the structure of the lyric type ( for example, in lyric works). Thus, it becomes clear though the types of chronotop are autonomous, they are mutually interdependent in the causative time dialectics, they enrich creatively each other's content, that the chronotop is conceptually a whole unit, its internal structure is absolutely conditional as those of all time forms, categories and styles, that they may penetrate into each others content in the universal poetics of a creative work based on the author's creative intention, and that it is a universal law for epic time of poetics.

**3. Categories of chronotop.** For sure, dividing the universally whole chronotop unit into certain categories is absolutely conditional. Since each of all poetic categories of time appears rarely in the context of common plot time in a pure form. The reason is that in the frame work of one separate time category there may be other categories too. It is for this reason in the chronotop system there is no conditional and abstract category in a certain sense, but at the same time, clear, concrete,, complicated and colorful aesthetic event like those of the categories of chronotop . The clear-concreteness of the category depends, **first**, on the type and genre of the literary work, **second**, on traditional classic theory of universality of the plot, composition, character, and conflict of the whole common poetics, **third**, on creative individuality of the writer or a poet, his/her literary style. The conditionality and abstractness of the categories, in certain meaning, are connected with conditionality of the chronotop . The limit of the categories by quantity but clarity and concreteness in quality, their literary emergent effectiveness, attractiveness by meaning and aesthetics, multi-meaning by structural content require their research based on universality and individuality, generalization of analysis and theory. The most important categories of the system, for example, include such *diverse chronicles*<sup>2</sup> as *author's time, plot time, time in composition, conflict time, personage's time, historical, dramatic, lyric, psychological, biographic, tragic, solution time, symbolic time of literary poetics*. All this is enough foundation for proving that the uniqueness of the chronotop is presented by a whole aesthetic system.

In the chronotop system the presentation of time and space – chronicle has a separate status. The fourth

<sup>2</sup> Chronos – means time in Greek



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dimension of the chronotop drives from the dialect of time (tense) and space. In the intertwining of space and time, **first of all**, the time can not exist separately from material changes. **Second**, there is no material system and process which does not change and continue from past into future. **Third**, the unity of space and time develop in action. **Forth**, in the common features of time, in the relation of space and movement of the substance there exist length, asymmetry, non-recurrence, non-circulation, continuity, dependence on structural relations. [8, 235] That’s why according to the theory of relativity out of four dimensions the three of them are applied in geometry in examining physic events, the time is accepted as the forth dimension. In science they are called a four dimensional continuity which is applied to the literary world too. It means that the chronotop is a “fourth coordinator” of the literary world.

The chronotop like the literary space is an inseparable constituent of the literary world depicted in a creative work. The literary space is dynamically active because it creates an environment for movement, for development. The chronotop is

followed by a literary space. Thus, time and space combine so in movement forming the time-space continuity of the personages. In literature such method of interpretation of chronotop and space is named chronotop by M.M.Bakhtin, which is driven from Greek “chono”- time + toros – space; to put it word for word it means space - time. [2,376]

**4. Methods of chronotop.** Both the classic forms and types of the chronotop as specific individual categories and literary-aesthetic styles and devices reveal themselves in a from of generalized harmony. Surely, this discovery depends, first of all, on the theme and conception of the literary work, author’s creative intention, individual skills and specifics of his literary styles. The close connection of the chronotop categories, first of all, with its plot time and composition, provides creative aesthetic revelation of the work in an entire chronotop system. The **retrospection** (returning the time to the past), **prospection** (direction of the time towards future), inversion of time, time parallelism, time contrast, static time, open and close times, (solution time) and others belong to the styles of time.

**Table 1.**

Discourse	Genre exemplifications	Chronotope	Voice
Outside-in.	Epic, lyric, tragedy.	Distance between author and hero, self and other. Hero as static and/or undergoes fixed changes in time.	Singular and controlling of hero.
Inside-out.	Parody, irony, novel.	Closeness between author and hero. Time as full of potential and uncertainty.	Multiple and less in control of hero.

**Conclusion**

It became well known that the modeling of novel’s chronotop is a an entirely complicated system composed of multi-layers, harmonization, continuity and succession of different types and forms of chronos. The continuity of the chronotop, chronologic succession, breaking of this succession, free movement of time, return to the back (time inversion), retrospective and prospective flows, rapid or slow change of rhythm, its moving out of limits, literary breakage of natural flows of time, harmony of time and space, chronotop as an imaginary model of the

literary world present a new scientific theoretical paradigms and complicated system of the chronotop . The complete content of the chronotop is composed of all forms and aesthetics of author’s creative intention, types, categories and their specific methods, at the same time, the harmony and dialect of their relationships. The entire poetics of the chronotop of fiction is formed by this complete system being a traditional **universal time system** common for the chronos. From this view point it is possible to call the chronotop “**a quintessence of chronoses**”.

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## EXPERIMENTAL STUDY OF TENSILE FAILURE OF THE STEEL SPECIMEN

**Abstract:** The results of experimental tensile testing of round steel specimens were presented in the article. The dependence of load change on the specimen elongation was obtained. The structure of the specimen material in the failure zone was studied.

**Key words:** the specimen, tensile testing, failure, load, material.

**Language:** English

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### Introduction

During tensile testing, the metal specimen [1] of the certain shape is fixed with grip sections into the

grips of the testing machine and is subjected to continuous, smooth deformation until failure. The stages of material deformation during tensile are

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displayed on the tensile diagrams, which present the dependence of applied load on the elongation value of the "reduced" section of the specimen. The mechanical properties of material during tensile are calculated based on this dependence.

Currently, the large number of studies (theoretical and practical) have been conducted on this topic [2-10]. Elastic limit, yield strength and tensile strength of materials with different carbon content were determined. The volumetric deformed state of the round and flat specimens during tensile was obtained by the computer simulation. The process of materials tension at different loading rates of the specimens was described.

On the example of tensile study of the several steel specimens with low loading rate, it is possible to determine the error in calculating the mechanical properties by mathematical processing the obtained

experimental data and observing the process of material failure.

### Materials and methods

Tensile testing of the round steel specimens was performed three times for obtaining the average values of the mechanical properties of material and predicting the failure zone of the specimen. Three round specimens were made of Fe37-3FN steel (EN). The specimens before testing had the following dimensions: the overall specimen length – 43 mm, the diameter of the "reduced" section of the specimen – 3.8 mm, the length of the "reduced" section of the specimen – 27 mm, the length of the grip section of the specimen – 8 mm, the diameter of the grip section of the specimen – 8.7 mm, the radius at the base of the grip section – 2 mm. The round specimens for performing tensile testing are presented in the Fig. 1.



Figure 1 – The specimens for performing tensile testing.

Tensile testing was performed on the "TM-20" special testing machine. The machine is designed for testing the specimens made of various materials for tensile, compression, shear and bending. The main technical characteristics of the machine:

- maximum force developed by the machine – 20 kN;
- the maximum stroke of the movable frame (the support) – 38 mm;
- the measurement range of displacement of the movable support – 0...20 mm;
- the scale factor of meter of displacements of the movable frame (the support) – 0.01 mm;
- the dimensions of the upper workspace in the "tensile" zone – not less than 35 mm;
- the dimensions of the lower workspace in the "compression" zone – not less than 51 mm;
- the machine length – 320±20 mm;
- the machine width – 320±20 mm;
- the machine height – 550±20 mm;
- average time until failure – not less than 500 hours;
- the weight – no more than 30 kg.

The general view of the testing machine is presented in the Fig. 2. The upper and lower devices for setting the round specimen into the machine are presented in the Fig. 3.

On the base 1 of the machine there are the column 3 and the transport handles 2 for carrying. The elastic element 5 of the force-measuring device is placed on the fixed beam 4. The upper grip 7 is mounted on the movable support 6 for testing. Vertical displacement of the support 6 relative to the column 3 is carried out using the screw jack 8 (rotation of the handwheel 15). Two working zones are formed between the fixed beam 4 and the support 6: *U* (upper) – for tensile and shear testing and *L* (lower) – for compression and bending testing. The devices intended for relevant testing are installed in these zones. The lower zone during the compression and bending tests of the specimens made of brittle and low-plastic materials is closed by the transparent protective screens 9 installed on the clip 14. The displacement sensor 10, connected to the support 6 by the rod 11 through the spring-loaded rocker 12, is installed on the back of the column 3 for measuring displacements of the support 6. The strain gauges are pasted on the elastic element 5 for measuring strain. Visual control of the test specimen 17 is carried out using the video camera 18 mounted on the post 13. The signal from the displacement sensor 10, the elastic element 5 and the video camera 18 is transmitted and processed to the electronic information unit installed in the lower part of the column 3, which has the USB port for connecting to the personal computer 16. The

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information about the testing process is provided in the graphical form using the special software. The

devices 19 and 20 are used for bending and compression testing, respectively.

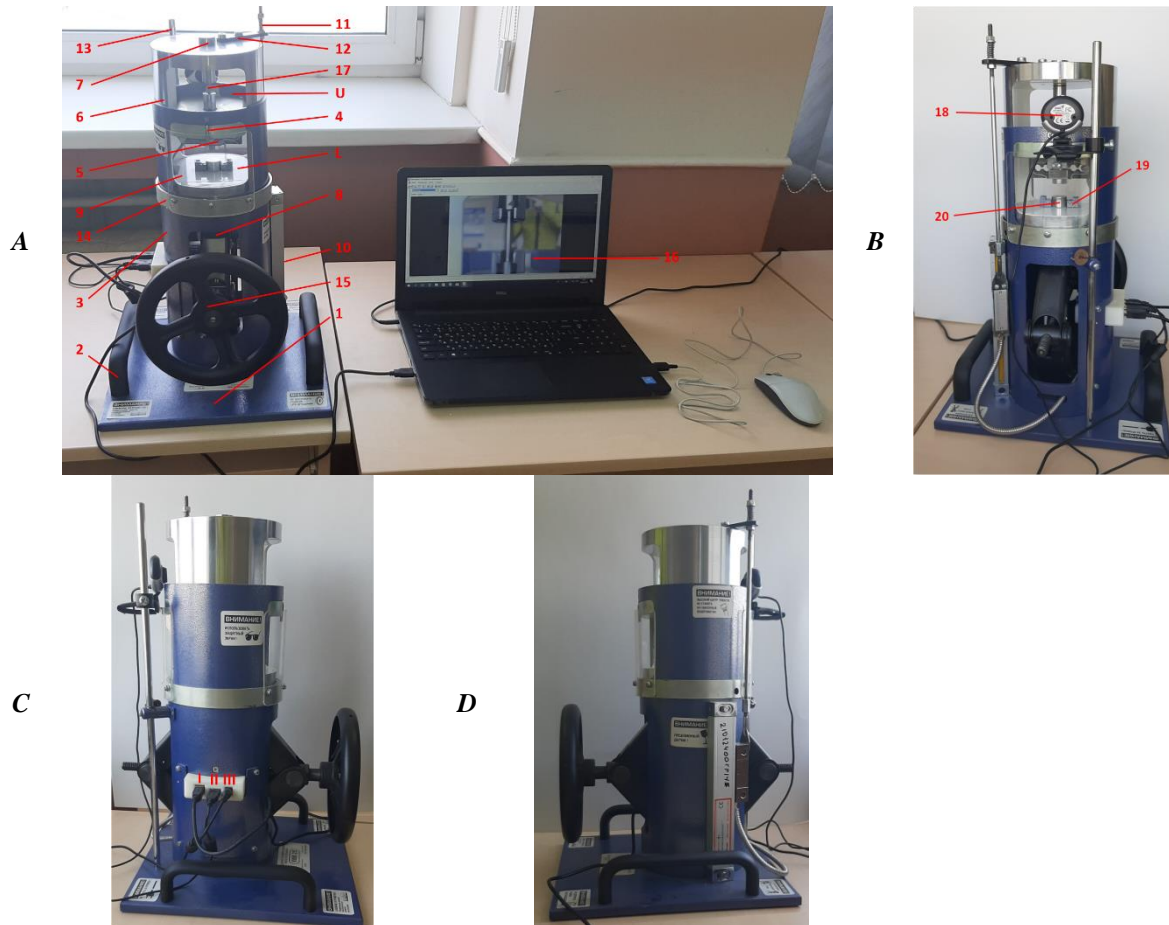


Figure 2 – The equipment for carrying out tensile testing: A – the front view of the "TM-20" testing machine and the computer; B – the rear view of the "TM-20" testing machine; C and D – the side views of the "TM-20" testing machine. I – the USB input for the data transfer to the computer, II – the USB input for turning on the video camera, III – the USB input for turning on the machine.



Figure 3 – The upper (left) and lower (right) devices for tensile testing of the round specimens.

The lower device for tensile of the specimens is fixed on the machine by means of the special metal ramrod. Tensile was performed until failure of the cross-section of the steel specimen.

**Results and discussion**

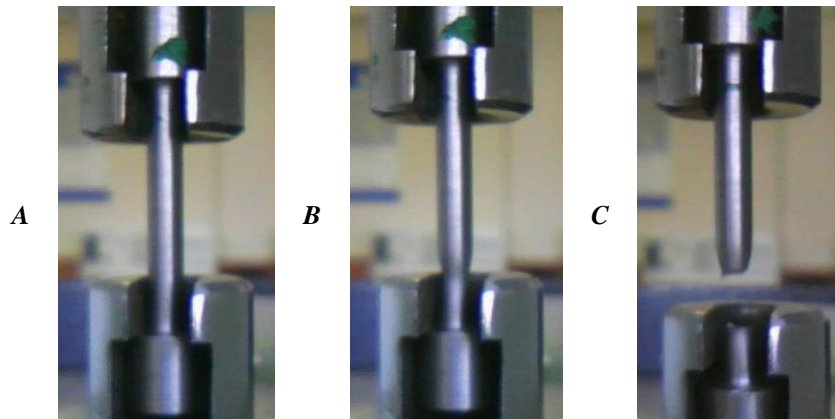
The steel specimen was subjected to constantly increasing load. In this case, the specimen lengthens, and the cross-section decreases. The neck (narrowing) appears on the "reduced" section of the specimen,

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which determines the failure zone. Failure occurs approximately at the distance of  $\frac{1}{4}$  of the "reduced" section of the specimen.

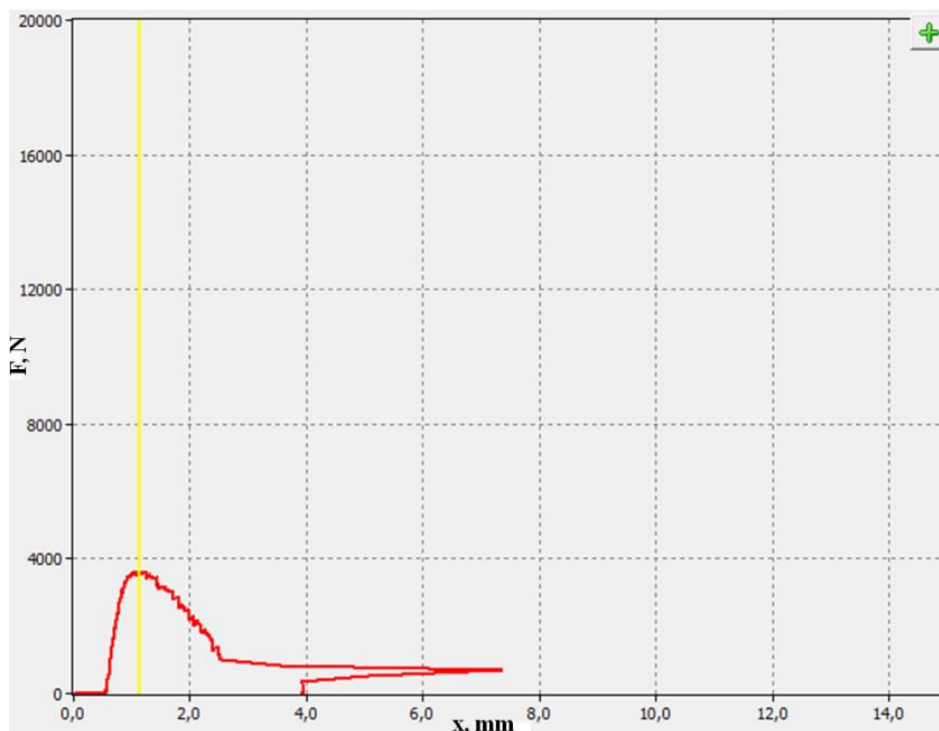
The tensile testing process of the round specimens is presented in the Fig. 4.



**Figure 4 – Performing tensile testing of the first specimen: A – loading the specimen; B – the neck formation on the "reduced" section of the specimen; C – failure of the specimen.**

Deformations in material are presented on the specimen tensile diagram. The following stages can be highlighted on the graph: displacement by 0.56 mm in absence of load is the backlash elimination in the machine mechanism; displacement from 0.56 mm to 0.9 mm at maximum load of 3312 N is the elastic zone (reversible deformations of material); displacement from 0.9 mm to 1.13 mm at maximum load of 3624.11

N is the yield zone (the specimen elongation without increasing applied load); displacement from 1.13 mm to 2.6 mm at decreasing load to 1007.09 N is the softening zone (the neck formation and subsequent failure of the specimen). The dependence of applied force on the specimen elongation is presented in the Fig. 5.



**Figure 5 – The dependence of applied force on the specimen elongation.**

Tensile of three identical round specimens showed that maximum tensile load, which leads to resistance of material, changes by average of 22 N. The round specimens after tensile testing are

presented in the Fig. 6. The necks diameters of the specimens were measured after failure:

- the first specimen – 2.6 mm;
- the second specimen – 2.5 mm;

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- the third specimen – 2.8 mm.

Thus, the predicted diameter of the steel specimen at which failure occurs is  $(0.65...0.73)d_0$ ,

where  $d_0$  is the initial diameter of the "reduced" section of the specimen, mm.



Figure 6 – The specimens after testing.

The material structure of the destroyed specimen and the material structure before testing are presented in the Fig. 7. The images of the material structure (100x magnification) were obtained using the 4XB metallographic microscope. Since the specimens were made on the lathe, it is possible to compare the

macrostructure of material after machining and plastic deformation. The marks of the different depth are formed on the surface of the specimen from the cutting tool after machining. The steel specimen has the granular structure after cold plastic deformation.

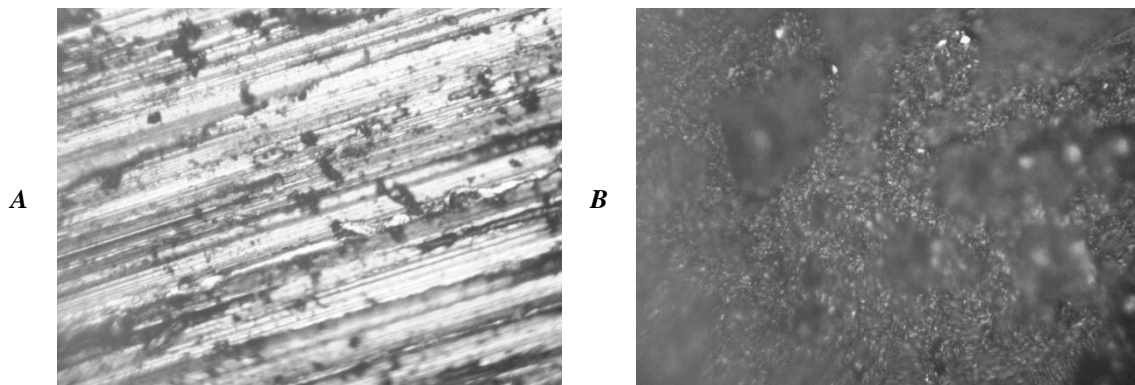


Figure 7 – The structure of the specimen material before testing (A) and in the failure zone (B).

### Conclusion

Failure of material occurs at elongation of the short round steel specimen by 6%. For the similar sections of the machine parts, it is recommended to

apply the calculated dependencies of  $0.65d_0...0.73d_0$ , at which material failure occurs. The granular structure, which indicates material strength, is formed on fracture of the specimen.

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## ALISHER NAVOI'S VIEWS ON COMPARATIVE LINGUISTICS

**Abstract:** Navoi made a great contribution to the development of comparative linguistics. His work "Muhokamat-ul lugatain" was devoted to the comparison of unrelated languages, but this side of the work of the poet and thinker is still insufficiently studied. This article covers this problem.

**Key words:** General linguistics; historical and comparative method; comparative method; comparative studies; related languages; classification of languages.

**Language:** English

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### Introduction

The comparative-historical or historical-comparative method opened a new direction in the study of the history of languages and since then has served much for the benefit of science. The historical-comparative method is considered one of the main methods in the science of linguistics. Linguistics as a science is based on the historical comparison method, but for a more direct connection between philologists and linguists, a comparative method is very necessary. Philology itself does not have the ability to make historical comparisons. The main weapon of linguists when studying the history of a language, when comparing, is juxtaposition .1

In all scientific literature, it is noted that comparative studies entered linguistics at the beginning of the XIX century. and it is indicated that the founders of this science were F. BOPP, R. Rask, J. Grimm and A. H. Vostokov, but Eastern linguistics is not taken into account here, because although the method of comparison appeared in the XIX century, the first to use this method was a scientist who lived in the XI century - Mahmud Kashgari. He used this method in the description of related Turkic languages. One of the most famous scientists and specialists in Turkic Philology N. A. Baskakov writes about him: "the Pioneer in the application of historical and comparative method in the study of Turkic languages was Mahmud Kashgari»2. Mahmud Kashgari in his work "Devon Lu-gotit Turk" uses the historical and

comparative method of comparison in the study of dialects of the Turkic languages belonging to the same family.

In Europe, the first work on the relationship of related languages appears in 1538, its author is the French humanist Gwilelma Postelusa. In his work "Kinship of languages", the author attempted to classify related languages3.

Alisher Navoi was one of the first who raised the Turkic language to the level of a literary language, to the heights where the Arabic and Persian languages were located. He knew two languages equally well: Persian and Turkic, and this is especially important for comparing different languages. Alisher Navoi himself gave himself such a high, but fair assessment: "No one knows Turkic and Persian as well as I do", which is why he was also called "Zu-l-lisonain", especially since Alisher Navoi wrote his works in both the Turkic and Persian languages.

In 1499, Alisher Navoi was the first in the world to compare unrelated languages, that is, to compare languages belonging to different language families. He compares the old Uzbek language belonging to the Turkic language family with the Persian language belonging to the Indo-European family. The name of this work by Alisher Navoi is "Muhokamat-ul lugatain". the phonological, lexical and grammatical aspects of languages are the basis of comparison in it.

In the European world, such a work appeared 100 years after the work of Alisher Navoi. It was the

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work of the Dutch scholar Joseph Justus Scaliger, created in 1599. It was called "Reflections on the language of Europeans" and attempted to describe and classify all European languages. The scientist divides them into 11 main groups - 4 large and 7 small<sup>3</sup>.

Navoi in his work "Muhokamat-ul lugatain" for the first time gives a classification of the world's languages: "There are so many types of words (language) that it is impossible to describe and classify them all. If stated without exaggeration and as briefly as possible, they are divided into 72 languages of 72 peoples, but there are even more of them. The number of languages is equal to how many countries there are in the seven corners of the world, how many cities, towns, villages and villages in each country, how many groups of people on each mountain, on each island and on the banks of rivers. The language of each group, each society is different from the language of each other group, society, they differ from each other in many features and aspects, this difference is not present in other languages."<sup>4</sup>

In the same work, Navoi examines the movements of birds and animals, and emphasizes that the sounds produced by animals and the singing of birds are not a language.

Navoi examines in detail the origin of languages and their classification: "Then there are three types of languages that are real and most revered, they are like a precious stone, the dignity of each of them is great. They are the origin of the real Turkic, Persian, and Indian languages... " - that is, there are three languages that are the basis of all languages, and each of these languages corresponds to the speakers. From these languages there are a lot of other languages. But while recognizing Turkic and Hindi as the basis for the emergence of other languages<sup>5</sup>, he divides all languages into three families and notes that all languages are descended from Turkic, Persian, and Hindi. As can be seen from the above, the classification of Alisher Navoi corresponds to the modern classification. However, the only drawback of this classification is that Persian and Hindi belong to different language families according to this classification. The reason for this is that the difference between Persian and Hindi is quite large.

Alisher Navoi correctly identified the Turkic languages as a separate family, which corresponds to the modern Altaic theory. This classification of languages by Alisher Navoi testifies to the vastness and thoroughness of his knowledge in the field of linguistics.

The absolute high value of this work attracted the attention of scientists all over the world and caused its multiple editions and translations:

1. in 1841, the famous orientalist published "Muhokamat-ul Lugatain". This work is kept in The national library in Paris.

2. In 1882 and in 1902 in the town of Bakhchisarai.

3. In 1897 in Istanbul Ahmed Javadom.

4. December 16, 1917 in Kokand Ashurali Zahiri publishes lithographic method.

5. In 1925-1926 in Ashgabat.

6. In 1903-1908 years in Astrakhan.

7. In 1940 in Tashkent, Usman, O. and P. by Shamsieva

8. in 1948 in Tashkent by Aibek and p. Shamsiev.

9. In 1964 in France.

10. In 1966 in Leiden in English Deveriam.

11. in 1967 in Tashkent by P. Shamsiev.

When studying this work from the point of view of linguistics, it was the English edition that was of great help. When studying the languages compared by Alisher Navoi, all dictionaries created in the Uzbek language were used. However, during the scientific study of 211 words and phrases, difficulties arose, the meanings of some words did not coincide with the meanings of the same words in dictionaries created by Uzbek scientists. This gave rise to an appeal to the English edition, that is, to "Judgment of the two Languages". The problem was solved.

"Judgment of the two Languages" consists of three parts. 1 part Introduction-introduction. consists of 12 pages part 2 - English translation of "Muhakamat - ul Lagutin", part 3-copy of the original "Muhakamat - ul Lagutin" written in Arabic alphabet.

In France, Robert Devereux presents his thoughts in English. In particular, he writes that Navoi was born in a family of Turkic aristocrats: "He was by birth Amir (or beg), hence the Mir before his personal name", - he was born Emir-Bek, so before his name is written "Mir". Deverex further writes that "The description is certainly appropriate as far as it goes, for Navai was famous as a patron of the arts and a mentor and supporter of literary talent of whatever nature", that is, he tells that Alisher Navoi was the owner of a powerful talent that manifested itself in literature, art, and government activities.

In the second part of the work, the main content of the work is given, and in it we found those words whose meanings or translation were incorrect in Uzbek sources. For example 'yorgachi' - in Uzbek dictionaries is interpreted as the name of a profession or action, but in the English edition the correct meaning of this word is given: 'yorgachi' - ('yurgachi-horseman') - horseman; for example, another word, 'kemachi' is given in Uzbek dictionaries as a shipbuilder, but in English - 'kemachi'

- ('kamachi-sailor') - sailor; 'kozchi' - in Uzbek - 'one who cares for geese', and in English-'kozchi' ('gazchi - hunter of geese')

- 'geese hunter'. The above examples show that the study of the English edition of the work of Alisher Navoi is of great importance. Only the study of all the editions of "Muhakamat - ul Lu-gatein" can give a complete picture about this product.

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	<b>JIF = 1.500</b>	<b>SJIF (Morocco) = 5.667</b>	<b>OAJI (USA) = 0.350</b>

The scientific discovery of Alisher Navoi is still of great scientific and theoretical significance, and it has not lost its value to this day.

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## STYLISTIC USAGE OF UZBEK PHRASEOLOGY: IMPORTANCE FOR SPEECH CULTURE LEARNING

**Abstract:** The article discusses the importance and necessity of studying stylistic potential of the Uzbek phraseology while teaching students of philology speech culture patterns. Expressive abilities of phraseology in the Uzbek language are also analyzed.

**Key words:** Uzbek language; stylistic potential; stylistic phraseology; functional styles; speech culture; expressive possibilities oral and written speech.

**Language:** English

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### Introduction

The stylistic diversity of our speech, its persuasiveness is created not only by individual words, but also by stable ones expressions - phrases-phraseological units. Phraseological units occupy a special place in the development of each language. Their skillful use opens up opportunities to enhance the expressiveness, emotionality, brightness and transparency of speech. According to their stylistic functions, nouns, adjectives, numerals, pronouns, and verb forms are a source of expressiveness in the description of an artistic or journalistic text. At the same time, phraseological units also acquire special significance for artistic description.

Phraseology combines complex language units that have a stable character. Phraseological units in the Uzbek language are referred to as iboralar or xalq iborolari. Phraseological units are most often used in a figurative sense. Phraseological units are equal in meaning to one word. In the process of speech, we can use a ready-made unit without creating a phrase. For example: boshi osmonda (happy), tarvuzi q'ltig'idan tushgan (sad), qadamidan o't chaqnagan (fast, agile).

Phraseological units are characterized by constancy of their composition. In free phrases, one word can be replaced by another, but in stable expressions this is not possible. In addition, most phraseological units have a strictly fixed word order.

Phraseological means of language, as well as vocabulary, have their own specific color. Author of the book "Rhetoric: learn to speak correctly and beautifully" I. B. Golub, analyzing the stylistic use of phraseological units in the Russian language, believes that the largest layer is colloquial phraseology (without a week, in all Ivanovo, you can not spill water), it is used mainly in oral communication and in artistic speech. Close to the spoken colloquial phraseology more reduced, often constituting a violation of literary language norms (the right brain, chatter in the middle of nowhere, tear the throat, the nose up) [3, p. 118]. The stylistic diversity of our speech, its persuasiveness is created not only by individual words, but also by stable ones expressions - phrases-phraseological units. Phraseological units occupy a special place in the development of each language. Their skillful use opens up opportunities to enhance the expressiveness, emotionality, brightness and transparency of speech. According to their stylistic functions, nouns, adjectives, numerals, pronouns, and verb forms are a source of expressiveness in the description of an artistic or journalistic text. At the same time, phraseological units also acquire special significance for artistic description.

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In the next group, the author identifies a different stylistic layer - K n I W n u y phraseology, which is used in the book style, mainly in writing (to put into operation, give evidence, effective demand, to pass away) [3, p.118].

Phraseological units can also be commonly used, which are used in both book and colloquial speech. For example: make an impact, have a meaning, keep in mind, make an impression, keep your word [1, p. 62].

Modern researchers believe that phraseology is very rich and diverse in its composition, has great stylistic capabilities due to its internal properties, which make up the specifics of phraseological units. This is semantic capacity, emotional and expressive coloring, and a variety of associative connections [2, p. 213].

Analyzing the use of phraseological units in various functional styles, it should be noted that phraseological units have their own special ways of expressing the speaker's thoughts. Both in oral and written speech, phraseological units are used to make speech emotional and expressive, and their stylistic capabilities also contribute to enhancing the content and attractiveness of speech. The expression of the emotional, subjective beginning in speech, evaluation, and semantic richness of phraseology act constantly, regardless of the speaker's will.

The expressive possibilities of phraseological units of the Uzbek language, its stylistic coloring and imagery enrich the speeches and style of speakers and writers.

The author of the textbook "Ona tili" ("Native language") M. A. Khamraev identifies the following

semantic features of phraseological units: synonymy of phraseological units, antonymy of phraseological units, polysemy and homonymy of phraseological units [6, p. 32]. Using phraseological synonyms, you can express the same idea. As in other languages, phraseological units often form synonymous rows in Uzbek. For example:

yegani oldida yemagani ketida Bo'lmoq, pichogi moy ustida Bo'lmoq, eshigini el ochib, el yopadi-live in a big way, live on a master's foot, live on a big foot; oyog'ini q'liga olib yugurmoq, oyog'i yerga tegmay yugurmoq-run without feeling your feet under you;

o pkasi og ziga tiqilgandek yugurmoq, ura qochib qolmoq - to run headlong;

miyig'ida ish bajarmoq, xamirdan qil Sug'urgandek ish bajarmoq - without a hitch, without a hitch, etc.

Phraseological antonyms are not often found in our speech. We can say that antonymic relations in phraseology are less developed than synonymous ones. For the speaker, phraseological antonyms are of particular interest, and the use of such phraseological antonyms enlivens the speaker's speech. For example:

yerga urmoq - ko'kkka ko'tarmoq  
(to throw mud - to extol to the heavens).

It is impossible to consider all the stylistic features of phraseological units in one article, so we have focused only on some expressive features of phraseological units.

The authors of the textbook "Culture of Russian speech" in the section "Lexical and phraseological norm" recommend a number of tasks that help students to distinguish between lexical and phraseological norms and correctly use phraseological units. For example, it is proposed to make sentences with the suggested phrases, determine the meanings of the selected words and phrases, distribute them into thematic groups, and evaluate the correctness of their use in the given sentences [4, p.22-29].

Analyzing the methodology of modern authors, we can recommend students a number of tasks on phraseological units. Such tasks will help you correctly distinguish the stylistic possibilities of phraseological units and will help to consolidate knowledge on this topic. For example, the following tasks and recommendations will be very useful for students in teaching speech culture: comment on the use of phraseological units in different statements; justify your choice of the proposed phraseological units when composing a text with a specific task or in presentations, essays; choose and justify the correct variants of phraseological units in the description of a specific situation; explain the semantic differences of phraseological units; edit the proposed texts, replace words with phraseological units in the texts, continue the texts using phraseological units from the proposed options, and so on.

Phraseological units as a layer of speech require special attention, so you need to carefully study all its

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features. It is also very important to know its stylistic potential. Working on texts, enriching your vocabulary, reading fiction, watching feature films, knowing aphorisms, Proverbs, sayings, stable expressions and idioms, constantly working on

improving oral and written speech, preparing public speeches will help students correctly use phraseological units in preparing their public speeches.

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## FINANCIAL ANALYSIS WITH THE APPLICATION OF IFRS

**Abstract:** The analysis of financial statements according to national accounting standards and international financial reporting standards was carried out, and it was concluded that methodological approaches should be adjusted when conducting financial analysis. At the same time, the reasons for differences between national accounting standards of Uzbekistan and international accounting are identified.

**Key words:** accounting, auditing, fixed assets, tangible assets, depreciation, inventory, international standards. National accounting standards, IFRS, analysis, accounting, reporting, audit.

**Language:** English

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### Introduction

The integration of business entities into the global economic system, along with legal, technical, technological and logistical issues, also raises the problem of providing financial information in the form of accounting statements for managers of enterprises and organizations. Current international financial reporting standards (IFRS) require disclosure of information such as clarity, relevance, comparability and reliability, as well as the publicity of reporting data.

The processes of improving the accounting and financial reporting system in the Republic of Uzbekistan and their convergence with IFRS are aimed at generating better information about the financial condition and financial results of economic entities.

The purpose of analyzing financial statements prepared in accordance with IFRS is to obtain key characteristics of the company's financial condition and financial results for making optimal management decisions by various users of information.

The main objectives of the analysis of financial statements prepared in accordance with IFRS are the following

✓ objective comprehensive assessment of the financial condition;

- ✓ evaluating the effectiveness of cash flow management;
- ✓ liquidity and solvency analysis;
- ✓ revenue, expense and profit analysis;
- ✓ analysis of the level and dynamics of business activity indicators;
- ✓ evaluating the effectiveness of the dividend policy and the use of net profit;
- ✓ analysis of the level and dynamics of profitability indicators;
- ✓ identify and quantify the impact of factors on business performance;
- ✓ justification of the investment policy for attracting (placing) capital;
- ✓ development of alternative options for optimal management decisions aimed at strategic improvement of business efficiency;
- ✓ comprehensive study of the composition and dynamics of financial sources of capital and liabilities, assessment of the optimal financial structure.

Analysis of the financial statements of an economic entity begins with an analysis of the principles underlying the formation of its indicators. Certain (sometimes significant) differences in the provisions of the National Accounting Standards and IFRS lead to the need to adjust the methodological approaches when conducting the analysis. Understanding the differences between national and

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international accounting standards is an essential part of analyzing financial statements. When analyzing reports compiled in accordance with international standards, one should take into account not only its difference from the BMS in terms of requirements, but also the reasons for these differences.

Differences between IFRS and BMS are mainly manifested in the measurement, recognition, and reporting of certain types of assets, capital, liabilities, income, expenses, cash and capital flows, and certain business transactions.

A lot of problems arise in terms of using the international terminology base due to different interpretations and identification of individual indicators of financial statements, including linguistic difficulties.

In the process of analyzing international financial statements, it is necessary to proceed not so much from the form as from the essence of the studied financial and economic processes occurring in the company. Reports prepared in accordance with IFRS are usually confirmed by the auditor, but, despite this, the subjects of analysis should take a critical approach to its content for the following reasons:

- ✓ the purpose of the financial statements, which is to objectively reflect the company's business activities, does not coincide with the purpose of the analysis, since it is aimed at identifying the reasons for the financial results obtained and their dynamics;

- ✓ the purpose of analyzing financial statements for individual users may differ significantly from the information needs of most users;

- ✓ the IFRS reliability requirement, which is aimed at reducing the risk of possible material misstatement or incorrect disclosure of information in the financial statements, does not coincide with the requirement for reliability of the results of financial analysis, since the focus of the analysis is to identify the possibility of achieving the required level of solvency, profitability, business activity and financial stability of the company;

- ✓ standardization of information in financial statements does not allow to reflect the industry specifics of the company's activities, whereas in the process of analyzing financial statements, it must be fully presented.

In practice, the analytical interpretation of the organization's performance indicators in the financial statements (in the explanatory note) is not yet widely used, while in the appendices to the financial statements prepared in accordance with IFRS, such information is usually reflected. In statements in the explanatory Memorandum basically sets out issues of accounting policy choice, whereas in the financial statements prepared under IFRS, the main explanation given to the assessment of the business and the influence that various factors had on the financial statements.

One of the existing analytical differences in international financial reporting is the ability to study the dynamics of various indicators in a long-term retrospective. This feature allows the analyst to identify trends in business performance, set a trend, and predict certain financial and economic evaluation indicators.

A number of regulatory documents explicitly specify the minimum time period (two consecutive accounting periods) for which a company is required to disclose its financial information. However, as practice shows, the vast majority of companies reflect, for example, indicators of activity of assets and liabilities in the balance sheet as of only two reporting dates, which clearly does not meet the requirements for disclosure of financial information in dynamics.

Important requirements for the formation of reliable information are contained in a number of international standards, the mandatory implementation of which leads to adequate financial indicators. These standards allow for a more realistic valuation of assets, liabilities, capital, income, expenses, and net income. For example, in accordance with IAS 36 "impairment of assets", the company's assets should be recorded in the balance sheet at a value not exceeding their recoverable amount, i.e. not higher than the value of future economic benefits that can be expected from them. To this end, at each reporting date, the company should check for any signs that indicate a possible decrease in the value of the asset, and if any of them are detected, it should assess its recoverable amount. If the carrying amount of an asset has become higher than the recoverable amount, the asset is subject to depreciation, which will result in the recognition of losses.

In accordance with IFRS, the company can reflect the financial statements using the procedure of discounting (reduction) of values, whereas in the National Accounting Standards this option is not provided.

A reliable and complete picture of the property and financial position of the organization, its changes, as well as the financial results of the company's activities cannot be achieved without meeting the most important requirement of comparability of data. This requirement is consistent with the quality characteristics of IFRS, including reliability and comparability of data. The relevance of meeting these requirements increases in the context of inflation, which is inherent in the current stage of development of market relations in Uzbekistan.

In General, the methodology and methods for analyzing financial statements prepared in accordance with IFRS are comparable to the analysis of an organization's financial statements prepared in accordance with the BMS. The main differences are related, first, to the interpretation and evaluation of the reporting items themselves during the analysis, and, second, to the significant impact of subjective



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estimates on the financial statements ' indicators during their formation.

A significant role in the interpretation of reporting data in the analysis process is played by the professional judgment of a specialist analyst, i.e. a conscientiously expressed opinion about the

economic situation and useful both for describing it and for making effective management decisions. It is based on the ideas, beliefs, and professionalism of an analyst. In accordance with IFRS, professional judgment is an element of accounting standardization, an element of the culture of the accounting profession.

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## THE ROLE OF ANALYTICAL PROCEDURES IN THE AUDIT OF THE COMPANY'S FINANCIAL RESULTS

**Abstract:** The analysis of financial statements according to national accounting standards and international financial reporting standards was carried out, and it was concluded that methodological approaches should be adjusted when conducting financial analysis. At the same time, the reasons for differences between national accounting standards of Uzbekistan and international accounting are identified.

**Key words:** accounting, auditing, fixed assets, tangible assets, depreciation, inventory, international standards. National accounting standards, IFRS, analysis, accounting, reporting, audit.

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### Introduction

In modern conditions, when the organization of the process of providing reliable information about the work of domestic enterprises plays an extremely important role for successful long-term planning of the state budget, the topic of monitoring and improving the quality of audits of financial results of enterprises is becoming more and more relevant. In turn, the quality of audits is characterized by the rational construction of the audit process, the use of advanced and scientific audit methods, and the completeness of information services. Thus, the quality of the audit is improved by improving the organization of the audit and rational use of available resources.

Audit firms are also interested in optimizing audit procedures, due to the fact that competition in the market of audit services is increasing every day, and the heads of audit firms strive to monitor both the cost of services provided, while striving to maintain quality.

Audit is the activity in which it is essential to provide the customer with a quality service that is for the company guaranteeing that it will be able to maintain the number of regular customers, developed by the firm over the years on the market and will have

the opportunity to acquire new customers. One of the important conditions for the activity of audit firms is to control and optimize the costs of conducting audit procedures, trying to minimize unjustifiably arising costs. Therefore, reducing the labor cost of conducting an audit is important in this issue. As a solution to optimize the complexity of the audit, it is possible to use analytical procedures, which in turn are one of the main means of obtaining audit evidence. Analytical procedures provide the auditor with the bulk of the information he needs, while requiring less time than conducting detailed testing.

ISA 520 defines "analytical procedures" as the evaluation of financial information based on the study of natural relationships between both financial and non-financial information. Analytical procedures also cover the study of identified deviations and relationships that contradict other relevant information or significantly differ from the predicted data [1, p.534].

The standard specifies that the auditor must apply analytical procedures in the process of planning and conducting an overall audit review. However, analytical procedures can also be used at other stages of the audit.

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Currently, many auditors consider the information obtained as a result of analytical procedures as not very convincing, and, as a result, concentrate their efforts on documentation, inspection, recalculation, confirmation procedures, which result in a greater degree of confidence, and analytical procedures are used rather as formal. In fact, analytical procedures are very effective and can help identify up to 27% of errors [2].

You should also take into account the fact that analytical procedures are much cheaper than detailed tests that focus on collecting and analyzing documents. Analytical procedures include comparing financial information with previous periods, budgets, and forecasts, as well as similar industries.

Analytical procedures used during the planning stage help you understand the client's business and the changes that are taking place in it, identify areas of potential risk, and plan other procedures. Audit planning is usually carried out before the annual financial statements are prepared. Accordingly, any analytical procedures performed at this stage of the audit will necessarily be based on interim financial statements, anticipated or planned financial statements, financial statements prepared for internal management purposes, or even, in some cases, on previous financial statements. The auditor expects that there is a relationship between the various items in the financial statements, and should check the information available at the planning stage to determine whether his expectations are consistent with the accounting data. In any case, if there are discrepancies between the results and the auditor's expectations, the auditor should plan further work.

When forming its expectations, the auditor should take into account non-financial information and the possible impact of changes in external factors. For example, knowing that a customer has increased their production capacity may lead to an expectation of an increase in turnover; on the other hand, knowing that the industry as a whole is experiencing a decline in demand may lead to an expectation of a decrease in turnover. In any case, if the audit procedures reveal such discrepancies, the auditor should plan further work to determine the causes [3, p. 122].

When performing analytical procedures, the following factors should be taken into account [4, p. 68]

- the purpose of applying analytical procedures and the degree of their reliability;
- the type of enterprise and the level of detail of information (for example, the ability to apply analytical procedures to individual sections of the enterprise's activities or to subsidiaries, divisions, segments);
- availability of financial (estimates or forecasts) and non-financial (the number of units produced and sold) information;

- reliability of information (for example, reliability of budgeting);
  - significance of information (for example, making estimates, budgets based on expected results);
  - source of information (for example, when assessing the reliability of the source of information, you can use ISA 500 "Audit evidence»);
  - comparability of information (for example, the ability to compare industry data or indicators at comparable prices);
- information obtained during previous audits (for example, to eliminate contradictions in the results of analytical procedures).

It should be noted that the use of analytical procedures is based on cause-and-effect relationships between financial reporting indicators, which leads to the fact that the relationship between data can be determined with great accuracy and take place regardless of changes or errors in accounting.

During the planning stage, procedures are performed to assess the risk of elements of the financial statements, with the help of which the auditor determines the explicable relationships. For example, there is a causal (correlation) the relationship between firm sales and the resulting gross profit, the amount of cost of goods sold, cost of sales, valuation of inventories, the inventory turnover. It should be noted that the relationship between profit data is more predictive than the relationship between the data in the balance sheet, since the indicators from the profit and loss statement in the company are formed during the reporting period, and the balance sheet indicators are a "scan" of the company's property status at the reporting date.

If the results of the analysis show unexpected results, they are analyzed for the presence of significant distortions. The analysis may reveal indicators that do not correspond to the evidence obtained during the audit, or the existing forecast values. The auditor should carefully examine such facts, request management's explanations, and obtain appropriate audit evidence.

In order for the auditor to rely solely on analytical procedures for the audit of a new client, the amount of the article should be insignificant, while the client's internal control system should be reliable, and, if necessary, comparable information should be available for enterprises in a similar industry.

Usually, the subject of analytical procedures is small costs with a small probability of distortion (for example, the cost of purchasing office supplies, paying for telephone conversations of employees). They are compared with similar expenses of previous periods.

Often, auditors compare information for the current year with data from the previous period, and study these ratios in a comprehensive comparison with the data expected by the auditor. Such comparisons are called complex tests. This analysis is used by

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auditors to analyze depreciation expenses: the auditors have information about the initial cost of fixed assets in the group, the depreciation rate set by the accounting policy for the group, and the amount of deductions in the past year. The auditor can add the amount of expected depreciation for received fixed assets, as well as make adjustments for the amount of depreciation for written-off fixed assets. Using this value, you can estimate the amount of depreciation charges for the audited period; if it is equal to the amount in the "depreciation of fixed assets" account, the auditor can consider this expense item verified using analytical procedures. the audit of the financial control inspection

Through a General analysis and review of business transactions, an estimate of probable expenses is made and whether these expenses are actually recorded in the accounting registers is analyzed.

You can also perform a separate analysis of expense accounts, for which the total amount of expenses is divided into separate types of expenses that are checked and analyzed. In particular, special attention can be paid to expenses and income on rent, or on interest payments, the amounts for which can be compared with Bank statements and compared with the terms of lease agreements.

Thus, the use of analytical procedures at all stages of the audit of financial results can significantly

improve the quality of the audit, while reducing the time spent by auditors on the audit. The significance of analytical procedures in the audit of financial results can be described as follows: if there are no unusual deviations from the results of the conducted analytical procedures, this leads to a reduction in the labor costs of the audit team and a reduction in the cost of the project; if significant deviations are detected, this leads to a more detailed consideration of the problem areas of accounting that are potentially distorted, which leads to the detection of most errors.

Moreover, by focusing on areas where the risks of non-detection of errors are higher, you can reduce the time spent checking areas with the lowest audit risk.

Based on the above data, it can be concluded that the critical role of analytical procedures in the audit is due to the need to use them both during the planning of the audit in order to get an idea of the business and possible risk, and the substantive review procedure, and when conducting an overall review at the final stage of the audit.

In addition, analytical procedures are important when checking the financial statements for the appropriateness of the business continuity assumption at the final stage of the audit, when the auditor expresses his opinion on the business continuity in the foreseeable future.

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## FEATURES OF ACCOUNTING IN THE SERVICE SECTOR

**Abstract:** This topic was chosen because a lot of attention is currently being paid to services. In the process of selling services, the company transfers revenue, which should reimburse the costs incurred and ensure the profit necessary for further expansion of activities. Important results of each enterprise are profit and profitability, which depend mainly on the sale of services. Increasing the volume of sales is an important task. Each company is interested in rapid implementation of its services, as it has a direct impact on the company's financial position, strengthen its economy, improve conditions for workers.

**Key words:** Intangible, heterogeneity, non-standard, complexity, impermanence, income, expenses, revenue, cost.

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### Introduction

Modern business is characterized by a constant growth of opportunities that are directly related to improving the quality of life, with innovative development and with an advanced offer of a variety of innovative services to consumers. The Internet and new means of communication can serve as a clear example of this real and endless process.

Despite the fact that the market offers a fairly wide range of services to the consumer, any services are distinguished by their heterogeneity and complexity. Accounting of the service sector, despite the absence of work in progress, is not an easy task, which is subordinated to accounting and analysis of income and expenses, as one of the most important indicators of economic activity of any organization [2].

The main distinctive features of accounting in the service sector are that, first, the result of meeting the customer's needs is usually immaterial, and therefore, there are difficulties in assessing the quality and usefulness of the service performed.

Second, unlike a physical product that goes through various production stages before the consumption stage, the consumption of services rendered occurs simultaneously during the production

of the service itself. When choosing a service, the consumer first chooses the service provider, which is an integral component of the process of satisfying their requests. In this case, the choice of the performer may be based not on the quality of the service provided, but, for example, on the behavior of the staff.

Third, the production of any service is closely related to the personality of the consumer. In other words, a comprehensive change in the human personality determines the variability of the quality of services and does not allow them to be formalized and standardized.

Fourth, in addition to the risks associated with the inability to timely identify and correct errors and inconsistencies at the time of simultaneous provision and consumption of services, there are risks based on the fragility of the services provided. In other words, if a physical product can be postponed and sold tomorrow, then the sale and consumption of many services cannot be postponed to the future. For example, transportation services, an empty seat on the plane means lost profit.

For service organizations, it is vital to ensure the most accurate correspondence of supply and demand,

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to develop the flexibility of the organization's structure and service delivery processes.

The costs associated with the provision of services, as in the case of production, are subject to rationing and planning, which also do not differ in principle from similar operations carried out in the production of products [3]. For this reason, service providers take the problem of developing budgets and then monitoring their implementation seriously.

### Accounting methodology for services

Fundamentals of accounting-reflection of business operations on accounts. According to the level of detail of accounting, accounts are divided into synthetic and analytical. Each company, based on the specifics of its activities, selects a particular set of accounts for accounting for production costs.

The method of cost accounting and calculating the cost of work and services is considered to be a set of techniques for documenting and reflecting production costs to determine the actual cost of work (services). The classification of cost accounting methods is based on the procedure for collecting and generalizing production costs for objects of analytical accounting [4, p. 78].

The method of calculating the cost of production is considered to be a set of techniques used to calculate the cost of a unit of production.

There are many methods of accounting for costs and calculating the cost of production. Classification of methods for accounting for production costs and calculating the cost of production continues to be the subject of discussion.

The normative method is the most progressive accounting method that allows you to carry out daily control of the level of production costs, take measures to prevent inefficient use of the organization's resources. The normative method provides for:

- creation of a system of current progressive norms and standards and on its basis – calculation of the standard cost;
- accounting for actual expenses during the reporting period with their division into expenses by norms and deviations from norms;
- accounting for changes in current regulations during the reporting period in order to adjust the standard cost and determine the impact of these changes on the cost, as well as the reasons for the changes;
- identification and analysis of the causes of deviations from the norms by types of costs and places of their occurrence;
- calculation of the actual cost of products (works, services) by summing up the standard cost at the beginning of the reporting period, deviations from the norms (plus overspending, minus savings) and changes in the norms during the reporting period.

The normative method is not only a method of accounting and calculating the cost of products

(works, services), but also part of the most important cost management system [6, p. 194].

The basis of regulatory accounting is the regulatory framework, which is a set of progressive, scientifically based labor, material and financial norms and standards.

In the normative method consolidated accounting cost of production and the relevant ledgers (statements) must be carried out by separate types or groups of similar products and calculation items with a unit cost norms, deviations from norms change norms. Standard costs for all sections of the consolidated statement of accounting (work in progress at the beginning and end of the reporting period, costs for the reporting period, the actual cost of production) should be calculated at the same level of standards reached at the beginning of the reporting period. As you know, the balance of work in progress at the end of the month becomes the initial balance in the next month. If there were changes in the current norms during the month, it becomes necessary to recalculate the remaining work in progress by the amount of changes in norms for the month. At the same time, changes in the norms for work in progress are separately highlighted in the consolidated statement of production costs.

A simple method is used mainly in most enterprises, mining and some manufacturing industries, producing one type of product (hydro, mining, oil, ore and nonmetallic raw materials, production of plastic masses, raw silk, etc.), and a number of ancillary industries for the generation of electricity, steam, cold and other types of motional energy.

In some industries, costs may be accounted for at separate stages of the process. A prerequisite for using a simple (process-based) method is the uniformity and at the same time mass production of the extracted or produced products, the ability not to divide costs by the method of attribution to direct and indirect costs (since they are all associated with the production of one type of product). All costs are related to output (due to the absence or stability of work-in-progress balances) [7, p. 22].

The standard-cost system is a system of cost accounting and cost calculation using standard (standard) costs, the main goals of which are cost management and control, setting real prices, preparing budgets and various forecasts.

The standard-cost system for domestic accounting is a new method, although its origin is associated with the beginning of the twentieth century. The first mention of it is found in G. Emerson's book "labor Productivity as the basis of operational work and wages". He believed that traditional accounting "has the disadvantage that it does not establish any relationship between what is and what should be." This, according to Emerson, is a very significant defect in traditional accounting. But there is another

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<b>GIF (Australia)</b>	<b>= 0.564</b>	<b>ESJI (KZ)</b>	<b>= 8.997</b>	<b>IBI (India)</b>	<b>= 4.260</b>
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one related to the fact that accounting ignores the quality side of objects. "We know their price, but not their value."

The meaning of the "standard – cost" system is that what should happen, not what happened, is taken into account, not what exists, but what is due, and the deviations that have occurred are separately reflected. The main task that this system sets for itself is to account for losses and deviations in the company's profit. It is based on a clear, firm establishment of standards for the costs of materials, energy, working time, labor, wages and all other expenses associated with the manufacture of any products or semi-finished products. Moreover, the established standards cannot be exceeded. Performing them even by 80% means successful work. Exceeding the norm means that it was set incorrectly.

Analytical accounting is maintained in the development of all production cost accounting accounts. The level of Analytics is determined by the indicators that the organization needs for monitoring and management. For example, in the development of accounts in the "Main production" section, in order to quickly provide managers with specific reliable information, analytical accounting is organized for each order, type of work, type of product separately, in the context of calculation items and places of work. Analytical accounting should provide grouping of information on work-in-progress balances at the beginning and end of the month, on expenses for the reporting month, on amounts written off as costs for final marriage, on the cost of materials saved in production and on the cost of products produced, works performed, services rendered [8, p. 80].

To the accounts of the "Auxiliary production" section, analytical accounts are opened by types of production, and inside them-by types of work, calculation items. Here it should be taken into account that the services provided by auxiliary productions are mostly used within the enterprise and only a part of them can be sold on the side.

From the point of view of cost management, the main goal of product cost calculation systems is to objectively calculate the production costs of each type of product (service). To correctly estimate costs, you need to know their value in the long term. The well-known principles of dividing costs into constants and variables used in short-term management practice are not applicable for long-term analysis, since in the long term all costs of an enterprise become variable. In addition, direct costs are taking up a smaller share in the cost of production of modern enterprises, while overhead costs, on the contrary, are increasing. Fixed costs, which are known to be weakly dependent on output, are often seen as unavoidable and therefore little controlled. This is the narrowness of the approach to managing such costs. All categories of costs are the result of management decisions. Most of the costs that were considered constant for a long time

can now be considered as variables of certain factors that depend on management decisions. The importance of decisions increases in proportion to the specific weight of such expenses [9, p. 118].

Thus, the most important task of objective cost calculation is to identify the cost-determining factors of overhead costs. In conditions of the same type or approximately equal complexity of production, costs can be analyzed in the traditional context of constants and variables. If this condition is not met, this approach becomes incorrect.

Investigating the causes of such expenses, we find that their value is determined to a greater extent not by the volume of production, but by other production factors. Among the cost-generating factors: the number and time of equipment commissioning, the number of orders received and placed, the number of product deliveries, the number of items of components and materials, the volume of production stocks, the number of quality control checks and operations to correct defects. It is advisable to analyze the labor costs of auxiliary and service departments and equipment maintenance based on the influence of the above factors on them. If these costs do not ultimately contribute to a reduction in the cost of production, they should be revised to take into account the accompanying circumstances.

In most enterprises, all production operations can be divided into main and auxiliary operations. These operations, in addition, perform specific production functions (functions of supply, production, quality management, logistics, sales, etc.). the Costs of performing these functions are related to the cost-generating factors that cause the costs. These costs are grouped according to their functions and the activities of the departments that bear them. Knowing the reasons for each group of indirect expenses, you can more reasonably attribute them to the cost of a particular type of product or service. Therefore, it is necessary, first of all, to correctly identify the factors that determine them (cost-drivers). The accounting and calculation system that reflects the costs of the function that they bear in the enterprise's activities is called the "method of accounting and calculating costs by functions" [10, p. 76].

The method of accounting and calculating costs by function (Activity-Based Costing, abbreviated ABC) originated in the United States and has spread since the late 1980s thanks to the work of G. Bere, R. Cooper, T. Johnson, R. Kaplan. This method is used by about 10 % of large companies, including in the United States, great Britain, continental Europe, and Australia. They are also starting to use it in Japan. The universality of this method makes it possible to apply it not only at manufacturing enterprises, but also in organizations of wholesale and retail trade, and in the service sector.

The theoretical basis of the ABC method is the observation that an organization has at its disposal a

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certain amount of resources that are used in the production process and allow it to perform production functions. All types of resources are characterized by their costs, which are distributed first to individual functions in proportion to the volume of consumption of these resources. To do this, the costs of each cost center for a specific function are summed up. Then the costs for each function are attributed to the cost carriers. The cost carrier can be a product (product, service), a specific customer, or an order. The cost carrier includes, respectively, the share of each center's costs for all production operations that it accounts for. It follows that this distribution is based on a causal relationship between costs and their underlying factors.

The main advantage of accounting and calculating costs by function is the more accurate calculation of the product cost compared to the traditional method of cost allocation, which leads to more informed pricing decisions. This advantage is provided by focusing on the main production and technological functions, choosing the indicators that most fully characterize them. In a competitive market, it is also increasingly important that transaction costs account for a large part of the value added. When the efficiency of performing basic and service operations increases, the products and services of enterprises become more competitive and attractive to consumers.

Management aimed at finding and eliminating "bottlenecks" of activities, improving the performance of operations in the organization, was called in the United States "management by functions" (activity-Based Management, AVM). The AVM approach to management is now increasingly used in developed countries.

The procedure for allocating indirect costs in accordance with this procedure is as follows: overhead costs are attributed first to the cost centers, and then to the types of products in proportion to wages or machine hours (their number for each center is multiplied by the rate of indirect costs). However, in contrast to the traditional methodology, costs are grouped not by centers, but by functions or activities of the organization. Each homogeneous group of expenditures can be characterized and measured using a single key indicator. This approach leads to the idea that almost all indirect costs of the enterprise can be considered as variables from known factors. This, in turn, is important for correct accounting and cost management [10, p. 63].

Thus, in modern conditions of increasing complexity of production, diversification, and changes in the cost structure, preference should be given to such an accounting and calculation system that will bring the most objective and realistic results. The company's costs become more manageable, and it becomes possible to find the most effective levers to reduce them.

Lease operations have a direct impact on the property status and financial results of an organization, and an indirect impact on the amount of tax payments it pays to the budget and extra – budgetary funds. In this regard, there is a need to obtain reliable information about the size and structure of lease operations, which involves solving the following accounting tasks:

- formation of reliable information about own and leased property;
- verification of the correct documentation of lease transactions;
- full and timely reflection of lease obligations;
- timely settlement of lease obligations;
- correct calculation, reimbursement and taxation of rent;
- correct reimbursement of expenses related to the maintenance of the leased property;
- identification of the financial result of lease operations;
- accurate determination of the cost of repair of leased property;
- formation of reliable information about capital investments in leased property;
- ensuring control over the safety and compliance with the legal regime for the use of leased property;
- full and reliable disclosure of information about leased property and lease obligations in the accounting statements [3, p. 28].

A necessary condition for the correct organization of accounting for lease operations is compliance with General methodological accounting principles. These include: property isolation of the organization, materiality of information, temporary definiteness of facts of economic activities, the priority of content over form, continuity of the organization, the completeness of facts of economic activity, the sequence of applying the accounting policies, the distinction in accounting for current costs and capital investments, the rationality of accounting, consistency of accounting and reporting information.

### Conclusion

In the course of this work, the definition of lease, characteristics of the object of research, classification and types of lease relations were considered.

The tasks of accounting for lease operations were also defined. They consist primarily in the correct reflection of operations, the reliability of determining the financial results from the lease of property, the correctness of the formation of costs associated with maintaining the property in working condition, as well as monitoring the safety of leased assets.

A study was conducted on existing accounting practices in the area of recording lease transactions. The accounting records of current lease transactions for both the lessee and the lessor are shown separately.



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**The conclusions drawn from this work are as follows.**

Leasing, despite the fact that it is developing quite quickly, has not yet found wide application in our country. To a large extent, this is due to the fact that many issues that arise during leasing operations (primarily accounting and tax aspects of leasing activities) are still unresolved. There are significant differences in the accounting treatment of the entire complex of lease operations and, in particular, financial lease operations, given in the domestic accounting system and in Western countries.

These accounting contradictions between Uzbek and international legislation make it difficult for foreign investors to invest in the Uzbek economy, since any investor seeks to invest their capital only in profitable enterprises, the profitability of which they can verify. To do this, the company's financial statements must be clear and reliable. And since has "its own rules of the game", different from international ones, respectively, in order to invest their capital in our economy. Foreign investors have to additionally study Uzbekistan accounting and "redo" the company's reporting in their own way, so that it can show comparable indicators accepted in international practice.

The procedure for reflecting incoming rent depends on whether the main or non-main activity in the organization is the provision of material assets for rent. In organizations whose business is to lease their assets under a lease agreement, revenue is considered to be receipts that are related to this activity, and rent will be recorded as revenue from the sale of works and

services. If the provision of assets for lease is not the subject of the organization's activities, the proceeds are recognized as operating income, and the rent is reflected in operating income.

The procedure for accounting and tax accounting of the tenant's utility expenses depends on how the payment for these services is made. In practice, the tenant can pay for the "communal" in different ways:

- directly by signing a contract with a utility provider;
- through an intermediary (the landlord acts as an intermediary between the producer of utilities and their consumer);
- the cost of compensating the landlord for utility costs;
- as part of the rent.

Most often, utility costs are included in the rent.

At the end of the lease or at an early date, the lessee may Express a desire to buy the rental object. this entails drawing up an additional agreement or reservation in the lease agreement. In the lease agreement, the parties provide for the transfer of ownership of the rental object to the lessee after payment of the purchase price of the property agreed by the parties to the agreement. The parties have the right to set off previously paid rent in the purchase price of the property.

The purchase price can be transferred by the lessee at the end of the lease term in one payment, as well as during the entire term of the lease agreement, for example, simultaneously with the transfer of payments for the rental of property.

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## THE PROBLEM OF SEASONALITY IN TOURISM

**Abstract:** Seasonal fluctuations are present in all spheres of human activity and have a significant impact on the development of socio-economic processes in general. The sensitivity of tourism to the seasonal factor is determined by the presence of a number of objective factors: from the climatic characteristics of the routes to the cyclical nature of some social processes. In addition, the characteristics of the seasonality factor in tourism require a more detailed consideration. In the article we can see the role of seasonality in the activation of tourist services in the socio-economic development of the country and its impact on the development of the tourism industry.

**Key words:** seasonality, tourism product, tourism industry.

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### Introduction

One of the most acute problems in tourism is the discrepancy between tourist demand and supply caused by the seasonality of tourism. Bringing the demand to the level of the existing supply is the task of tourist advertising. But tourist advertising is not able to solve the problem of seasonality.

Seasonality creates significant difficulties in the tourism industry, reducing the profitability of tourism enterprises, the efficiency of the use of fixed assets, impairing the service of tourists, especially at the height of the tourist season, and causing staff turnover due to underutilization of tourism enterprises in the off-season period.

Seasonality in tourism complicates the development of the tourism economy, exacerbating the contradictions between elastic demand for tourist services and a relatively stable tourist supply, thereby causing problems in serving tourists. During the "peak" months, there are certain difficulties in the operation of transport, catering, housing, sightseeing, etc. If during the "hot" season all hotels, campsites and motels in Europe are overloaded, then in the off-season period, as a rule, a large number of places in tourist accommodation facilities are unoccupied.

Therefore, seasonality requires constant regulation of tourist demand.

Tourist flows are characterized by seasonal unevenness, which has mainly annual and weekly cycles. In the annual cycle, the seasonality periods are individual months or quarters, and in the weekly cycle, they are individual days.

The problem of seasonality, i.e. the peculiarity of tourist flows to concentrate in certain places for a relatively short period of time, is a complex problem that is almost impossible to solve. In most countries of the world, 80 % of tourist flows occur between may and October. Seasonality can only be mitigated, not eliminated. The change of seasons cannot eliminate seasonality in the formation and development of favorable recreational resources. Summer, for example, has been and will continue to be the most convenient time for organizing and conducting recreation for the majority of the healthy population. Attempts by some countries to extend the season of active tourism due to changes in the time of holidays in educational institutions and postponement of holidays have not yet brought the desired results.

The seasonality of tourist enterprises significantly reduces the economic efficiency of capital investments in the tourism industry. This

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implies a natural desire to extend the period of operation of tourist enterprises as much as possible, minimizing the factors of seasonality.

Seasonal fluctuations in tourist flows create economic and organizational difficulties for tourist services. Funds of tourist enterprises that have not been used for a long period of time significantly increase the price of tourist services.

In socialist countries, the planned management of the national economy creates the prerequisites for a centralized solution of issues of coordination of all branches of the national economy, which makes it possible to comprehensively solve economic problems, including the problem of seasonality of the tourist economy. The positive experience of some socialist countries in Europe in solving the problem of year-round employment of service personnel in the tourism system (Hungary, Bulgaria) is noteworthy.

The seasonality of holidays leads to the fact that in the summer, the demand for transport services, especially in the most popular holiday destinations, far exceeds the supply. It is very difficult to increase the capacity of the main modes of transport, although this will not completely solve the problem. The only way to solve the problem is to smooth out seasonality, and then achieve a more or less uniform use of transport means for the seasons.

This can be achieved by setting differentiated transport rates for tourists during the off-season period.

In modern tourism, there is a certain pattern of seasonality, which is derived from long-term observations. Its essence is as follows: the further a country is located from the main tourist centers of Europe and North America, the less pronounced seasonality there. This can be explained primarily by the relative stability of natural and recreational conditions, as well as a relatively low level of tourism development in the southern hemisphere, of the southern hemisphere countries, only the Australian Union has a pronounced seasonality. Here, in October-December, one third of all foreign tourists visiting the country are accounted for. This is the period when in the countries of the Northern hemisphere there is a decline in the tourism system, the most favorable for recreation in terms of natural and recreational conditions.

In the tropical countries of the Caribbean, where climate conditions are almost the same throughout the year, seasonality is also observed. The tourist season here is warm winter.

Europe, as the area of the greatest development of tourism, has the highest level of seasonality. The high concentration of foreign tourism is manifested by a pronounced seasonality in summer. During the two summer months (July-August) approximately half of the total annual number of foreign tourists travels in Europe. In Spain, for example, the number of tourist visits culminates in August — 21.7% of the total

annual number of foreign tourists. In Yugoslavia, more than 50% of all overnight stays are in July and August, and the concentration of tourist flows in these months increases in the Mediterranean countries in Europe, Africa and Asia. In winter, the flow of tourists noticeably moves to the African countries of the Mediterranean basin. In these countries, the tourist season lasts all year. Foreign tourists arrive more or less evenly throughout the year. The difference in the number of tourists arriving by month is insignificant.

Thus, the level of seasonality is not the same in all countries, and in some countries it is almost non-existent. In those countries where the annual fluctuations in climate elements are small, the seasonality of tourism is less pronounced or does not exist at all. In countries where natural and climatic differences in the seasons are noticeable, summer remains the main tourist season.

The problem of increasing the tourist season is acute for the tourist economy of the vast majority of countries, but it is especially relevant for European countries, where there is a high level of concentration of tourist flows in the summer months.

The problem of seasonality is waiting to be solved in the socialist countries of Europe, where the tourist season is narrowed. For example, in Bulgaria, Hungary, and Yugoslavia, July and August account for almost half of all tourists.

An important economic problem of the tourist economy of the USSR is to solve the problem of eliminating or somewhat smoothing the peaks of seasonality in the vacations of workers and in the field of tourist services. In our country, there are quite a few workers and employees who take vacations mainly in the fall, winter and spring. These include workers in agriculture, seasonal industries, and river transport.

In order to attract tourists during the off-season or winter season, government organizations and travel companies carry out a number of promotional activities. To increase the tourist season, and then to smooth out the seasonality, many countries promote tourist routes in the off-season through advertising and set benefits for this period. Tourist advertising shows the advantages of winter holidays in the mountains and reveals opportunities for winter sports, promotes various festivals and exhibitions that are held in the autumn, winter and spring months.

Tourists traveling in the off-season are provided with benefits in the form of discounts on fares and tourist services. The tourist experience of such countries as Yugoslavia, Italy, Switzerland, Austria, France and others shows that the development of tourism in the off-season period is not only possible, but also quite profitable. Given that the off-season does not play a significant role in the development of sea tourism, tourist organizations in Italy, France and Russia increased the number of cruises during this period.

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Recently, there has been a rapid increase in the rate of winter recreation and the number of tourists in winter. According to the UN, every seven years a twofold increase in the number of tourists vacationing in the winter. At the same time, a large role is played by mining and ozodorovitelnye objects, which significantly expand the possibility of recreation in winter.

The organization of various sports competitions, festivals, competitions, exhibitions, scientific conferences, etc. helps to increase the tourist season.

### Seasonality of the tourist market

the functioning of the tourist market and related tourism industry enterprises is subject to sharp seasonal fluctuations in demand for tourist products.

Seasonality refers to a stable pattern of intra-annual dynamics of a phenomenon, which manifests itself in intra-annual increases or decreases in the levels of a particular indicator over a number of years.

The production and service process of tourism has a pronounced dependence on seasonal fluctuations.

The study of seasonality in tourism allows you to: determine the degree of influence of natural and climatic conditions on the formation of tourist flow; set the duration of the tourist season; reveal the factors that determine seasonality in tourism; determine the economic consequences of seasonality at the level of the region and the tourist company; develop a set of measures to reduce seasonal unevenness in tourist services.

Seasonality in tourism is characterized by the following characteristics:

- the period of maximum intensity of tourist flow is called the main tourist season;
- tourist region, travel company depending on the development of the type of tourism may have one or more tourist seasons;
- developed countries, regions, centers, firms have a longer main tourist season, and the intensity of the tourist flow does not have a pronounced seasonal unevenness, that is, significant seasonal fluctuations are characteristic of a low level of development of the tourist offer;
- seasonal fluctuations in tourism are different for individual kinds of tourism at the time.

Seasonality in tourism is determined by a number of factors:

- natural and climatic-the quantity and quality of specific benefits for the development of sports, health, educational and other types of tourism;
- economic-the structure of consumption of goods and services, the formation of the solvency of demand through supply;
- social - availability of free time;
- demographic - differentiated demand by gender, age, and other characteristics;
- psychological-traditions, fashion, imitation;

- material and technical - development of a network of accommodation, food, transport, cultural and health services;

- technology - a comprehensive approach to providing quality services.

All the above factors of seasonal fluctuations can be divided into primary and secondary. The primary factors are those that are formed under the influence of natural and climatic conditions; the secondary ones are all the others.

Therefore, there is a real possibility of influencing the seasonal unevenness of demand in tourism. The seasonality of tourism leads to the seasonal nature of employment of workers in the tourism industry. This has its positive and negative sides.

On the one hand, tourism generates an uneven distribution of working hours (overtime during the tourist season and insufficient workload of workers in the off-season) and, as a result, a significant proportion of underemployed workers and staff turnover.

On the other hand, the seasonality of tourism encourages the multi-disciplinary nature of jobs, when the same employee performs different functions depending on seasonal characteristics.

In addition, seasonal work is beneficial for many categories of the population as a source of additional income.

The seasonality of tourism affects the structure of employment of employees in the tourism industry, the features of which are:

- significant share of part-time employment;
- seasonal fluctuations in the volume of employment and work load;
- low proportion of qualified personnel;
- limited opportunities for professional growth;
- significant share of women's labor.

Currently, the tourist market of economically developed countries shows a tendency to reduce seasonal unevenness in tourism services due to the outstripping development of supply relative to demand.

For example, France, Italy, Switzerland and Austria, with approximately the same tourist resources, represent a classic example of the development of sea and mountain tourism, respectively. By rapidly developing contrast tourism, France and Switzerland have relatively stabilized seasonal unevenness not by reducing the intensity of tourist flows during the main tourist season, but by lengthening it. As a result, the number of tourists served in July-August was 28% in France, 40% in Italy, 37% in Switzerland, and 45% in Austria, which is an example of possible smoothing of seasonal fluctuations by combining traditional and non-traditional types of tourism services.

The lengthening of the main tourist season has a strong impact on the efficiency of the tourist company,

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since, first, "conservation" or reduction of the load of the material and technical base leads to direct losses in the main activity of the tourist company; second, more full employment is provided and unemployment is eliminated; third, the level of use of fixed assets in other industries-transport, food, utilities, etc.; fourth, smoothing seasonal fluctuations leads to a more rational use of natural resources.

The volume of tourism services sold has a pronounced seasonal character, which is due to many factors (time of year, vacation period, holidays, etc.). Therefore, in the process of analyzing and planning the volume of services sold by a travel company, it is necessary to take into account the regularity of deviations of indicators for individual months from the average annual indicators.

These calculations are based on seasonality coefficients, which are calculated as a percentage of the average monthly levels for a number of years to

the average monthly volume of services sold for the entire billing period.

In the practice of economic analysis, various methods are used for calculating the seasonality coefficient: simple average, analytical alignment, relative numbers, moving average, and the y method. Persons.

The easiest of these is the simple average method, which is used to calculate seasonal fluctuations in cases where the intra-annual change in the volume of sales of services fluctuates throughout the year around a certain (constant) level.

To identify a stable, rather than random pattern of intra-annual dynamics of the volume of tourism services sold in the context of individual months, calculations should be made for a number of years (at least the last three).

Since the volume of sales of tourism services has a clear tendency to change, it is advisable to calculate the seasonality by analytical alignment.

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## FORMATION OF PRACTICAL SKILLS AND ABILITIES OF STUDENTS ON THE BASIS OF KHAZANKIN TECHNOLOGY

**Abstract:** This article illustrates the importance of effective, productive issues in the development of acquired knowledge, abilities and skills as competencies given in the example of a practical training project.

**Key words:** productive problem, technology of Khazankin, control training, mathematical knowledge, experimental work, supervisor, control activities, assessment, practical work.

**Language:** English

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### Introduction

The special "productive issues" technology of teaching mathematics, proposed by Khazankin [1], provides for the development of creativity in students.

The knowledge, skills and competencies acquired within a particular subject can be applied beyond its limits, transforming a particular skill in a subject into a universal learning movement. Productive issues are not aimed at consolidating mathematical knowledge, but at teaching students to apply their knowledge independently. As a result, knowledge is not just a result but a means of an individual's development becomes productive issues for students range from reproductive issues is relatively interesting and important.

Productive problem solving is done in the following steps:

1. Understand the problem (what to do?).
2. Find the necessary information (text, picture, etc.).
3. Change the form of information according to the problem (find the cause, separate the basic information, evaluate, etc.).
4. "I think ...", "... because,...", "First,...", "Second,..." and so on formulate an answer using words.

5. Independent full answer (story) without relying on the teacher's reference questions.

Using productive issues allows you to develop the following skills [9]:

acquiring new knowledge based on existing experience;

apply skills in non-standard situations;

independent selection and adaptation of methods of action required to solve the problem situation, finding different ways to solve it;

work with different types of information, adapt, evaluate and change them;

critical thinking, selection of optimal methods of action, reflection.

Problem-solving mathematics teaching technology is based on the following conceptual ideas: personal approach, pedagogy of success, pedagogy of cooperation;

teaching math = teaching problem solving;

problem-solving training = problem-solving skills training + basic problem-solving skills;

individualization of "complex" and "capable" teaching;

proportionality of individual and collective activity;

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conversations of students with different levels of mastery management;

adaptation of audience and extracurricular activities.

The system of trainings organized in the process of introduction of this technology includes the following classes: non-traditional lectures, practical training to solve "basic problems" (allocation of a minimum number of key issues on the topic, solving each problem by different methods, solving different information systems), problem-solving by students, independent problem-solving), competitions and Olympiads, consulting classes (students' questions on the basis of pre-prepared cards, work with cards: analysis, generalization, filling in cards), control classes (individual tasks, oral report to senior students), correction in pair work until fully understood, putting three grades - the answer to a theoretical question, the solution of an example on a card, for written logical speech - evaluation motivation) [4].

In particular, the organization of the process of asking students questions on pre-prepared cards in mathematics consulting classes in higher education institutions can be carried out at the following stages:

issues are divided into groups depending on the content, methods of solving, the level of complexity;

from the proposed problems, the problem is selected in such a way that the method of solving it is the basis, the model for the problem-solving methodology of the whole group;

a single problem is formed and solved that allows students to get acquainted with the solution of several problems on different cards;

find the underlying issues on the cards;

the resources available to solve individual problems included in the cards are identified by the students;

in addition, an important (in the opinion of the teacher) issue is added for all.

In technology of Khazankin a special place is given to control training. The purpose of them is to organize individual work, assistance of higher education to lower level, gradual transition to the solution of relatively complex problems.

In higher education institutions, there is an opportunity to monitor and evaluate students' mathematical knowledge in the organization of practical training in mathematics, as well as to carry out individual work of students serving educational, pedagogical and developmental purposes.

During the experimental work on the research, we verticalized the pedagogical impact on the control process: each student had one stage above the supervisor and one stage below the student. Students are supervised and supervised by a volunteer or teacher, provided that supervision is provided among a group of students selections were organized [7].

The upper echelons took control from the lower echelons. This form of monitoring knowledge, skills, and competencies led to higher results than traditional question-and-answer and other control activities: the teacher was exempted from assessment in practical work and focused on managing student activities; creative roundtables were held during the session; problems were discussed amicably among students, and no "2" grade or reprimand was used for students to express their opinions freely.

After the topic was repeated for the lower level students, the upper level students took on the task: they prepared a card to control the knowledge of the lower level students [8]. Theoretical questions on the card, the basic issues and examples that take into account the abilities of the student taking the control, individual qualities, level of knowledge included (developing interests, developing skills problematic situations, issues and assignments, etc.).

Controls were conducted on each topic, usually once a week. The student who forms and accepts the content of the test also achieved positive results: re-understanding, systematization of the study material, comparison of new and old - at the same time developed the thinking as a "controller".

Algorithm of stages of organization of control work:

1) the student performs an individual task on the card;

2) oral report of students is heard (pair work);

3) gaps or inaccuracies in the student's knowledge are identified;

4) the conversation in the couple continues until it is fully understood;

5) The student receiving the control work puts three marks on the control card:

a) the answer on theoretical knowledge;

b) for solving the problem on the card;

c) for performing independently assigned tasks in the notebook.

6) the student receiving the control work determines the quality of solving each problem by means of symbols;

7) evaluation motivation [4].

The use of game technology in solving interesting problems in mathematics lessons is widely used in general secondary schools. Elements of play are used in the organization of practical training in higher education institutions in pairs, in small groups, in the organization of joint educational activities of students in the team.

One of the most complex and important tasks of didactics is to make the study work as interesting as possible for the student and at the same time not to turn this work into a game. The purpose of organizing such practical classes is to expand and systematize students' mathematical knowledge based on the application of interesting problems [6].

Qualities of interesting topics:

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- 1) such an issue (like any issue in general) has an evolving direction;
- 2) it is necessary to use non-standard forms of the given data and methods of their representation;
- 3) the initial data and situations are conceived and used from real characters in order to achieve the set goal;
- 4) this is a qualitative problem, the solution of which is based on reasoning without the use of mathematical conclusion;
- 5) the issue includes an unusual question.

The following can be mentioned as tasks to be performed [10]:

1. Get acquainted with the methods of using interesting problems in mathematics lessons.
2. Learn how to create interesting problems.
3. To study the use of interesting topics in game technology [5].

Below we present the project of practical training for the formation and development of practical skills and abilities of students [2, 3] (tables 1, 2).

**Table 1. Technological model of practical training on "Derivatives of composite functions"**

Time - 2 hours	Number of students: 15-26
Form of training	Practical training
Plan	1. Find the product of complex functions. 2. Find the derivatives of given functions functionally and explicitly.
The purpose of the lesson: to achieve full assimilation of practical skills on derivation of composite functions, parametric and implicit functions on the basis of theoretical knowledge and partial practical skills acquired independently by students on composite functions, parametric and explicit functions	
Pedagogical tasks Teacher: 1. Development of students' ability to derive composite functions. 2. To teach students the formulas for derivation of functions given parametrically and explicitly. 3. Development of skills in solving examples on the application of the formula for deriving a function from a given parametric method. 4. Strengthen the ability to derive from a given function without explicitly. 5. Strengthening practical skills on the basis of assignments, achieving full mastery.	Learning outcomes Student: 1. Knows how to derive a product from a composite function. 2. Can distinguish given functions functionally and explicitly.  3. Knows how to derive a product from a given function in a parametric way.  4. Knows how to derive a function from a given function implicitly. 5. Can solve examples on the topic independently.
Methods	Brainstorming, question and answer, two-part diary
Tools	Textbook, ICT
Organize the learning process	Individually, in pairs, in teams
Learning conditions	Projector, computer-equipped auditorium

**Table 2. Technological map of practical training**

Stages, time	Activity content	
	the teacher	a student
Step 1. Introduction (15 min.)	1.1. The topic, its purpose, training questions (plan), expected results of the training are announced . 1.2. Introduces the evaluation criteria. 1.3. Check the task given for independent preparation. 1.4. 2 examples of finding the product of a complex function are given 1.5. Comparison with reference.	1.1. Hears, writes.  1.2. Hears. 1.3. Indicates the function. 1.4. The example works.



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		1.5. Each student evaluates themselves by examining examples they have worked on.
Phase 2. The main part (60 min.)	2.1. Knowledge on the concepts of parametric function, product of parametric function on the basis of "Bloom's cube" is activated. 2.2. Peer review: assign each student partner as an expert. 2.3. The implicit function conducts a question and answer according to the algorithm for finding the product of the implicit function. 2.4. Based on the "confused logic chain", the stages of the algorithm are strengthened. Establishes mutual control on the basis of the standard. 2.5. Collaborate: Work with students on an example of finding the product of an undisclosed function. 2.6. Reinforcement: gives examples of independent work on finding the derivatives of functions. 2.7. Peer review is a collaborative learning process. Participates in questions and answers, writes the necessary places.	2.1. Participates in questions and answers, writes the necessary places. 2.2. Evaluates the work of the partner. 2.3. Participates in questions and answers, writes the necessary places. 2.4. Solves the "confusing chain". The partner checks the answer. 2.5. Works together, writes an example. 2.6. Individual example works. 2.7. Checks the work of his partner at the back desk, teaches his example to his partner next to him.
Step 3. The final (10 min.)	3.1. Reflection. Provides the task of filling a two-part diary. Work in pairs. Mutual control. Comparison.  3.2. Assigns them to write homework assignments. 3.3. Tell each pair of students to determine the average grade for each of the three assignments. Announces the current grades received by students, puts them in the journal. 3.4. Concludes the lesson. Students listen to their opinions. Announcing the topic of the next lesson and saying goodbye.	3.1. Fills in a two-part diary, evaluates the work of his partner, compares his answers with the work of his back partner. 3.2. Record.  3.3. Calculates, announces the price of the partner, writes down his mark.  3.4. Hears, says goodbye.

Mathematical skills based on an algorithmic sequence of practical actions that are formed in students during practical training depend on the ability to solve basic problems, abstract correct imagination, which is initially formed. Effective, productive issues play an important role in the development of acquired knowledge, formed skills and competencies as

competencies. Examples and problem solving requirements, rules are complete by students achieving mastery, while understanding the essence of algorithmic actions, step-by-step training in their conscious implementation, the correct selection and implementation of appropriate methods and tools will increase the effectiveness of practical training.

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## SIGNS OF QUALITY OF LOCAL GRAIN VARIETIES AND METHODS OF THEIR DETERMINATION

**Abstract:** This article analyzes a number of sources and addresses the issue of methods for determining the quality of local varieties of grain. The quality of grain is of great importance for its further use for processing and storage.

**Key words:** grain, structure, shape, moisture, density, protein, starch.

**Language:** English

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### Introduction

Physicochemical and mechanical properties of local grain varieties are of great importance for their storage and processing. These properties characterize the basis of methods for determining quality, methods of moving, cleaning and processing of grain.

Physical properties of grain include: grain shape, linear dimensions and size, volume, performance and frailty, alignment, mass of 1000 grains, vitreousness, density, filminess and huskiness, bulk mass.

Structural and mechanical properties of grain link the structural features of material with its reaction to mechanical action. These properties determine process

of grain grinding, peeling, yield and quality of crushing products, energy consumption for grain grinding. Main criteria for evaluating the mechanical properties of materials are their strength and hardness.

Mechanical properties of bodies are detected when they are exposed to external forces, under the influence of which deformations of various kinds are formed. Usually whole deformation process is divided into three stages: elastic deformation, plastic flow and deformation. Correct assessment of "behavior" of local varieties of grain in all three stages allows you to get a clear idea of its overall strength.

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Ability of grain to resist deformation at the point of application of force is called hardness. This is the second evaluation criterion of structural and mechanical properties of grain. Hardness characterizes possibility of destruction of the material of separated anatomical parts of grain in the place of application of force [1,2,3,6].

**Chemical composition of grain** depends on botanical characteristics (species, variety, selection variety), growing conditions (climatic conditions, soil composition, fertilizers, watering), degree of maturation, etc.

Chemical composition of different types of grain may vary in content of protein, carbohydrates, fats, minerals, vitamins.

Chemical composition of the aleurone layer has following features. It contains a large number of proteins-38% or more, mainly related to albumins and globulins, unable to form gluten, 9-10% fat, 6% sugar (sucrose), 15% *fiber*, 9-10% ash, a significant amount of *hemicellulose*. Aleurone layer is rich in water-soluble vitamins: B1 and B2 and especially vitamin PP.

Weight of the aleurone layer is from 4 to 9 % of the grain weight. Ash content of the aleurone layer ranges from 8 to 11%.

Chemical composition of endosperm is different from composition of all other parts of grain. Endosperm contains all grain starch, amount of which is 78-82% by weight of endosperm, about 3% sucrose, 0.2-0.4% reducing sugars, 13-17% proteins, mainly gliadin and glutenin, forming gluten. Characteristic is the low content in the endosperm of ash (0.3-0.5%), fat (0.5-0.8%), pentosans (1-1.5%), fiber (0.07-0.12%). Products derived from endosperm contain least amount of ash elements (Ca, P, Fe, etc.) and vitamins.

Different grains and seeds are characterized by different forms:

1. Form of grain and seeds is very diverse. Grain and seeds of different crops can be distinguished several main varieties differ in shape. There are following forms of grain: spherical, lentil-shaped, ellipsoid, elongated with different sizes in length, thickness and width, triangular pyramid, characteristic of buckwheat, as well as other forms. Spherical shape has seeds of peas, millet, sorghum, some varieties of corn. With lentil-shaped, when width and length are almost equal with a much smaller thickness. Shape of ellipsoid of rotation differs in the same width and thickness, length is much larger. Seeds of many legumes have this form. Grain which closer in shape to an ellipsoid, but for research it is often applied to ball, has a higher bulk mass, gives a greater yield of flour [1,2,3,6,7].

2. Linear dimensions are length, width and thickness of the grain. Length is distance between base and top of grain, width is the greatest distance between the side and sides, thickness is between dorsal and abdominal sides (back and abdomen). Set of linear dimensions is also called coarseness. In study of linear

dimensions and grain size, two methods are used: measurement of individual grains with the help of special devices (micrometer, thickness gauge, hour projector, etc.) and sieve analysis, in which the grain is sifted through a set of sieves with holes of a certain shape and size. When measuring individual grains from the hinge, obtained data are processed by method of mathematical statistics. Large grain fractions give a greater yield of finished products. Grain sizes are taken into account when setting the mode of grain preparation for grinding and grinding itself. During storage and as a result of hydrothermal treatment, linear dimensions of grain and its volume may vary. Thickness most characterizes milling properties of grain from three dimensions (length, width and thickness). Was established high correlation between grain thickness and endosperm content [1,2,3,5,6].

3. Volume of grain mass, expressed in appropriate weight units, is called "nature" of the grain. Nature of grain is expressed by weight of 1 liter of grain in grams. Nature characterizes mainly one of the properties of grain mass - its density (or fluidity). Density of packing of the grains, in turn, depends on many different reasons.

For the value and calculation of grain mass fluidity, volume mass (with all other things being equal, a larger volume of grains corresponds to a larger volume mass), determining the mode of cleaning and processing of grain, the output of finished product (larger volume – larger output) [1-5].

4. Performance of grain is an indirect indicator characterizing ratio of endosperm and shells in the grain, which is important in assessing the milling properties of grain. Endosperm in the grain usually adheres very tightly to shells, while fulfilling all space limited by shells. Hence term "fulfillment" was born. Such grain on the surface does not contain wrinkles and folds. In the case when by time of harvesting grain does not reach full maturity and endosperm contains a lot of moisture, wrinkles and folds appear on its surface, and the endosperm shrinks. This grain is called frail. Reason of frailty can be: the effect of drought, dry weather and frost, fungal diseases, bacteriosis, viral diseases, flower parasites, field pests and other adverse conditions of development and maturation. Completed full-weight grain, small, normally developed and frail grain differ in physical, biochemical and technological properties. Frail grain contains more shells and less endosperm, it is very small, sometimes consists of almost one shell, usually has normal dimensions in length, but reduced width and thickness. Therefore, characteristics of width and thickness are used to determine density of grain. Frail grain, in comparison with completed, has large external surface and, as a consequence, it is less resistant to storage and more susceptible to external factors. It is much more difficult to grind frail grains into flour, flour turns out to be darker and has a bluish tint. According to totality of above factors, frail grain is referred to as a grain

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impurity. According to standards, fine grain is determined by the amount of passage through a sieve with holes of certain sizes: for grain-1, 7x20 mm, rye-1, 4x20 mm, barley-2, 2x20 mm, etc. Normally executed grain has a coefficient of 1.11, frail - from 1.20 to 1.96. Coefficient of frailty due to the complexity of its determination is advisable to apply only in research [1,2, 3,6,7].

5. Evenness, or uniformity of grain size, is an important indicator of quality. The more homogeneous the grain in size, or the more it is aligned, the less there is a loss in processing and the better quality of products produced. This applies to processing of grain into flour and especially into cereals. First of all, it is important to equalize the humidity and size, i.e., linear dimensions or weight of 1000 grains, as well as the uniformity of grain color, vitreous, size, chemical composition and other indicators. The most important are equalization of humidity due to special role of moisture in storage and processing. This can lead to nesting self-heating of the grain.

Aligned glassiness increases amount of proteins contained in the grain, going to formation of gluten. Structure of the grain depends on the nature of exchange during loading and maturation. Main factors determining vitreous nature include: sowing material, agrotechnical conditions, soil and climatic conditions, composition of fertilizers, uneven ripening of grain in the ear.

High temperature, lack of moisture, short period of filling and ripening of grain increase the vitreousness. Excess phosphorus reduces, and excess nitrogen, on the contrary, increases glassiness. Although glassiness of grain is a varietal feature of the grain plant, but it can vary by region depending on soil and climatic conditions.

Glassiness is an important technological indicator of grain. Glassiness grain has a great resistance to crushing and chipping, in connection with which grinding requires more energy than for powdery grain. Higher yield of flour is obtained from the glassiness grain, than from the mealy. Glassiness grains are longer than powdery. Thus, sorting the substrate, it is possible to allocate glassiness grains. This is of great practical importance: it is possible to increase amount of grain going to production of flour for pasta, to prepare more valuable batches of grain for export, to improve quality of seed material. With inept storage and subsequent improper drying of the grain, endosperm turns glassy. Grains with such glassiness are difficult to grind and will be dark in color, giving the flour an overall dark color. [1,2,3,5].

6. Density of grain as a whole and its anatomical parts is of great technological importance. As a rule, well-poured grain has a higher density than unripe. Density of grain and its parts depends on their chemical composition. The highest density have starch and minerals, so with an increase in their proportion increases density of the grain, and, conversely, increase

in the amount of protein (1,34-1,37) and lipids (0,89 - 0,99) reduce density of the grain. Significant differences in chemical composition cause large fluctuations in grain density ( $\text{g} / \text{cm}^3$ ): wheat-1,33-1,53; rye-1,26-1,42; corn-1,23 -, 27; barley-1,23-1,28; oats-1,11-1,15. Density can be considered as a complex characteristic, which reflects such indicators of physical and chemical properties of grain as structure, chemical composition, weight of 1000 grains. Inverse of density is the specific volume. Grain density correlates with other indicators. Density of the whole grain is on average-1,336, its endosperm-1,471, corcule-1,290, shells-1,066. The whole grain processing technology is based on these differences at present, as the milling properties of higher density grain are better.

Grain density is determined by formula

$$\rho = \frac{m_1}{m_2 - m_3} \rho_E$$

in which  $m_1$  is the mass of the filler in the dry state,  $m_2$  is the mass of filler after saturation with water, which is calculated by weighing it in air,  $m_3$  is the mass of filler when weighing it in water.  $\rho_E$  – is density of water, which is applied, equal to one gram per cubic centimeter. This method allows you to set the average density of grains. Grain density is significantly affected by humidity, temperature and other factors. Figure 1 shows typical graphs of changes in density ( $\text{kg} / \text{m}^3$ ) of local grain varieties I, III and IV types under the influence of humidity. Data obtained by pycnometric method. For grain types I, II and III there is an area of humidity in which density decreases especially sharply. Density of type IV grain decreases almost straightforwardly. At a humidity of 15...16% rate of change in density decreases, this is especially noticeable in wheat grain type I. The study of this phenomenon showed that decrease in density at 15...16% humidity is due to structural transformation of the endosperm and to a lesser extent - swelling of shells and grain as a whole. At higher humidity, the latter factor becomes predominant [1,2,3,5-7].

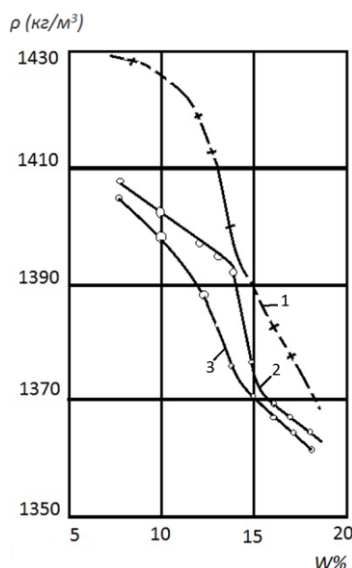
7. When harvesting part of grain gets mechanical damage. These damages are divided into two groups: grain crushing and micro-damages. Also, mechanical damages of grain are a consequence of interaction of grain with working parts of cars and the equipment. As a result, grain is crushed, flattened and acquires various macro and micro damages. Micro-damages include such damages as ruptures of the membranes or endosperm near corcule, as well as the loss of corcule itself by the grain [1,2,3,6,7]. One type of mechanical damage is grain fracture. Fracturing occurs when improper use of harvesting apparatus, transportation, storage and drying of grain or other influences on it. As a result, cracks on the grain can be large, immediately noticeable or very small. Small cracks are detected with a diaphanoscope. During transportation, grains are damaged and partially turn into broken ones, which are further destroyed faster than whole ones. Grains

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with different types of damage are less resistant to storage, they breathe intensively, easily absorb moisture from the environment, are more accessible to grain pests, microorganisms develop faster on their surface. Mechanical damage reduces milling, cereal and baking quality of grain, reduce the yield of finished products, contribute to formation of large amounts of crushed cereals. During processing in the elevator,

flour mills and cereal plants, grain damage increases. So, micro-damage turns into macro-damage. In grains with micro-damage, germination is reduced, and plants grown from them are less productive. And also, all kinds of mechanical damage resulting from the harvesting, primary processing and storage, adversely affect quality and condition of grain.



**Fig. 1. Influence of humidity to density of wheat grain: 1- III type; 2- I type; 3- IV type.**

To fight against mechanical damage, it is necessary: to improve the scheme of technological processes of grain processing; to develop machines and equipment in which the speed of the working bodies is regulated and the fall of grain from a great height is not allowed; to cover the working bodies with elastic materials, etc. It is also important to develop new varieties of grain and legumes with strong shells.

8. When processed into flour, grain is subjected to various types of mechanical impact. Intensity of these effects, their technological effect, quantity and quality of products produced are closely related to mechanical properties of grain. Mechanical properties of grain can be estimated only on the basis of mass observations with subsequent processing of materials by methods of mathematical statistics. When processing grain into flour, the main process is its grinding, which consumes from 50 to 70 % of all energy, consumed at grain processing enterprises of the Republic of Uzbekistan. The most important property of grain, which should be taken into account when grinding it, is strength, i.e. resistance to mechanical destruction [1-3, 5-7].

Strength can also be estimated by value of destructive force or stress. It is necessary to take into account type of deformation, as resistance to shear, compression, tension and torsion for the grain. Strength

of the grain depends on its structure, humidity, temperature, varietal and species composition, soil and climatic conditions of growth and other factors that are still not well understood. Humidity has a very strong effect on the strength of grain and related indicators of specific energy consumption, percentage of extraction and productivity of the mill. F. Adra has determined that if conditional tensile strength of grains of the coarse fraction is equal to 7.5...At 8.5 MPa, then for grain of the fine fraction it will be raised to 9.5...11.5 MPa.

Dry grain has properties of brittle and wet plastic body. Increasing humidity abruptly worsens technological effect. Increasing the temperature increases strength of the grain. When the temperature decreases, the grain becomes more brittle, will be more easily destroyed. Influence of humidity and temperature on the mechanical properties of grain is associated with colloidal-chemical changes in its polymers colloidal properties (proteins, carbohydrates). At high humidity (17-20%), microhardness of the shells is leveled and becomes approximately the same regardless of the structure, variety and growing area (20 MPa) [1-6].

9. Aerodynamic properties of grain are features of its behavior in an air stream. Moving grain in the air meets resistance (pressure), which depends on a

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number of factors. Pressure of air flow on the body in it, depends on mass of the body, its size, shape, surface condition, relative speed and location of the grain, as well as the state of the air environment. With a vertical air flow, particles (grains, impurities) can either fall, or be carried up by the air, or be in a suspended state. The soaring velocity (m / s) is the air flow velocity at which the gravity of the particle is balanced by the air resistance force. The rate of soaring is inversely proportional to the square root of the windage coefficient. Aerodynamic properties of grain and its impurities are used in cleaning and sorting of grain mass. Air flow from the grain mass emit organic sweepings (pieces of straw, chaff, empty glume). Secondary passage through the air stream allows you to select many seeds of weeds. Speed of soaring of grain and its impurities is set experimentally in pneumatic classifiers of different designs. Value of the speed of soaring is different for grain and seeds of different cultures and depends on their shape and size. For example, for grain it is 9-11 m/s, for millet-6-8 m/s, for peas-15-17 m/s.

10. Grain contamination means presence of live pests of grain stocks – insects or ticks at any stage of development – between the grain space or inside individual grains. Based on the biological characteristics of individual species of insects, there are pests infestation of grain in explicit and implicit forms. Explicit form is characterized by the presence of live pests of grain stocks in the boundary grain space, and hidden form - presence of pests within individual grains. Various types of insects and ticks can

exist in grain mass. Many of them develop only in storage and are not found in nature (barn weevil, crustaceans, barn moth). Others are able to reproduce in nature and in storage (rice weevil, grain moth, bean seed, mites). The third breed only in natural conditions and get to storage together with a crop (a pea grain, a grain scoop, nematodes, etc.) [1, 4, 5, 7].

Pests of grain stocks cause great damage in the currents and storage facilities of agricultural enterprises, in the food industry processing grain, as well as in the system of trade and public catering. Under favorable conditions, many of them multiply intensively, feeding on grain, flour or cereals. Their development is accompanied by large losses of grain products in weight (5-6%) and a decrease in quality. Seed germination is reduced, as insects are partially or completely eat away corcule and endosperm. Contaminated grain produces contaminated flour, while reducing its yield and increasing waste. The ash content of individual fractions of flour increases. Flour becomes dark in color. Dark and with increased ash fractions of flour go to lower grades, the yield of flour of higher grades is reduced.

### Conclusion

Present article analyzes physico-chemical and mechanical properties of local grain varieties. Also matter on methods of determining the quality of local grain varieties was viewed. Quality of grain is of great importance for its further use for processing and storage.

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## NUMERICAL SOLUTION OF THE PROBLEM OF THE ACTION OF A PLANE UNSTEADY ELASTIC WAVE ON CYLINDRICAL BODIES

**Abstract:** This paper considers the effect of a non-stationary wave on cylindrical bodies with circular and rectangular cross sections. The problem is solved in a flat formulation, by the numerical method (FEM). Numerical results were obtained under the influence of a load in the form of a unit Heaviside function.

**Key words:** unsteady wave, cylindrical bodies, finite element method, Heaviside function, pipe.

**Language:** Russian

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### ЧИСЛЕННОЕ РЕШЕНИЕ ЗАДАЧИ О ВОЗДЕЙСТВИИ ПЛОСКОЙ НЕСТАЦИОНАРНОЙ УПРУГОЙ ВОЛНЫ НА ЦИЛИНДРИЧЕСКИЕ ТЕЛА

**Аннотация:** В этой работе рассматривается воздействие нестационарной волны на цилиндрические тела с круговыми и прямоугольными поперечными сечениями. Задача решается в плоской постановке, численным методом (МКЭ). Численные результаты получены при воздействии нагрузки в виде единичной функции Хэвисайда.

**Ключевые слова:** нестационарная волна, цилиндрические тела, метод конечных элементов, функция Хэвисайда, труба.

#### Введение

Для современной инженерной практики строительство подземных сооружений весьма существенную и важную роль играют исследование и анализ волновых явлений,

происходящих в средах с различными неоднородностями. Полученные в этой области результаты являются определяющими для создания методов расчета динамических воздействий на конструкции и сооружения,

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взаимодействующих с различными видами грунтовых сред. Однако, для решения поставленной проблемы нельзя достичь существенного продвижения без глубокого их теоретического анализа. Основные положения динамической теории сейсмостойкости разработаны в трудах [1,2,3,4,5] и др. Эти положения заключаются в следующем: рассматривается подземная сеть произвольной схемы, состоящая из упругих стержней (трубопроводы, стволы тоннелей) и сопрягающих их конструкций большой жесткости (смотровые колодцы, станции метрополитена и пр.)([6,7].

Движение грунта, окружающего трубопровода, при землетрясениях представляется в виде бегущей волны переменной интенсивности. При данной постановке задачи рассматривают только процесс, связанный с колебаниями трубопровода в грунте без учета объема колеблющегося грунтового массива [8]. При этом учитывается отпор грунта, трение проскальзывание стержней в грунте. В указанной постановке задача решается с помощью совокупности дифференциальных уравнений, описывающих колебания стержней, с учетом динамических и кинематических условий сопряжения стержней. На основе вышеописанной расчетной модели исследовано влияние сейсмических волн на трубопроводы, испытывающих продольные колебания [9,10]. Среди наиболее употребительных вычисленных методов, применяемых при расчете подземных трубопроводов, тоннельных конструкций метод конечных элементов и сеток. К вариационно-разностным методам относятся: метод Бубнова-Галеркина, метод Ритца и метод конечных элементов [11,12,13,14,15]. Остановимся на последнем, который нашел в настоящее время широкое распространение для решения практических инженерных задач. При проведении расчетов производилась неравномерная разбивка расчетной области на прямоугольные и треугольные конечные элементы. Эта разбивка стучалась по мере приближения к зоне грунта прилегающей к трубе. В настоящее время имеются хорошо разработанные программные комплексы для решения плоских и пространственных задач линейной и нелинейной теории упругости по МКЭ

[16,17]. Такие задачи, могут быть решены на многосвязной области любого очертания (исключение составляет определение напряженно-деформированного состояния в малой окрестности особой точки).

### Постановка задачи

В прямоугольной декартовой системе координат рассматривается плоская область, в которой задано свободное круглое (или квадратное) отверстие (рис.1 и рис.2). Рассматривается подкрепление с отношением диаметра среднего контура к толщине, равное десяти. До начала момента вращения  $t=0$  точки рассматриваемой механической системы находятся в покое:

$$\begin{aligned} u|_{t \leq 0} &= 0; & \vartheta|_{t \leq 0} &= 0 \\ \frac{\partial u}{\partial t}|_{t \leq 0} &= 0; & \frac{\partial \vartheta}{\partial t}|_{t \leq 0} &= 0; \end{aligned} \quad (1)$$

Начиная с момента  $t \geq 0$  к области  $\Omega$  в некотором ограниченном объёме прикладывается внешняя нагрузка

$$u = \sigma / (\rho C), \quad (2)$$

где  $\sigma$  - амплитуда внешних нагрузок;  $\rho$  - плоскость материала;  $C$  - скорости рассмотрения продольных волн. Для нестационарных задач в качестве условий изучения требуется выполнение принципа причинности: в среде должны отсутствовать перемещения вне области, ограниченной передним фронтом волн, идущих от источников колебания. Граничные условия на границе расчётной области для делительных динамических (сейсмических) воздействий. При решении задач для бесконечных элементов из бесконечной полуплоскости выделяется исследования расчётная область конечных размеров. Исследуемая область дискретизируется, причём возникает необходимость постановки таких условий на границе, которые бы не повлияли на результаты решения за счёт отражения, что происходит при длительных динамических воздействиях. Некоторые исследователи предлагают рассматривать решения лишь на некотором расстоянии от границы области [1,8], считая, что отраженные волны не успевают достичь этого участка за рассматриваемый промежуток времени.

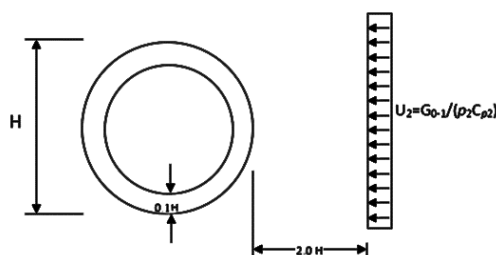


Рисунок 1. Воздействие упругой волны на подкрепленное круговое отверстие

## Impact Factor:

ISRA (India) = 4.971  
 ISI (Dubai, UAE) = 0.829  
 GIF (Australia) = 0.564  
 JIF = 1.500

SIS (USA) = 0.912  
 ПИИЦ (Russia) = 0.126  
 ESJI (KZ) = 8.997  
 SJIF (Morocco) = 5.667

ICV (Poland) = 6.630  
 PIF (India) = 1.940  
 IBI (India) = 4.260  
 OAJI (USA) = 0.350

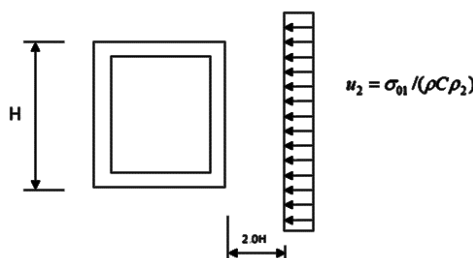


Рисунок 2. Воздействие упругой волны на подкрепленное квадратное отверстие

Иногда целесообразно вводить в расчётную область дополнительное искусственное демпфирование, увеличивающееся по мере приближения к границе [2,10]. В работе [2] были предложены граничные условия для конечной расчётной области, позволяющие моделировать бесконечную среду. Указанные граничные условия пропускают волну через границу расчётной области без отражения, т.е. получается так называемая стандартная вязкая граница. Задания стандартной вязкой границы осуществляется путём замены реакции не прижимаемой во внимание части полуплоскости распределёнными нагрузками  $\sigma$  и  $\tau$ , вычисленными по формулам:

$$\sigma = \alpha \rho C_p u; \quad \tau = b \rho C_s v; \quad (3)$$

где  $u$  и  $v$  - скорость движения точек на границе тела соответственно по координатам  $X_1$  и  $X_2$ ;  $\alpha$  и  $b$  - безграничные параметры;  $\rho$  - плотность материала;  $C_p$  и  $C_s$  - скорости соответственно продольных и поперечных волн. Подобные условия можно рассматривать как установку вязкого демпфера на границе.

### Методы решения

Процедуры МКЭ предусматривают переход от дифференциальных зависимостей, для отдельных конечных элементов к глобальной системе уравнений для всего массива. Для линейных задач нестационарного взаимодействия это система глобальная и имеет вид [10]:

$[M]\{q''\} + [S]\{q'\} + [K]\{q\} = \{F\} - [p]\{\delta'\}$  (4)  
 здесь  $[M]$ ,  $[S]$ ,  $[K]$  - соответственно матрицы масс, демпфирования жесткости системы;  $\{q''\}$ ,  $\{q'\}$ ,  $\{q\}$  - векторы укоренной скорости и смещений;  $\{F\}$  - вектор внешней нагрузки;  $[p]$  - матрица внешнего демпфирования. Матричное дифференциальное уравнение (4) в конечно - разностном виде с использованием методики Ньюмарка имеет вид

$$\begin{aligned} & \left(\frac{1}{\Delta t}\right)^2 [m](q^{j+2} - 2q^{j+1} + q^j) + \\ & \left(\frac{1}{2\Delta t}\right)[S](q^{j+2} - q^j) + [k][\beta q^{j+2} + (1 - 2\beta)q^{j+1} + \\ & \quad \beta q^j] = \\ & = \beta F^{j+2} + (1 - 2\beta)F^{j+1} + \beta F^j \end{aligned} \quad (5)$$

где  $j, j+1, j+2$  - прошедшие, настоящие и будущие значения переменных;  $\beta$ -параметр, выбираемый из условий численной устойчивости и точности. В рассматриваемом примере он принят  $\beta=1/3$ .

Таким образом, получается система линейных алгебраических уравнений, которая решается по временному шагу.

По предложению [10] использовались следующие соотношения для определения перемещения и скорости:

$$\begin{aligned} \{\dot{q}\}^{j+1} &= \{\dot{q}\}^j + \tau[(1 - \gamma)\{\ddot{q}\}^j + \gamma\{\ddot{q}\}^{j+1}]; \\ \{q\}^{j+1} &= \{q\}^j + \tau\{\dot{q}\}^j + \tau^2\left(\frac{1}{2} - \beta\right)\{\ddot{q}\}^j + \beta\{\ddot{q}\}^{j+1}; \end{aligned} \quad (6)$$

где  $\gamma$  характеризует схемные демпфирования,  $\gamma=1/2$  при котором затухание отсутствует. Соотношение (5) можно представить в форме алгебраической системы

$$\begin{aligned} [A]\{q\}^{j+1} &= \{R\}^j \quad \text{где} \\ \{R\}^j &= \{F\}^j + \left(\frac{2}{(\Delta t)^2}\right)[M] = [K]\{q\}^j - \frac{1}{(\Delta t)^2}\{q\}^{j-1}; \end{aligned} \quad (7)$$

которые реализуют типовую процедуру вычисления переменного вектора  $\{q(t)\}$ .

В случае диагональных матриц масс элементов матрица системы также является диагональной. Шаг интегрирования по времени принят равным  $0,125 \cdot 10^{-4}$  при минимальном периоде свободных колебаний элемента  $6,28 \cdot 10^{-4}$  с.

### Решение задачи о воздействии плоской продольной упругой волны на круглые полости.

В прямоугольной декартовой системе координат рассматривается плоская область, в которой задано круглое отверстие (рис.1). Начальные условия приняты нулевыми, что соответствует отсутствию упругих перемещений и скоростей при  $t=0$ . При  $0 \leq n \leq 10$  ( $n = t/\Delta t$ ) скорость упругого перемещения и изменяется от 0 до  $p = \sigma_o / (\rho c_p)$ ,  $\sigma_o = -0,1$  (МПа), при  $n > 10$   $u=p$ , что соответствует воздействию плоской продольной упругой волны типа функции Хэвисайда  $\sigma_{01}$  (рис.3)

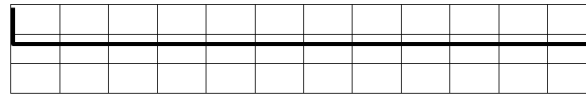
$$\sigma_{xx}^0 = \sigma_0 H(t)$$

<b>Impact Factor:</b>	<b>ISRA (India) = 4.971</b>	<b>SIS (USA) = 0.912</b>	<b>ICV (Poland) = 6.630</b>
	<b>ISI (Dubai, UAE) = 0.829</b>	<b>РИИЦ (Russia) = 0.126</b>	<b>PIF (India) = 1.940</b>
	<b>GIF (Australia) = 0.564</b>	<b>ESJI (KZ) = 8.997</b>	<b>IBI (India) = 4.260</b>
	<b>JIF = 1.500</b>	<b>SJIF (Morocco) = 5.667</b>	<b>OAJI (USA) = 0.350</b>

$$\sigma_{yy}^0 = \sigma_0 \frac{v}{1-v} h(t), \quad (8)$$

где  $t=t+(x+R)/c_p$ , ( $\sigma_0 = 1МПа$ );  $c_p$ -скорость продольной волны;  $R$ -радиус отверстия. Расчеты проведены при следующих исходных данных:

$$H=2,0 \text{ м}; \Delta t=0,407 \cdot 10^{-5} \text{ с}; E=0,36 \cdot 10 \text{ Мпа}; \\ v=0,36; \rho=0,122 \cdot 10^4 \text{ кг/м}^3; c=1841 \text{ м/с}; n=t/\Delta t.$$



**Рисунок 3. Воздействие типа функции Хэвисайда.**

Исследуемая расчетная область имеет 1536 узловых точек. Контур круглого отверстия аппроксимирован 28 узловыми точками. Диаметр круглого отверстия плоский фронт воздействия проходит за  $n=24$ . Графики показывают, что численное решение достаточно точно воспроизводит волновую картину. Расхождение для максимального сжимающего упругого контурного напряжения  $\sigma_k$  составляет 6%.

На рис. 4 показано изменение упругого контурного напряжения  $\sigma_k$  в точках 1А – 5А во времени  $t/\Delta t$ , при воздействии (8) сжимающее упругое контурное напряжение  $\sigma_k$  в точке 1А растет до максимума, а затем, осциллируя, асимптотически стремится к постоянной величине. Многократная суперпозиция прямых, тораженных и дифрагированных упругих волн приводит к концентрации сжимающего упругого контурного напряжения  $\sigma_k$  в окрестности точки 1А.

Максимальной величины сжимающее упругое контурное напряжение  $\sigma_k$  достигает в точке 1А почти за три прохода фронтом продольной волны диаметра круглого отверстия и равно  $\sigma_k = -2,712$ . Графики показывают, что упругое напряженное состояние около круглого отверстия стремится к

соответствующим номинальным упругим напряжениям.

### **Воздействие упругой волны на подкрепленное круглое отверстие.**

В прямоугольной декартовой системе координат рассматривается плоская область, в которой задано свободное круглое отверстие. Рассматривается подкрепление с отношением диаметра среднего контура к толщине, равное десяти. Начальные условия приняты нулевыми, что соответствует отсутствию упругих перемещений и скоростей упругих перемещений при  $t=0$ . В сечении на расстоянии 2.ОН (рис.1) при  $0 \leq n \leq 10$  ( $n = t/\Delta t$ ) скорость упругого перемещения и изменяются линейно от 0 до  $p = \sigma_0 / (\rho_2 c_{p2})$ ,  $\sigma_0 = -0,1Мпа$  (-1кгс/см), а при  $n > 10$   $u=p$ , что соответствует воздействию плоской продольной упругой волны типа функции Хэвисайда  $\sigma_0$ . Расчеты проведены при следующих исходных данных:  $H=2,0$  м.

$$\Delta t_1=0,186 \cdot 10^{-5} \text{ с}; E_1=0,72 \cdot 10^5 \text{ Мпа} (0,72 \cdot 10^6 \text{ кг/см}); v=0,3; \rho_1 0,275 \cdot 10^4 \text{ кг/м}$$

## Impact Factor:

ISRA (India) = 4.971	SIS (USA) = 0.912	ICV (Poland) = 6.630
ISI (Dubai, UAE) = 0.829	ПИИЦ (Russia) = 0.126	PIF (India) = 1.940
GIF (Australia) = 0.564	ESJI (KZ) = 8.997	IBI (India) = 4.260
JIF = 1.500	SJIF (Morocco) = 5.667	OAJI (USA) = 0.350

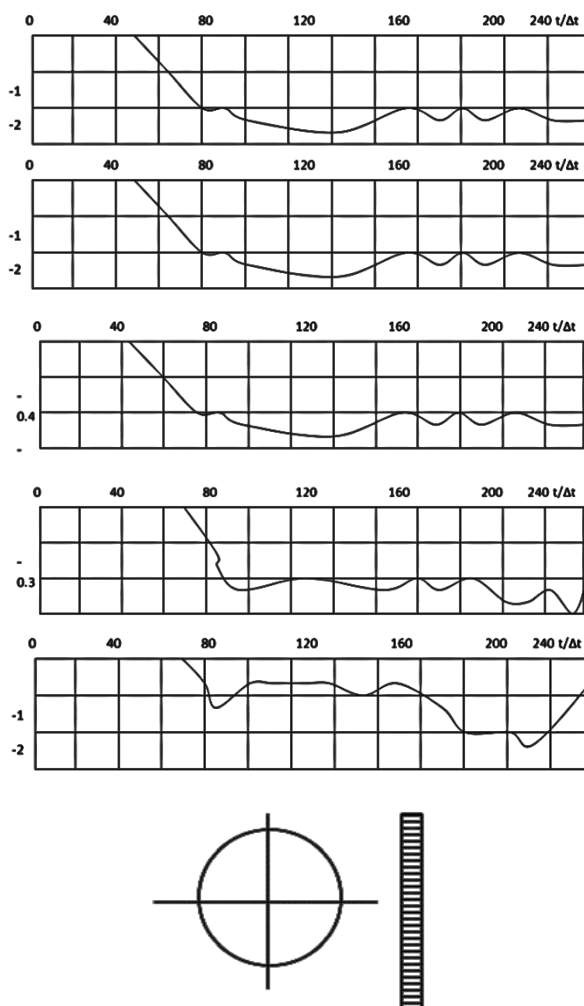


Рис.4. Изменение сжимающего упругого контурного напряжения  $\bar{\sigma}_x$  в точках 1А-5А во времени  $t/\Delta t$  на контуре свободного круглого отверстия при воздействии плоской продольной упругой волны типа функции Хэвисайда.

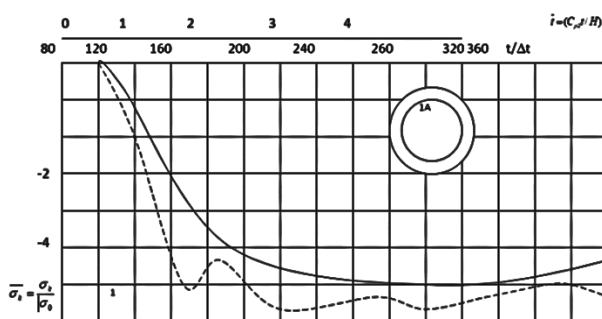


Рис.5. Изменение сжимающего упругого контурного напряжения  $\bar{\sigma}_x$  в точках 1А во времени  $t$  на контуре свободного круглого отверстия: 1-результаты аналитического решения при воздействии плоской продольной упругой волны типа функции Хэвисайда; 2-результаты численного решения, полученные МКЭ в перемещениях при воздействии плоской продольной упругой волны типа функции Хэвисайда.

$$(0,275 \times 10^{-5} \text{ кг/с / см}); c_{p1}=536 \text{ м/с}; \\ \Delta t_2=0,407 \times 10^{-5} \text{ с}; E_2=0,36 \times 10 \text{ Мпа}$$

$$(0,36 \times 10) \times 5 \quad \nu=0,36; p_2=0,122 \times 10^4 \text{ кг/М}^3 \\ (0,122 \times 10^{-5} \text{ кгс/см}^2); c_{p2}=1841 \text{ м/с};$$

## Impact Factor:

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 ISI (Dubai, UAE) = 0.829  
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ICV (Poland) = 6.630  
 PIF (India) = 1.940  
 IBI (India) = 4.260  
 OAJI (USA) = 0.350

(...1 – подкрепление, ...2 – среда). Исследуемая расчетная область имеет 1536 узловых точек. Внутренний контур подкрепленного круглого отверстия аппроксимирован 28 узловыми точками. По толщине подкрепление аппроксимировано двумя узловыми. Наружный контур подкрепленного круглого отверстия аппроксимирован 32 узловыми точками. Диаметр среднего контура подкрепленного круглого отверстия (плоский фронт воздействия) проходит за  $n=60$ . На рис.5 показано изменение сжимающего упругого контурного напряжения  $\sigma_k$  ( $\sigma_k = \sigma_k / |\sigma_0|$ ) в точке 1А во времени  $t(t = (c_{p2}t) / H\% \cdot 1(-)-2(-)-)$  – результаты аналитического и численного решения при воздействии (8). Расхождение для максимального сжимающего упругого контурного напряжения  $\sigma_x$  составляет 16%.

### Воздействие плоской упругой волны на подкрепленное квадратное отверстие.

Рассмотрим задачу о взаимодействии плоской продольной упругой волны на подкрепленное квадратное отверстие (рис.6). В прямоугольной декартовой системе координат рассматривается плоская область, в которой задано подкрепленное квадратное отверстие. Рассматривается подкрепление с отношением стороны среднего контура к толщине равной десяти. Начальные условия приняты нулевыми, что соответствует отсутствию упругих перемещений и скоростей упругих перемещений при  $t=0$ . В сечении на расстоянии  $2 \cdot OH$  при  $0 \leq n \leq 10$  ( $n=t/\Delta t$ ) скорость упругого перемещения и изменяется линейно от 0 до  $P=\sigma_0 \cdot (\rho_2 c_{p2})$  ( $\sigma_0=-0,1$  МПа (-1кгс.см)), при  $n>10$   $u_2=p$ , что соответствует воздействию плоской продольной упругой волны типа функции Хэвисайда (рис.8).

Расчеты проведены при следующих исходных данных:  $H=2,0$ ;  $\Delta t=0,186 \cdot 10^{-5}$  с;  $E_1=0,72 \cdot 10^5$  МПа ( $0,72 \cdot 10^6$  кгс/см<sup>2</sup>);  $\nu=0,3$ .

Исследуемая расчетная область имеет 13-40 узловых точек. Внутренний контур подкрепленного квадратного отверстия аппроксимирован 36 узловыми точками. Наружный контур подкрепленного квадратного отверстия аппроксимирован 44 узловыми точками.

Диаметр среднего контура, подкрепленного круглого отверстия (плоский фронт воздействия) проходит за  $n=60$ . На рис.7 и рис.8 показано изменения упругого контурного напряжения  $\sigma_k$  ( $\sigma_k = \sigma_k / |\sigma_0|$ ) в точках 1А-11А во времени  $t/\Delta t$  при воздействии (8). Сжимающее упругое контурное напряжение  $\sigma_{xk}$  в точке 5А растет до максимума, а затем осциллируя, асимптотически стремится к постоянной величине. Постоянная суперпозиция прямых, отраженных и дифрагированных упругих волн приводит к концентрации сжимающего упругого контурного напряжения  $\sigma_k$  в окрестности точки 5А. Максимальной величины сжимающее упругое контурное напряжения  $\sigma_k$  достигает в точке почти за два прохода фронтном продольной волны стороны среднего контура подкрепленного квадратного отверстия и равно  $\sigma_k = -13,9$ .

Графики показывают, что сжимающее упругое нормальное напряжение подкрепление сжимает концентрацию упругих напряжений около отверстия. Упругое напряженное состояние при удалении от подкрепленного квадратного отверстия стремится к соответствующим номинальным упругим напряжениям. сравнительный анализ контурное напряжений неподкрепленного и подкрепленного отверстия (точка 1А).

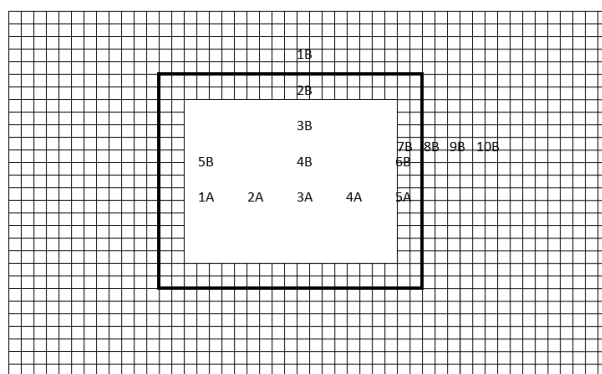
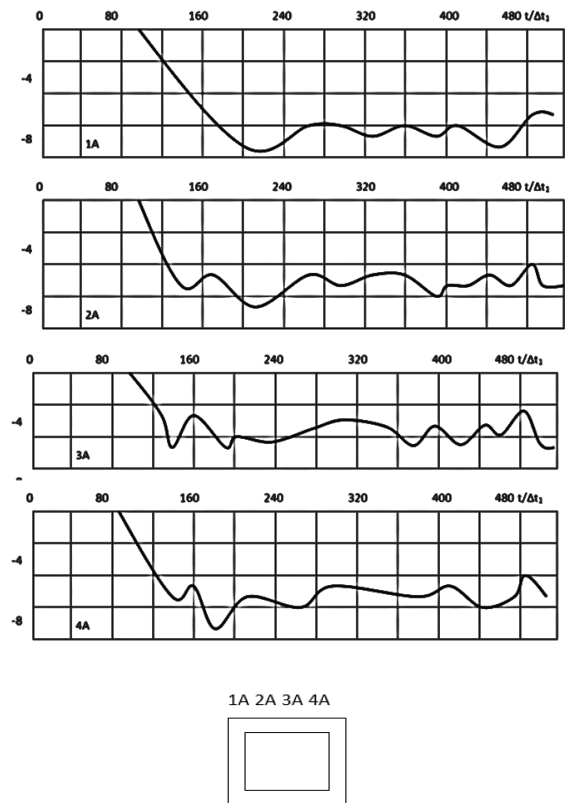


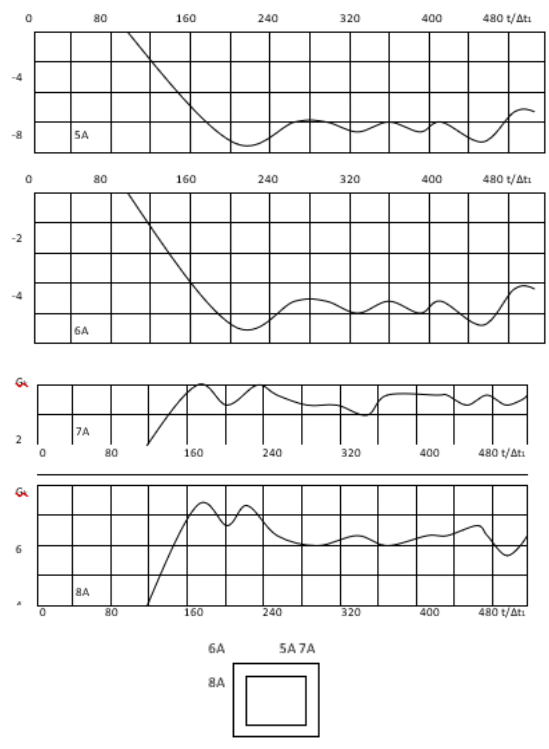
Рис. 6. Точки, в которых приводятся упругие напряжения во времени.

**Impact Factor:**

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**Рис. 7. Изменение сжимающего контурного  $\sigma_k$  в точках 1А-4А во времени  $t/\Delta t_1$  на внутреннем контуре подкрепленного квадратного отверстия при воздействии плоской продольной упругой волны типа функции Хэвисайда.**



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Рис.8. Изменение контурного напряжения  $\sigma_k$  в точках 5А-8А во времени  $t/\Delta t_1$  на внутреннем контуре подкрепленного квадратного отверстия при воздействии плоской продольной упругой волны типа функции Хэвисайда

### Выводы:

- при воздействии плоской продольной волны типа функции Хэвисайда максимальное растягивающее упругое контурное напряжение возникает: для свободного отверстия в точке, находящейся на оси симметрии в теневой области внутреннего контура подкрепления; для подкрепленного квадратного отверстия в точке, находящейся на оси симметрии в освещенной области внутреннего контура подкрепления.

- при воздействии плоской продольной упругой волны типа функции Хэвисайда на свободное круглое отверстие и на свободное квадратное отверстие сжимающее упругое контурное напряжение максимальной величины достигает не более за три прохода фронтом волны характерного размера.

- анализ численных результатов показывает, что МКЭ в перемещениях с успехом может применяться для решения плоской динамической задачи теории упругости и становится конкурентоспособным с другими методами динамической теории упругости. Проведенные исследования сходимости и устойчивости, сравнение результатов численного решения плоской динамической задачи теории упругости,

полученных МКЭ в перемещениях, с результатами аналитических решений, показало их хорошее совпадение, что позволяет сделать заключение о физической достоверности результатов численного решения плоской динамической задачи теории упругости, полученных МКЭ в перемещениях.

- максимальное значение интенсивности напряжений в прямоугольном сооружении, взаимодействующем со средой, достигается на границе, вблизи угловой точки и во внутренних точках тела.

- Максимальных контурных напряжений в подкрепленных отверстиях четыре раза больше, чем максимальных контурных напряжений в свободных отверстиях. Наличие подкрепления снижает концентрацию напряжений в среде.

- установлено, что в начале подкрепленная отверстия и к моменту, когда волна проходит около ее радиусов, становится почти равномерно всесторонне сжатой, затем наступает качественно новая фаза движения, на которой контурные напряжения падают, а появившиеся заметные изгибные напряжения бурно растут с образованием по кольцу отверстия пяти волн.

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## THE SOURCES OF THE WORK “AT-TAMHID FI BAYANIT TAWHID” BY ABU SHAKUR AS-SALIMI AL-KESHI

**Abstract:** This article provides the important information on the subject of aqeedah "At-Tamhid fi bayanit tawhid" on the basic sources of the work of the scholar Abu Shakur as-Salimi al-Keshi, who lived and worked in Movarounnahr in the second half of the XI century and the XII century.

**Key words:** Movaunnahr, Creator, Ahli Sunnah va Jamaah, Hanafi, Moturidia, Asharia, Quran, Hadith, Belief, Muqalid, Qadaria, mutazila, Hashavia.

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### Introduction

The famous Movarounnahr scholar Abu Shakur as-Salimi al-Keshi, who lived in the second half of the 11th century and the first quarter of the 12th century, made a huge contribution to the development of Moturidiyya doctrine. The full name of the scholar is Abu Shakur Muhammad ibn Abdullah Said ibn Shuayb al-Kashi al-Hanafi as-Salimi al-Makshifi. The place of birth and upbringing of scholar is given to the scholar as a name in relation to the ancient city of Kesh, and in some Arabic sources it is mentioned as “al-Kashshi” or “al-Kassi”.

Abu Shakur as-Salimi al-Kashi wrote a work on the science of aqeedah, entitled as “At-Tamhid fi bayani tawhid” (Guide to the statement of Tawhid). In this work, the scholar covered religious issues from the standpoint of the Moturidis. His work differs from the works of the aqeedah in its simplicity and lightness of style.

While writing this work, Abu Shakur as-Salimi quoted the verses from the Quran, the Hadiths of the Prophet, the words of the Companions, the followers and the followers, Abu Hanifa (d. 150/767), Abu Yusuf (d. 182/798), Muhammad ibn. It can be seen that he acted on the basis of narrations narrated on religious subjects as well as a number of works from

famous scholars such as al-Hasan (d. 189/805) and Malik ibn Anas (d. 179/712).

It can be seen that the author used the works of his masters and other well-known Hanafi scholars in the writing of the work “Al-Tamhid”, as well as important works on theology and other sciences. Although in some places it is openly pointed out that it is a quotation from a particular work, in many places such a situation is not observed.

While discussing the religious topics, the verses of the Quran are first cited as evidence. But the surah and the sequence number of these verses are not mentioned in his work. It is known that the verses of the Quran are firm in terms of reaching us, but not all are firm in terms of proving their meaning. In this regard, the scholars of the subject “Al-fiqh” divide it into four divisions according to the wording and meanings of the verses of the Quran. In turn, these four divisions are divided into twenty parts, each with its own definition and sentence.

It is also noteworthy that the author used the popular commentary books to explain and interpret the meanings of some verses on religious topics. In particular, he interprets the subject of "Believers to see Allah in Paradise in the Hereafter" using the commentary of the work "Jame 'al-bayan fi tafsiril Quran" [1: 65-69] by Ibn Jarir at-Tabari (d. 310/923).

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According to the Moturidis, Abu Mansur al-Moturidi referred to the book of "Tawheed al-Ahli Sunnah wa'l-Jama'ah" when discussing the issues such as "Taqwin (creation) is different from Muqawwan" [2: 268]. It can also be observed that the author is a mature scholar in the science of commentary in stating the original meanings of many verses.

It is also not indicated the source of the Hadiths cited as evidence for the various religious topics described in "At-Tamhid". In some places, the Hadith is mentioned directly in the mursal state, that is, without quoting the narrators between himself and the Prophet (peace and blessings of Allah be upon him).

It should be noted that mursal hadiths are a document in the Hanafi school. This is because the mursil (narrator of the Hadith in the mursal state) narrates the hadith between him and the Prophet (peace and blessings of Allah be upon him) only if he clearly believes that the Hadith is authentic. On the contrary, he mentions the narrators in the middle in a place where he does not fully believe. It should be noted that Abu Shakur as-Salimi used a number of reliable collections of Hadith in his work to cite the Hadiths as evidence.

One such collection of Hadiths is the work of Imam al-Bukhari (d. 870), "Al-Jame 'as-sahih (a reliable collection)". Abu Shakur al-Salimi cites a number of Hadiths from this collection of Hadiths as the evidence for various religious themes in his work. For example, he mentioned such hadiths as "do not raise your voices, for the One you are praying for is neither absent nor deaf", "Allah has ninety-nine names, and whoever counts them will enter Paradise," the unborn child is born according to nature", Then his parents will bring him up as a Jew or a Christian or a pagan." [3: 331].

In At-Tamhid, he also used hadiths on a number of religious topics in al-Jame 'as-Sahih (the trustworthy collection) by Imam Muslim, the second largest collection of hadiths. In particular, the author mentioned the following hadiths: "The Prophet (peace and blessings of Allah be upon him) was asked when you became a prophet. He said, "When I was a prophet, Adam was between water and mud." "The Qur'an was revealed in seven letters, all of which are sufficient and healing." While passing through the cemetery, he placed a wet branch of a palm tree on top of the two graves on the ground and said, "Allah will ease the torment when these two (two palm branches from the owners of the grave) are wet" [4: 432].

Using some quotation of the work "Al-Musnad" by Imam Ahmad ibn Hanbal such as "I am the master of the children of Adam," "The key to paradise is the word of God," "Allah commands those who have a particle of faith in their hearts to be expelled from Hell." [5: 378]. Abu Shakur al-Salimi also attracted attention and used them in some parts of his work.

It can be seen that Abu Dawud used the hadiths in his work "Sunanu Abi Dawud". In particular, in the collection of Abu Dawud, "The Qadaris are the pagans of this ummah". "If they are sick, do not go. If they die, do not attend the funeral. They are the followers of the dajjal." "Allah created Paradise and its people and created Hell and its people." "About the Prophet's grandson Hasan: "This son of mine is a Sayyid. He will soon reconcile the two groups of believers because of him." [6: 283]. These hadiths are also mentioned in this work.

A number of hadiths have been referred into "Sunan at Termzi" by Imam al-Termizi. For example, to the question What is faith?. the Prophet (peace and blessings of Allah be upon him) answered, Iman is believing Allah, His angels, His Messengers, His Books, do believe in the resurrection after death, and that destiny is from Allah, good and bad, "Oh Ali, only believer can love you and only hypocrite people can dislike you", "Thirty years of caliphate after" [7: 132]

A number of hadiths from "As-Sunan" by Ibn Majah have been used. In particular, "The Messenger of Allah (peace and blessings of Allah be upon him) was asked about faith. He said: "(Iman) is to know the heart, to confess with the tongue and to perform the pillars," and "Repentance is repentance" [8: 438].

The hadith which was from the work "Al-Sunan" by Imam an-Nasoni: "Whoever falls asleep or forgets the prayer, let him recite it as soon as he remembers" [9: 143].

Tabarani's "He who is addicted to alcohol will not enter Paradise," "The happy man will be happy in his mother's womb, and the unhappy man will be unhappy in his mother's womb" [10: 147] and the work "Al-Mustadrak" by al-Hakim al-Naysabur, hadiths such as "I am the city of knowledge, its foundation is Abu Bakr, its wall is 'Umar, its roof is Usman, and its door is Ali" [11: 124] have been mentioned in discussions of faith and knowledge.

Al-Bayhaqi's "Sunan al-Bayhaqi" also quotes the hadith as following, "Like the stars of my Companions (in finding the right path), whichever one you follow, you will find the right path" [12: 234].

Also, in Daraqutni's work, such hadiths also mentioned: the Prophet (peace and blessings of Allah be upon him) entered the mosque one day with his right shoulder on the shoulder of Abu Bakr and his left shoulder on the shoulder of 'Umar and said: [124]. "This is how we live, this is how we die, this is how we are buried and this is how we are resurrected."

It is worth saying that Abu Shakur al-Salimi made effective use of a number of sources on theology, in particular the works of Imam Abu Hanifa, the founder of the Hanafi school, in explaining religious topics in addition to the collections of hadiths mentioned above. In particular, the views Abu Shakur al-Salimi on the attributes of Allah, whether faith increases or decreases, and whether the servant is able to do something with the power that Allah

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creates at that time are in line with the topics were explained in an understandable style, which was described in the work "Al-Wasiyat" by Abu Hanifa, explained in an understandable style [14:32].

In addition, in the work "Al-Fiqh al-Akbar" by Abu Hanifa, such religious themes as Allah's knowledge of the unknown, the eternity of Allah's creation, and the measurement of the deeds of His slaves are also reflected in the work of as Solimi.

It can be seen that the scholar Muhammad ibn Hasan, who made a great contribution to the spread of the Hanafi school in the Islamic world, quoted from the work "Al-Jame 'al-Kabir" to shed more light on the subject of imitation in faith.

It is not right to make an exception in faith, but to say, "I am a true believer," the definition of God's justice and grace, It should also be acknowledged that religious topics such as the will of Allah were narrated by Abu Mute "al-Balhi", a direct student of Abu Hanifa, using the work "Al-Fiqh al-absat". [16: 103]. The work "Al-Fiqh al-absat" is noteworthy not only in the work of al-Salimi, but also in the texts of the Moturidis and Eastern Ash'aris.

Abu Shakur al-Salimi narrated the religious views of the Mu'tazilites based on the works of Qazi Abduljabbar (d. 415/1025), the leader of the Mu'tazilites in his time. In particular, according to the Mu'tazilites, he used "Al-Kitab al-Mughn" to explain such topics as the definition and practice of reason, and the obligation to interpret similar verses [17: 375].

In addition, according to the Mu'tazilites, it is obligatory to believe in man due to reason, it is not permissible to imitate in faith, and the imitator is not considered a believer, the denial of the attributes of Allah is eternal, and his views on the justice of Allah are explained in the work "Sharh Usulil Hamsa" by Qazi Abduljabbar (Commentary on the Five Principles of Mu'tazilites) [18: 121].

Abu Shakur al-Salimi described the beliefs of the Mu'tazilites about intercession on the basis of the work "Matashabeh ul-Qur'an" by Qazi Abduljabbar [19: 499].

It should be noted that the work "Tamhid" by Abu Shakur al-Salimi was directly based on the teachings of Moturidia, and the masterpiece of the founder of this doctrine "Kitab at-Tawhid" by Abu Mansur al-Moturidi was also used effectively.

In particular, according to the Moturidis, the Creator of the universe is ancient, the attributes of Allah, the revelation of Allah and the sending of messengers are obligatory according to wisdom, the steadfastness of the Shari'ah is ugly, and there is no difference between faith, Islam, enlightenment and monotheism. The interpretation of Abu Shakur as-Salimi on issues such as the ability of God to create is fully consistent with the views of Moturidi [20:30].

In addition, Abu Mansur al-Moturidi used the work "Sharh al-Fiqh al-Akbar" directly in his coverage of the role of faith - the heart and the tongue,

that is, the heart is the place of faith and the heart is the place of confession, and the two are the pillars of faith [21: 12- 14]

Al-Hakim al-Shahid (d. 334/945), one of the scholars of the Hanafi madhab, quoted directly in the debate on the conditions of faith and whether or not should increase.

It can be seen that Abu Shakur al-Salimi acted on the basis of the theological works of Abul Hasan al-Ash'ari, the founder of this doctrine, in expressing the views of the Ash'aris on matters of faith. In particular, the work al-Ash'ari "Mujarradu's article al-Shaykh al-Ash'ari li Ibn Furak" by al-Ash'ari refers to the fact that according to the Ash'arites, taqwin and muqawan are one thing, that wickedness does not undermine faith and imamship, and that the deeds of slaves will be considered on the Day of Resurrection [22: 28].

The work "Maqalat al-Islamiyyin" by Abul Hasan al-Ash'ari has been used to argue that the Mu'tazilites believed that Allah had no attributes, that the intercession of the Prophet (peace and blessings of Allah be upon him) belonged to the entire Ummah who died as a believer, and that the Mu'tazilites believed that the names of Allah are other than Him, and they are all creatures [ 23: 188].

In addition, Abul Hasan al-Ash'ari used Kitab al-lam to explain such matters as naming Allah by a name and the obligation of Allah to send messengers. [24:54] According to the Ash'arites, the mind is not a means of knowing Allah and the issue of knowing Allah through the Messenger , which has been used by Abul Hasan al-Ash'ari in his book Usulu ahlis-sunna wal-jama'ah (Ahli as-sunnah's beliefs). [25:54] According to the work "Al-Ibanatu an usulid-diyana" by Abul Hasan al-Ash'ari (Statement of the Foundations of the Faith), the Ahli Sunnah wal-Jama'ah, shed light on issues such as evil and sin not being commanded and approved by Allah [26:67].

One of the great representatives of the Ash'ari doctrine, Abu Bakr Muhammad al-Baqilani, based on the work of "Tamhid ul-avoil" and "Talxis ud-daloil", mentioned the views of the Ash'arites and the Karaites on similar verses and the views of the Ash'aris and Hashawis on the names of Allah [27: 295-298]. In addition, al-Baqilani used the work "Al-Insaf fi asbabil-khilaf" (Objectivity about the causes of discord) to illuminate religious issues such as the views of the Ash'arites on the definition of the Quran and the need for the Quraysh to be imams according to the Ahli Sunnah wa'l-Jama'ah [28:12; 63].

Another scholar of the Ash'arite school of thought, Juwayni, used the work "Al-Irshad" to describe what the Mu'tazilites thought was good and what the evil mind considered evil, and what the Mu'tazilites and Qadaris considered as good to be from Allah and evil from the slaves of Allah. [29: 229].

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Al-Jahiz, one of the Mu'tazilite scholars, used the work "Rasa'il ul-Jahiz" (The Treatises of Jahiz) to shed light on topics such as the fact that, according to the Mu'tazilites, they could not be called by the names of Allah [30:16; 85].

Ibn Hisham in his work "Al-Siyratu an-Nabawiyah" quotes the saying of Aisha, the mother of the believers "On the night of the Ascension, the body of Muhammad (pbh) did not disappear".

In addition to the above-mentioned works, Abu Shakur al-Salimi was accompanied by Companions such as Abu Bakr as-Siddiq, Umar ibn al-Khattab, Ali ibn Abu Talib, Tabein such as Hasan al-Basri, Abu Hanifa, and Malik ibn Anas, Abu Mute' al-Balhi, Abu Yusuf Ya'qub, Ibn Ibrahim, Muhammad ibn al-Hasan, Muqatil ibn Sulayman, Muhammad ibn Idris al-Shafi'i, etc., whose also refer to the meanings of verses and hadiths, as well as the words and opinions of scholars belonging to the class of followers.

In addition, the Ahli Sunnah wa'l-Jama'ah shed more light on the subject, using the debates of the scholars of the various erring sects of their time.

For example, the famous Tabein Hasan al-Basri (d. 110/728) quotes the words of God about the amount of intelligence such as : "Allah has given us wisdom as much as we know slavery, and He has not given us wisdom as much as we know about God." Muhammad ibn al-Hasan (d. 189/805) who was the disciple Abu Hanifa narrated the words of the Creator about justice: "Allah does not punish anyone innocently" [32: 20-21] The famous Companion narrated that Abdullah ibn Mas'ud said about the ruling of the children of the polytheists who died in the youth of the polytheists in the Hereafter: "Believers are the kings whose servants are young children, and the young children of polytheists are servants of the people of Paradise" [32:32]. Ali ibn Abu Talib (d. 40/661), one of the Khilafah al-Rashid, quoted the words of the Prophet (peace and blessings of Allah be upon him) as to which of the two is superior to the intellect as following: "The intellect is preferable, because knowledge needs intelligence, while the mind does not need knowledge" [32:34].

Abu Shakur al-Salimi also cites the debates of the scholars of Ahli Sunnah wa'l-Jama'ah on various topics related to the 'aqeedah'. In particular, during the reign of Caliph Harun al-Rashid (786-809), the ten Zindiks (atheists) won over all the jurists and scholars of Baghdad at that time by arguing about the existence of a Creator. Caliph Harun al-Rashid was saddened by this incident and summoned Muqatil ibn Sulayman (b. 150/767), the chief of the commentators in his time, from Basra to Baghdad and ordered him to discuss them. Muqatil ibn Sulayman narrated the process of debating these dynasties, which denied the existence of a Creator, and how he overcame them. As a result, two of these atheists became Muslims. [32:52]

Ghaylan al-Qadari, who was the leader of the Qadaris in his time, came to Kufa from Basra in 740

and gathered the faqihs of Kufa on the subject of the will and will of Allah, debated with them and defeated them. It was at this time that Abu Hanifa, under the command of his teacher Hammad ibn Abu Sulayman (d. 120/738), debated with Ghaylan al-Qadari (d. 150/767) and was told that he had won [32: 129-131].

Abu Shakur as-Salimi also paid special attention to the views of Sufi scholars on the knowledge of the Creator. For example, when al-Shibli (d. 334/946) was asked, "How did you know your Lord?" he answered the following: "I knew Allah with Allah. If it weren't for Him, I wouldn't know Him." [32:214] Hotam al-Asam (d. 238/851) was asked "How did you know your Lord?" He replied, "I recognized His works in all things" [32:215].

The judge of Samarkand, Sheikh Said ul-Islam Abu Said al-Khalil ibn Ahmad ibn Muhammad ibn Khalil ibn Musa ibn Asim ibn Jank as-Sijzi (d. 378/988), who was known as Ibn Jank on the subject of imitation in the faith of Abu Shakur as-Salimi mentioned that he had seen and used the fatwa by his own which he was given once. But Abu Shakur as-Salimi did not meet Ibn Jank directly. Abu Shakur as-Salimi used the fatwa of Qazi Abu Said al-Khalil in his work, because he was the imam of the Ahl al-Ray (Hanafi school) in his time and was a judge in Samarkand till the end of his life.

Muhammad ibn Fadl, Muhammad ibn Ahmad al-Ansari (d. 350/962), narrated on the interpretation of some verses of the Quran [32: 230]. by Abu Sahl al-Anbari. He mentioned the views of Sufyan as-Sawri and Abul-Qasim al-Qushayri (d. 465/1072) on the subject of exceptions in the faith [32: 236]. He narrated a conversation between Hammad ibn Abu Hanifa, who was the son of Abu Hanifa, and Imam Malik about doubt in faith [32: 234].

He mentioned the view of Al-Hakim al-Termizi (d. 320/932) that it is true that the deeds of the slaves of Allah are weighed on the Day of Resurrection [32: 259]. He narrated the words of the famous Arabic writer and poet al-Asmai (d. 216/831) about the meaning of some attributes of Allah [32: 380].

The reference of Abu Shakur al-Salimi to a number of authoritative sources in writing the work of "Tamhid" adds to the value and importance of "Al-Tamhid". By interpreting the verses of the Quran on various religious topics and interpreting the meanings of the hadiths, it is possible to know how skilled Abu Shakur al-Salimi was in the science of tafsir and hadith.

The use of the works of Abu Hanifa, who was the leader of the Hanafi school, and Abu Mansur al-Moturidi, who was the founder of the doctrine of Moturidi, and other scholars, further enhances the value of Tamhid. In whole, the scholars of later times used the work "Al-Tamhid" by Abu Shakur as-Salimi as a source in their writings. Ahmad Rifat Efendi (d. 1293/1876) in his book "Mir'at ul-maqasid

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(Mirror of Goals)" about the Besiktas sect made effective use of the work "at-Tamhid" among a number of important sources [33: 202].

In addition, It is worth mentioning that the author gave some commentaries on many books of well-known Hanafi scholar Nuriddin ibn Sultan Muhammad Ali al-Qari, in his book "Sharh al-Fiqh al-Akbar" (Commentary on Fiqh al-Akbar). Abu Shakur as-Salimi quoted al-Tamhid directly in his coverage of religious issues on the topic "Great sin does not lead a believer away from faith" [34: 155].

It should be noted that Bayazi Zada (d. 1687) in his book "Al-usul al-munifatu lil-imam Abi Hanifata (Imam Abu Hanifa's religious views)" effectively used the work of Abu Shakur as-Salimi "Tamhid". Which was the interpretation of the religious views of Abu Hanifa [35: 124].

Modern scholars who have conducted the research on the origin and history of the formation of the doctrine of Moturidia have expressed positive views on the important role of Abu Shakur al-Salimi's work "Tamhid" in the development of theology. In particular, Claude Gillod, a European orientalist, states the following: "As we have seen, there were no perfect works of theology in Movarounnahr until the second half of the fifth century". It was at this time that Abu Shakur as-Salimi (who lived in the second half of the 5th century AH) wrote "Al-Tamhid fi bayan at-tawhid" which was his perfect work on theology. This work made a great contribution to the further development of the doctrine of Moturidia" [36: 155-203].

An orientalist A. Muminov says that the time of Abu Shakur as-Salimi dates back to the second half of

the V / XI centuries and he notes that this work was mainly used as a textbook, and briefly spoke about the scholar and his work "At-Tamhid" [37:59].

Sonmez Kutlu, a Turkish scholar, in his article "The sources of theological literature in the period of Timur and later centuries in Turkistan" considered about the period from Abu Mansur Moturidi to Amir Temur and their works on theology and some of these books, about which scholar today is giving an important information, when it was published and who was publishers. Sonmez Kutlu singled out Abu Shakur as-Salimi among these scholars. In addition, this article provides important information on the development and activity of the doctrine of Moturidism in the period of the Timurids and in subsequent centuries [38: 1-10].

Ahmad Rifat Efendi (d. 1293/1876), who was one of the authors who lived and worked in the last period of the Ottoman Empire, used the work "Al-Tamhid" by Abu Shakur as-Salimi as one of a number of authoritative sources in his book on the history of mysticism and sects, "Mirat ul-maqasid fi daf'il-mafosid (Mirror of Purposes in Repelling Corruption)". The author presented this work to the Ottoman ruler Sultan Murad V (1840-1904) [39: 187-212].

Turkish scholar Ja'far Qaradash, in his book "The Life of the Hereafter in the Concept of Islam", mentioned about the direct use of the work "Al-Tamhid" by Abu Shakur al-Salimi in discussing the eternity of the Hereafter and the views of various sects in this regard [40: 31-34].

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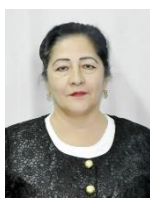
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## METHODOLOGICAL FEATURES OF THE TYPES OF SENTENCES IN THE UZBEK LANGUAGE ACCORDING TO THE PURPOSE OF EXPRESSION

**Abstract:** The article describes the possibilities of using interrogative, command sentences for the purpose of speech. Speech types are shown to be as functional as they are neutral in speech patterns. Descriptions, interrogations, commands, and exhortations are described as having different meanings depending on their use in different speech styles, and their correct using is illustrated by examples of speech implications. It is emphasized that affirmative and negative statements have methodological features in the Uzbek language.

**Key words:** Uzbek language, speech, adverb, style, modal relation, speaker, speech process, rhetorical interrogative sentences, command sentences, speech styles, affirmative and negative sentences.

**Language:** English

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### Introduction

National independence has opened a wide way for the development of our native language, as well as in all spheres of life without exception [1,3]. In the Uzbek language, it is possible to effectively use different types of speech to express ideas correctly and effectively. Language is also a great product of human culture and an opportunity for development. This is because his thinking and speech play a key role in the formation of a person as a human being. [2,5]. Informative sentences are the most commonly used type in all styles of speech. They are primarily responsible for informing the listener by confirming or denying an event, object, sign, quantity, and so on. It also serves to express modal attitudes such as suspicion, joy, pride, sadness, longing, despair, pitching.

These meanings are related to the verb form. When there is an interjection, the lexical meaning understood from the interjection is confirmed, the tense is indicated, or the modal relation is expressed. **Ukam-o'qituvchi-Ukam o'qituvchi bo'ldi // bo'ladi // bo'lmoqchi // bo'lar.** My brother is a teacher-My brother became a teacher // will // want to be // will be.

In order to express meaning such as suspicion, pitching, joy, it is necessary to say the words in a special tone. It depends on the speech time and the speech process. When the speaker expresses his attitude to the reality stated in the listener's information during the speech, he repeats his speech exactly with a special question or exhortation. In this case, the speech is in a dialogical form. I'm here now. **"Am I here now?" I'm here now!** The irony is pronounced with a vowel stretch beyond the melody for pitching meanings:... **have I come now? Am I done?** In this case, in order to clarify and reinforce the meaning of sarcasm or denial, the preposition "a" is given after the sentence. **Am I going too? Aaa?**

Interrogative sentences are mainly used in dialogic speech and in most cases require an answer. Interrogative sentences formed through affix loadings are rare in formal work within the framework of decrees, judgments, and scientific methods. Interrogative sentences and interrogative words are used more in artistic, journalistic, and colloquial speech styles.

Question forms that express different modal attitudes are specific to the style of speech and artistic



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discourse, and are rarely or rarely used in formal and scientific styles.

The interrogative forms formed by tone are unique to the style of speech and represent the concept of a separate *ottenka* question, not a pure interrogation. The interrogation may be accompanied by a variety of emotions. Sentences that express such a concept are called rhetorical interrogative sentences. Rhetorical interrogative sentences are sometimes formed in the form of pure interrogative sentences, and often by special lexical-morphological and phonetic means:

a) The rhetorical interrogative pronouns formed by **nahot / nahotki** in Uzbek language/ are related to the meaning of surprise, sometimes requiring an answer, and sometimes not. When it does not ask for a reply, it means a call, when required for an answer, the tone of the question prevails.

b) – The interrogative forms formed by **uzbek mi, -a** are used in both internal and external speech processes and usually do not require an answer. When the speaker is amazed by the events of the objective world, when this event happens unexpectedly, he asks himself a question with the form of a question. At the heart of this question is a clear answer. When speech is uttered in a tone of voice, *ottenkas* such as anger and hatred, regret and denial are expressed, and when uttered in a tone of interrogation, *ottenkas* are expressed.

For example: Oh my god! Is this an angel?!(surprise) Who knows, we'll see no, shall we?(thinking), Will you answer me like that?(anger, denial). Wow, what did I do? How many days are left, ah ?! What should I do now? can i read (regret, contemplation).

There is no rhetorical questioning in the type of statements like: **he knows whether he will go or not**. In such statements, **uzbek -mi** in English **whether** relates the first structure to the second, and at the same time shows whether the two actions in the first structure are equally related or unrelated to the reality understood from the next construction. Rhetorical interrogative sentences can be cohesive. In this case, reality is denied and meaning is reinforced. In some cases, the interrogation may be denied again by special means. **U seni so'kdimi-yo'q, urdimi-yo'q - U seni so'kdimi, urdimi-yo'q! (Whether he insulted you or not - whether he insulted you or not!)**

The speaker enters the interrogative sentence into the speech in order to attract the listener's attention and continues the speech without waiting for an answer. In this way, it is said that the event expressed in the interrogative sentence is significant for the event that will take place later: **Ana u: Ko'ryapsizmi? Ana, biz tomonga uchib kelyapti! (Here it is: Do you see? Here it is flying towards us!)**

In order to increase the emotionality of the speech, to exaggerate the significance of certain events, interrogative sentences with the word in **uzbek "aytmaysizmi" (Especially)** are used: **Ayrim kishilarning ruhlanib ketganini aytmaysizmi?! Ko'rmaysizmi?! Qaramaysizmi?!( Wouldn't you say some people are inspired ?! Don't you see ?! Don't you see ?!)**

Compare: **Some people are inspired- Especially some people are inspired ?!** It seems that in such structures, first of all, the feeling of the speaker is expressed. In some cases, the speaker introduces the form of the interrogative sentence in front of the part of speech in order to express his speech, to emphasize the importance of the performance of a particular action: **mi...: (va'dani bajardikmi – bajardik )** and did we do it - we did it!

Compare:... **...dushmani mudofaa marrasiga quvdingiz-quvdingizmi-quvdingiz.**( You chased the enemy to the defensive line-chased! - Did you chase?)-chase!

Command sentences, in addition to pure command, also express various modal relations and differ in their specificity to certain speech styles. For example, command sentences that express meanings such as advice, desire, and desire are specific to the style of speech and artistic speech, while command sentences that have a passive form are specific to the formal style of work. Fiction also uses the speaker to ask himself questions to increase the effectiveness of the speech. [4,155] Pure command sentences are rarely used in scientific style, in artistic-descriptive and informational texts. In addition, forms with the affixes in Uzbek **-gin, -sin, -in**, which soften the cut command, are also peculiar only to the style of speech and dialogic speech, and are rare in other styles. The means of forming command sentences are the command forms of the verb. Any command spoken in a calm tone represents a neutral command. However, the command can express different modal relations: Such modal relations are realized by phonetic, lexical, grammatical means:

a) via tone: **Qani, ketdik, yur. (Come on, let's go)** (Live speech).

b) via **-gin, -in, (-yin)** – ...tez-tez xat yozib turgin. ... (write letters me,often) tur, manavini o'qigin, kimdan kelibdi – (get up, read this, from whom it came) (Verbal);

v) via **-chi** Qani, aytib ko'r-**chi!** Aytmay ko'r-**chi!** Qani yozma-**chi!** (Og'z.so'zl.); Oh, tell me! Strongly request you, tell me! (Verbal);

g) through repetition: **...ket-ket!go-go!** Ko'zimga ko'rinma! **Jo'na, Jo'na!** Get lost! Go-go! (Verbal);

d) Through the verb + **bo'p:** **...aytmay bo'psan!(tell me please)**

y) With a change of personality: Qani, **kirsinar.** (Gaz.) Oh, let them (!) enter. (Newspaper.) **O'zlari**

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biror gap **aytsinlar**. (Let them say something themselves. (Verbal)

In a dialogic speech, one of the interlocutors confirms or denies the performance of an action. The denial or affirmation of this action is necessary and conditional for the second, forcing the first speaker to perform that action, putting pressure on him.

**Exclamation sentences** are not characteristic of formal speech style such as artistic and journalistic as well as denial call etc. Business papers related to decision-making departmental relations in scientific style are almost never used in legal documents and so on. Pure motivational speech, which expresses the excitement, emotion, and emotional relationship caused by the objective world and its events, is largely characteristic of monologue speech. The work of writers and poets (author's speech) is also included in the concept of monologue speech. Encourages that convey meanings such as call, invitation, command-and-call are mainly specific to the formal style of work and speech.

Exclamation sentences are formed by various means, and these means serve for one:

1) With exhortations: Eh, vaqt o'tib ketdi! Oh, time has passed! (Live speech);

2) by prioritizing predicate: **Yashasin tinchlik! Yo'qolsin dushmanlik!** Long live peace! Let the enmity disappear! (From newspaper.)

3) with intonation: **Shahrimiz juda ko'rkam! Baxtli yoshligimiz uchun Yaratgandan minnatdormiz!** (Gaz.): Our city is so beautiful! We thank the god for our happy youth! (From newspaper.)

In Exclamation sentences can express a very strong emotion of the speaker in the speech. In this case, various means do not form pronouns, but reinforce the meaning of the formed pronouns:

a) via **-ki, -a, -da** In this case, **-ki** is pronounced longer, **-a / -ya / da** pronounced with emphasis, and thus the meaning is strengthened.

Naqadar go'zal-**a** bu gul! Bu gullar qanday yaxshi edi-**ya!** Shahar juda o'zgarib ketibdi-**da!** Hayot shuncha totliki, aslo to'y-maysan! (Jonli nutq);

b) via these expressions: **qanday, qanaqa, shunday, shunchalik, naqadar, biram**: It expresses the uniqueness of the role of the depicted, emotional reality: uning o'g'li **shunday //shunchalik// biram** sho'x bo'libdiki... **Qanday // qanaqa** yigitlar edi ular!

(her son was so // so // so happy... What // what guys they were!)

v) through repetition: **Yo'qol! Yo'qol! To'xta, to'xta**, nima deyapsan o'zing! (Jonli nutq): GO, GO! Go away! Stop, stop, what you say yourself! (Live speech).

This means that pronouns, interrogatives, commands, and exhortations have their own characteristics depending on their use in different speech styles, and their correct use creates speech sensitivity.

Confirmation and denial serve a methodological function. [3,161] Confirmation and denial also play an important role in speech. But denial differs in that it is used more or less in a certain style, depending on how it is expressed. For example, while negative sentences formed by **-ma** are used freely in all speech styles, negative sentences formed with the words no, no, and neither are used relatively rarely in scientific, formal work. Also, negation sentences formed by tone and with affirmative form are specific to the style of speech and are almost never used in other styles. Such applications are closely linked to the requirements and nature of speech styles.

a) Negative verb is formed by adding **-ma** to verb forms. An action that does not occur through denial is confirmed and reported. This denial occurs in the past or present: **ekish boshlandi – ekish boshlanmadi**;

(sowing began - sowing did not begin)

b) the negative form is formed by adding the incomplete verb «**emas**» (not) to all independent word groups. In this case, «**emas**» (not) denies the lexical meaning of the word before it. When added to the verb form «**emas**» (not) it can be synonymous with the verb formed by **-ma**. The verb + **ma** form represents simple information, the verb + «**emas**» (not) form represents a bit of tension: **kelmadi-kelgan emas** (did not come-not to come) Musobaqada **g'olib chiqmadik – g'olib chiqqan emasmiz. Shikoyat qilmadik – shikoyat qilgan emasmiz. O'qiyapmiz – o'qiyotgan emasmiz**; we didn't win the race - we didn't win. We didn't complain - we didn't. We read - we do not read;

v) When the word "no" is combined with verb forms, it denies action and is often synonymous with the verb formed with **-ma**. The denial expressed by 'no' gives a bit of clarity-seriousness. When 'no' becomes an independent cut, it indicates that the object does not exist in a particular space during a particular speech: I have never died, nor have I surrendered to the hand of the enemy / H. O. / I have not read this book;

g) **-na** orqali hosil qilingan inkor alohida ta'kid ottenkasini ifodalaydi – inkor gapga «**ham**» yuklamasi ma'nosini qo'shadi: **na** o'qidi, **na** yozdi. – o'qimadi **ham**, yozmadi **ham**. **Na** ishlaydi, **na** o'qiydi kabi.

Tasdiq forma orqali ifodalanadigan inkor turli qo'shimcha ottenkalar ifodasi uchun xizmat qiladi. The negation formed by **-na** represents a special emphasis - negation adds the meaning of the preposition "both" to the sentence: neither read nor wrote. - He neither read nor wrote. Like neither works nor reads.

The denial represented by the affirmation form serves for the expression of various additional ottenkas.

a) When the speaker wants to express the meanings of the listener (other) in the performance of

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a particular action, such as unlimited ability, impossibility, compulsion, he uses the form of the verb + "**bo`psan**": **aytib bo`psan** /aytmaysan/. you say / don't say /.

In this case, if the verb is in the negative form, it means affirmation: **aytmay bopsan** / **aytasan** / (you should say)

b) When the speaker wants to add meanings such as sadness, resentment, desire in the occurrence of a certain action, he uses the phrase «**koshki, qani endi**» ("I wish, I were".) The condition is in the form of inclination. I wish he would read. **Koshki** o'qisa. When in the form without the verb. Represents affirmation in the sense of cut-pitching, denial in the sense of desire: Compare: **Koshki, kelmasa** /keladi/ - **Koshki, kelmasa** /kelmasa yaxshi bo'lardi/; I wish, if he does not come / he comes / - I wish, if he does not come / would not be good /;

v) the speaker uses the **-ya** and repetition when he wants to express the meanings of rejection of the listener's opinion, protest, pitching, determination against that opinion. **Keladi-ya! Keladi-ya-keladi. Aytadi-ya-aytadi;**

g) when the speaker does not believe that a certain action / affirmation / said by the listener will take place, when he interrupts, when he speaks with a serious accent, he denies in a special tone the idea given by the statement in the affirmative form. He often quotes the word in uzbek **ha** "yes" before the sentence:

**U keladi. – Ha keladi!** (He comes. "Yes, he comes!") In this case, "yes" in uzbek **ha** is slightly longer and is separated by a small pause, the emphasis of the word at the end of the sentence is strengthened.

The expression of affirmation by means of a negative form is also associated with various additional tones.

a) so'zlovchi ma'lum ish-harakatni ro'yobga chiqarishda qat'iylik, albattalik o'ttenkasini ifodalamoqchi bo'lganda, fe'ning har ikki komponentini inkor formada qo'llaydi. **Sen borgan joylarda men ham bormay qo'ymayman** (Qo'shiq) the speaker uses both components of the verb in the negative form when he intends to express the tone of persistence, of course, in the performance of a particular action. Wherever you go, I will go. (Song)

b) the speaker uses the form «**yo'q+emas**» "no + not" when he wants to express the partial existence of a particular object at a particular time and place, as well as o'ttenkas such as humility, modesty, respect. In this case, it is first mentioned whether there is an object that reflects the opposite of that object.. **Daf'atan qaraganda, romandagi real hayot va fantastik olam tasvirida nomuvofiqlik bordek...tuyuladi. Lekin, unda ichki bog'lanish yo'q emas (Gaz.).** For example: Suddenly, there seems to be a mismatch between the novel's depiction of real life and the fantasy world. However, it does not lack internal connection Kamchiliklar ham **yo'q emas** (Gaz.). There are some disadvantages also. (Newspaper.).

It is known that everyone grows up in the environment in which they live, in society. [5, 15]. Accordingly, in one's speech, he chooses the words that correspond to the purpose of expression;

At the current stage of development of the Uzbek language in the development of functional methods of speech it is important to use the types of sentences for the purpose of expression, as well as affirmative and negative sentences. Uzbek language construction has a rich methodological potential. Depending on the purpose of the speaker's speech, it is advisable to use appropriate types of speech in each of the point styles.

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## THE ROLE OF BODY LANGUAGE IN TEACHING ENGLISH

**Abstract:** In this article it was discussed some issues in teaching English with body languages. The main aim of this article is to analyze the role of body language and its influence in teaching process. Some tips for successfully using body languages are also given in this work and reader can utilize it for his or her practical classes.

**Key words:** body language, gestures, atmosphere, physical appearance, facial expressions, eyesight.

**Language:** English

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### Introduction

These days, most people know that learning languages, especially learning English becomes more and more essential to students. Students often learn English through the classroom teaching. Owing to the disadvantages of traditional teaching, teachers need to reform teaching methods to arouse students' interest in English and help them to learn better. There are many helpful and proper methods to get the goal and one of them is using body language.

What is body language? Body language is a necessary part of people's communication. It includes gestures and facial expressions. It is also called nonverbal communication. In education, body language plays an essential role in cultivating student's characters for teachers are usually imitated by students. During the teaching process, body language as a secondary means of teaching English is vivid, it can warm-up the class atmosphere, help students to understand the topic, shorten the distance between teacher and students and improve the quality of teaching. English teaching is a key part of the school education. Generally, traditional English teaching considers teachers as a center, book learning

as a standard and examination handling as the goal. As a result the interest and desire of the students may decrease. In addition to that according to the students' present level and practical situation, body language is required.<sup>1</sup>

### Methods

Body language is a silent and true language, which can define a speaker's inner world, it always catches one's eye mostly in no communicative.

#### A. The Importance of Body language

Teaching by example of teacher is reflected in many ways and body language is a part of teaching by example. During the communication between students and teachers, all of the attitudes, feelings and self-cultivation are displayed through the instrument, facial expression, gestures, glances and even clothing have far-reaching implications on students. The appearance is the first impression of teachers to students and by this way teachers may gain students' admiration and goodwill. It will give students a good impression and add the charm of education.

Our body language reveals the truth of what really is happening or what we mean to say rather than

<sup>1</sup>.Klima, Edward; Bellugi Ursula. (1979). The signs of language. Cambridge, MA: Harvard University Press. ISBN 0-674-80795-2.

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our words. We can show our attitude, feelings and moods with non-verbal communication even better than words sometimes. Someone's happiness, sadness, interest or boredom can be detected through non-verbal language. If we want our students to feel confident, we should smile in the class even if students make mistakes. A warm smile can let them know that they can commit mistakes but it is the process of learning. Teachers can use a variety of vocal intonations while presenting new material.<sup>2</sup> For example, loud and soft voice can be used while teaching opposite words like "fat" and "thin" respectively.

Eyes are the "windows to the soul". Looking straight into students' eyes creates a positive relationship with them. Teachers can especially maintain a good eye-contact, students feel that the teachers are with them. Teachers can especially maintain a good eye-contact while emphasizing on an important topic.

### B. The necessity of Body language

Most teachers can impact students not only on teaching content, but also on the thinking style. If a teacher is preciseness, the students will feel the class boring, and have no passion to learn. On the other hand, the teacher with passion, the students will be full of vigor, and the teaching will become interesting and proceed smoothly.

## Results

### 1.To make friendly atmosphere in classroom.

If a teacher has good appearance, wonderful gesture and reasonable eyes, it will make a cozy atmosphere in class. This also make a lesson more interesting. On teaching, we always use flexible body language depend on the needs of students. At this time students attention is focused, the consciousness of practice in classroom activities is enhanced, the interest, feeling and will of students are stimulated, then the effect of teaching can be improved.

### 2.To encourage students' imagination

Body language has strong defining and performance, it can make the language visualize and materialize. In teaching, we should make the body language yield well, and arouse the curiosity of students, to make a good and harmonious classroom atmosphere, grasp the knowledge efficiently and qualitatively, improve the teaching quality effectively.

### C. The Skill of Use Body Language in English Teaching

In classroom, body language mainly includes: eyes, physical appearance, gesture, body language and distance. Different classroom needs different body language.

Facial expressions- in teaching process, teachers provide the students with messages through their own facial expressions. In the process of class exchange, teachers express their affection; optimism and deep confidence to the students. The students will feel warm and become active. The facial expressions of teachers in English teaching should change along with the changing of class contents and teaching circumstances. Also teachers' delight, anger, sorrow and joy should appear at the right moment, infect the students to make them have the feeling of delight and sorrow at the same time. They can't take their own passive morals into the classroom. Apart from this, smile can give a positive feedback and impacts the effective domain by communicating pleasure, trust, friendliness, interest, excitement or surprise. While we are teaching English, the use of smile is very important. Students can ease pressure on learning English and create hopeful and optimistic mind with the help of teachers' natural smile.

Eyesight-eyes are the windows of heart. Through the window, teachers transmit information which can't be expressed by verbal language to the students. An excellent teacher should have a pair of eyes which can speak. Teachers should be good at using eyes to transmit messages, exchange feelings, express attitudes and carry on teaching. If a teacher stared angrily at the students who didn't concentrate his attention nor did some petty actions in classes, the students would restrain himself consciously.<sup>3</sup> When a student didn't answer a question for a long time because of his shame of making mistakes, an encouraging eyesight from his teacher would make him become more confident than before. Eyes are also an essential part on our faces. A good teacher always knows how to use eye contact, Teachers often have a face to face communication with students, so eye contact can be described in the following kinds: survey and focus.

Survey is to look at students regularly. In teaching, teacher can remind students to listen to the teacher careful relying on survey. After asking the question, the survey of teacher can find the student who wants to answer, and remind the students who don't think about.<sup>4</sup>

Focus is to use eyes staring at a student for a long time. Focus includes serious one. The close watch is

<sup>2</sup>Kurien, Daisy N (March 1, 2010). "Body Language: Silent Communicator at the Workplace". IUP Journal of Soft Skills.

<sup>3</sup>Tracy, Jessica L; Robins, Richard W. (2008). "The nonverbal expression of pride: Evidence for cross-cultural recognition". Journal of Personality and Social Psychology.

<sup>4</sup>Merabian, Albert (2009). "Silent Messages"- A Wealth of Information About Nonverbal Communication.

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the most important focus. When students, feel nervous, teacher's smiling eyes will let students relax.

Movement-the main movements is gestures. Gestures are the most important part of body language. Gesture is a very complex kind of body language, which is the most useful tool for communication before people create and use spoken language.

Usually, people use hand contact or hand movements to interpret each other's mental activity or state of mind, and express our intent by hand. In English teaching, teachers can use gesture to express the meaning of words concisely, comprehensively and visually. The English teaching in classes focuses on communication activities. Dull and dry communication will make students produce detestable feeling but lively, vivid, even exaggerated actions and gestures can enliven the teaching circumstances, making the activities go off without a hitch.

### C. The use of Body Language between Teachers and Students

The performance of body language is to help to release of the students' emotions. Teachers can apply body language in speaking, listening and even reading in class. For instance, a teacher can extend his or her arms slowly while saying "They studies in a very big house". As a result, the students will have the impression that the room is very big. English classroom can literally be a stage for teachers as well

as students. For the purpose that teachers teach in a cozy environment, they can change the classroom into a shop, a hotel, a park or even a hospital. Few role plays in flow with the topic to be taught and a teacher can expect an amazing learning experience.

### Discussion

According to school students, distinctive figures will greatly influence their thoughts. Therefore, the use of body language in schools is very helpful for students. Then with the limitation of the use of mother language, the students will be studying in a good environment.

### Conclusion

From all the above, we find that body language plays a vital role while we are teaching English. Body language has strong characteristics in images and informative functions. It can make the abstract things become specific. To sum up, practice makes perfect. The 45 minutes in class is very precious and should be educational reforms, cherished during which the students should practice as much as possible. At the same time, the recent educational reforms, the students' present level and the practical situation like their limitation of vocabulary requires teachers to simplify their teaching language with the help of facial expressions, eyesight, body movements, namely body language.

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## PRINCIPLES OF DISSYMMETRY AND ENTROPY AS THE BASIS OF MODERN SCIENTIFIC WORLDVIEW

**Abstract:** The article presents a comparative analysis of linear and nonlinear thermodynamics of equilibrium and non-equilibrium States of dissipative systems of different nature, preservation of their structure and behavior, as well as criteria for the emergence of qualitatively new formations, conditions for the emergence of self-organization and development of systems under the influence of symmetry and entropy. Various forms of entropy and entropy equilibrium are investigated, and control methods for complex artificial and natural systems are defined.

**Key words:** thermodynamics, linearity, non-linearity, equilibrium, non-equilibrium, entropy, symmetry, dissymmetry, order, disorder, control, nature, society.

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## ПРИНЦИПЫ ДИССИМЕТРИИ И ЭНТРОПИИ КАК ОСНОВЫ СОВРЕМЕННЫЕ НАУЧНОГО МИРОВОЗЗРЕНИЯ

**Аннотация:** В статье на основе представлений об универсальном характере явления диссимметрии и энтропии проводится сопоставительный анализ линейного и нелинейная термодинамика равновесных и неравновесных состояния диссипативных систем различной природы, сохранения их структуры и поведения, а также критериями возникновения качественно новых образований, условия возникновения самоорганизации и развития систем под влиянием симметрии и энтропии. Исследуются различные формы энтропии, энтропийного равновесия, и определены методы управления сложные искусственные и природные системы.

**Ключевые слова:** термодинамика, линейность, нелинейность, равновесность, неравновесность, энтропия, симметрия, диссимметрия, порядка, беспорядка, управления, природа, общества.

### Введение

XXI век-это век социально-экономического, интеллектуального, технологического преобразования современного общества, основу которого составляет молодое поколение, призванное самой жизнью активно участвовать в этом преобразовательном процессе, и это

непосредственно связан фундаментальных и методологических идей. К числу фундаментальных мировоззренческих и методологических идей, которые могут служить стимулом дальнейших междисциплинарных направлений и исследования сложных систем

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естествознания и естественнонаучного образования.

Естественнонаучного образования определяется статусам естествознания как особой современной системы наук. Как известно, физика и сегодня образует прочный фундамент всего естествознания; методы физической науки обеспечили мощный прогресс в развитии таких наук, как химия, биология, астрономия, геология и другие технические, в том числе общественных наук [1, с. 184]. В этом качестве она сегодня конституируется как междисциплинарная и трансдисциплинарная система наук. Естественнонаучное образование должно организовываться не по дисциплинам, а по проблемам. Междисциплинарность предполагает использование понятий и методов разных дисциплин, синтезированных для решения специфических проблем.

Процессы развития систем природы, общества и мышления достаточно сложны для того, чтобы их можно было бы изучать в целом, поэтому их познание осуществляется совокупностью наук, каждая из которых изучает одну определенную сторону единого целого – природы, общества и мышления.

Цель науки – познание истины сущности предметов – главного, наиболее важного внутреннего их свойства, закономерных связей явлений. В природе явление и сущность существуют в единстве, однако сущность, как правило, оказывается скрытой за внешними проявлениями, которые нередко искажает, фальсифицируют сущность.

Цель познания заключается в правильном осмыслении и восприятии окружающего мира и в добывании абсолютных истин которые с углублением знаний уточняются, т.е. с углублением знаний и добыванием новых знаний происходит уточнение вечных истин. Истина формируется в результате взаимодействия субъекта и объекта познания и поэтому представляет собой единство объективного и субъективного. Истина объективна по своему содержанию, т.е. представляет собой адекватное отражение действительности, не зависящее от субъекта познания, и субъективна по форме, по способу существования, т.к. не существует вне человека, ее носителем является человеческое сознание.

Известно, что мир принципиально не может быть совершенным и не может быть добрым или злым. Происходит непрерывное уравнивание добра и зла, порядка и беспорядка, совершенства и несовершенства. Феномены порядка и беспорядка (хаоса) в природе объясняются в физике на основе законов термодинамики. Ее законы применимы к любому веществу, к любым системам, включающим электрические и

магнитные поля и излучение, поэтому они вошли в физику газовых и конденсированных сред, химию и технику, необходимы в геофизике и физике Вселенной, используются в биологии и управлении функционирования технических, социальных систем. Термодинамика даёт наиболее общие соотношения между макроскопическими величинами, характеризующими изучаемые объекты, не вникая в детали внутреннего строения объектов [2].

### Основная часть

Интерес к термодинамике как к фундаментальной и одновременно развивающейся науке сохраняется с 1824 г. (с книги С. Карно «Размышление о движущей силе огня») и до наших дней. Наука термодинамика связана с именами У. Томсона (лорд Кельвин), Р. Клаузиуса, Л. Больцмана и др. Это – классическая термодинамика, рассматривающая наиболее общие закономерности тепловых процессов в состояниях систем, близких к равновесию, т. е. при отсутствии или малости градиентов переменных величин, характеризующих состояние, и определённых внешних условиях (равновесная термодинамика).

Классической науке до недавнего времени был присущ линейный подход: каждой причине соответствует одно следствие, следствие соразмерно причине, при переходе от причины к следствию порядок симметрии не изменяется. Линейность адекватно отражала ситуации умеренных воздействий и связанной с этим слабой неравновесности изучаемых состояний. При значительной интенсивности взаимодействия изучаемой системы с внешней средой глубина неравновесности, т.е. градиенты (пространственные и временные) переменных состояния возрастают настолько, что гипотеза линейности термодинамического описания приводит к неточностям не только количественного, но и качественного характера. Опыт и практического деятельности свидетельствовали, что понятие закрытой или изолированной системы является достаточно грубой абстракцией, упрощающей действительность, поскольку в природе трудно найти системы, невзаимодействующие с окружающей средой. Физическое состояние системы со структурами имеет более низкую степень симметрии по сравнению с пространственно-однородным состоянием.

Для возникновения процессов самопроизвольного нарушения симметрии с понижением её степени система с необходимостью должна быть открытой, т. е. активно взаимодействовать с окружающей средой. Поэтому, выше сказанный противоречие стало разрешаться, когда в термодинамике вместо



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понятия закрытой изолированной системы ввели фундаментальное понятие открытой системы, т.е. системы, обменивающейся с окружающей средой веществом, энергией и информацией. Для объяснение таких сложных процессов физическая наука нуждалась новая нелинейная неравновесная термодинамика. Новая нелинейная неравновесная термодинамика является молодым и интенсивно развивающимся разделом физики.

Её основы заложили в 60-годах XX века И.Пригожин (Нобелевская премия 1977 г.) и бельгийская школа термодинамики. Современная термодинамика – одна из областей точного знания, позволяющая с единых позиций рассматривать процессы преобразования энергии и вещества в материальных системах самой разной природы и сложности имея общенаучный характер и занимается глубинными основаниями материального мира.

Научному мировоззрению в XIX в. была присуща идея развития, которая в физике формировалась под влиянием статической механики и равновесной термодинамики. Основная проблема, связанная с изучением динамических систем в широком смысле слова, состоит в достижении понимания закономерностей их эволюции. Наиболее проста закономерность эволюции изолированных (закрытых) систем, которые не обмениваются со средой ни веществом, ни энергией, ни информацией. Согласно второму закону термодинамики, в этих системах могут иметь место лишь такие процессы, в которых энтропия (мера неорганизованности, или беспорядка системы) не убывает, а растет со временем и поэтому изменение их структуры может идти лишь в сторону разрушения, их конечное состояние – устойчивое равновесие с максимальной энтропией.

Природа иерархически структурирована в несколько видов открытых нелинейных систем разных уровней организации: динамически стабильные, в адаптивные, и наиболее сложные – эволюционирующие системы. Известно, что любые дискретные множества, любые объекты и явления (системы) живой и неживой природы без исключения содержат черты порядка и беспорядка (хаоса), определенности и неопределенности, организованности и дезорганизованности, а следовательно, и энтропии. Величина энтропии как количественной меры неопределенности, непредсказуемости, беспорядка, хаоса, дезорганизованности вероятностных систем является всеобщей. Поэтому исследователю неизбежно приходится считаться с наличием энтропии в виде неупорядоченных, дезорганизующих, хаотических, шумовых факторов в поведении вероятностных систем, в элементах и в их взаимодействии. Поняв

энтропию и вооружившись ею как новым инструментом познания, можно увидеть в новом ракурсе и переосмыслить многие явления окружающего нас мира.

Понятия энтропия является одним из фундаментальных свойств любых систем с вероятностным поведением. Понимание физического смысла энтропии затруднено тем обстоятельством, что ее значение не может быть измерено никаким прибором, но зато вычисляется. Утверждение о существовании энтропии обычно относят ко второму закону термодинамики. Более чем 100-летний опыт использования понятия энтропии в термодинамике подтверждает правильность представления о ней как о физической величине, изменение которой однозначно связано с наличием обмена энергией в форме теплоты. Значить, равновесность означает состояние системы без изменений.

А, неравновесность обеспечивается хаосом, которому имманентно присуща креативность, возможность преобразования в порядок; при этом своеобразном синонимом понятия хаос, хотя и достаточно неоднозначно, выступает понятие энтропии.

Неоднозначность соотношения понятий хаос и энтропия проявляется в том, что энтропия, согласно второму закону термодинамики, есть “мера беспорядка системы”. В контексте же синергетической теории, энтропия есть “прародительница порядка” (А. Тоффлер).

В подобной трактовке хаоса и энтропии акцент делается не на увеличение беспорядка (с увеличением энтропии и хаоса), а на имманентно присущей состоянию беспорядка креативности, несущей в себе возможность становления порядка [3, с. 658]. Понятие хаоса, и его синергетическом понимании, полностью конгруэнтно понятию диссимметрии: и хаос, и диссимметрия репрезентируются как содержащие в себе креативный потенциал стать либо порядком и симметрией, либо полностью подвергнуть систему элиминации.

Помимо диалектики диссимметрия соотносится с синергетикой. Данное соотношение выражается как в причастности диссимметрического развития к равновесным и неравновесным состояниям системы (рассматриваемым в синергетике), так и в явном проявлении диссимметрии, обнаруживаемом в основных положениях синергетической парадигмы [4, с.182-187]. В связи с мировоззренческим аспектом обращает на себя внимание конгруэнтность еще одного мировоззренческого вывода, свойственного синергетическим построениям и построениям на основе диссимметрии. Обе точки зрения признают материальное единство мира на его различных структурных уровнях. И если в синергетике в этой

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связи делается акцент на представлении о Вселенной как о “целостной системе” (Н.Н. Моисов), то взгляд на данную проблему с позиций диссимметрии был выражен еще Луи Пастером и впервые вводя в научный оборот понятие “диссимметрия” рассматривавшим мир как “диссимметрический ансамбль”, объясняя это тем, что «...свойства определенных фигур не совмещаются простым наложением со своим зеркальным изображением» [5, с. 383]. Продолжая теорию Л. Пастера, П. Кюри в логике своих научных изысканий о влиянии окружающей среды на находящиеся в ней тела, определил, что, «...у них сохраняются преимущественно те элементы собственной симметрии, которые совпадают с симметрией среды». Согласно принципу диалектического единства симметрии и диссимметрии, всякому живому объекту присуща та или иная форма этого единства [6, с. 74].

Процессы спонтанного нарушения симметрии физического состояния системы приводят к возникновению той или иной из числа возможных структур – упорядоченных образований, обладающих определённой формой и характерными пространственно-временными размерами. Это фундаментальное нарушение лежит в основе синергетической версии космогенеза, согласно которой «в момент образования материи Вселенная должна была находиться в неравновесных условиях, поскольку в состоянии равновесия из закона действия масс... следовало бы количественное равенство материи и антиматерии»[7].

Подобное равенство нарушено, на что указывает неравенство во Вселенной частиц и античастиц и из чего следует, что «в момент образования материи» Вселенная находилась в состоянии диссимметрии. Еще В. И. Вернадским было отмечено, что «в мире есть диссимметрия, проявляющаяся в существовании в нем энтропии» [8, с. 350]. С позиций диссимметрической концепции трансформации энтропия есть мера степени диссимметризации системы, [9, с. 114] т.е. рост энтропии в системе зависит от степени ее диссимметризации.

Известно, что абсолютное значение энтропии различных веществ при различных температурах можно определить на основе третьего закона термодинамики. Этот закон устанавливает также начало отсчета энтропии и тем самым позволяет вычислить абсолютное значение энтропии. Энтропийное равновесие между порядком и беспорядком в системе определяет мировые процессы в космосе и условия жизни на Земле. Поэтому иногда в шутку говорят, что энтропия как физическая величина, которая не измеряется, а вычисляется, является генеральным конструктором и директором, а энергия является только главным бухгалтером,

следящим за тем, чтобы сходились кредит с дебетом [10, с. 5-9]. Иначе говоря, что обобщённая энтропия, как и энергия, относится к фундаментальным понятиям реальной действительности. Энергия – свойство, позволяющее системе достигать заданные состояния или, образно говоря, “энергия творит организацию”. Тогда энтропия определяет качество энергии, меру её способности к созиданию, “меру творчества”, его конечный результат.

Сегодня в литературе встречается по меньшей мере четыре формы энтропии:

Во-первых, энтропия как мера неопределенности состояния любой вполне упорядоченной физической системы, или поведения любой системы, включая живые и неживые объекты и их функции. Физическая энтропия является мерой энергетической упорядоченности объекта и представляет собой функцию от числа их возможных состояний. Любое повышение упорядоченности объектов ведет к снижению их совокупной энтропии, и наоборот.

Во-вторых, термодинамическая энтропия микрочастиц, или молекулярного (микроскопического) множества. Термодинамическая энтропия есть мера неупорядоченности (или беспорядка) микрочастиц, то энтропия в широком смысле — мера неупорядоченности (или беспорядка) объекта по любым признакам. Величина энтропии измеряет степень гомогенности структуры объекта, имеет размерность единицы энтропия – Джоуль на Кельвин (система СИ).

В-третьих, информационная энтропия, или неопределенность информации, т.е. сведений о некоторой информационной системе, имеет размерность единицы времени (секунды).

В-четвертых, энтропия, или неопределенность поведения, любой не вполне упорядоченной системы вплоть до макроскопических множеств. Например, биологическая, политическая, экологическая, социальная, историческая и т.д.

Физическая и термодинамическая энтропии и информационная энтропия системы принципиально различны. Если физическая и термодинамическая энтропии для замкнутых систем со временем не уменьшается, а растет в соответствии со вторым началом термодинамики, то информационная энтропия со временем может не увеличиваться, а уменьшаться для любых систем [11, с.18].

Поскольку принципиально неустранимы броуновское движение, флуктуации и шумы как для микро-, так и для макрообъектов и макро наблюдений, то возникает как микро-, так и макро неупорядоченность, что позволяет использовать в

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качестве универсального параметра микро- и макросистем обобщенную энтропию (ОЭ). Понятие обобщенной энтропии представляет такие наиболее общие свойства действительности, как неупорядоченность и упорядоченность, неопределенность и определенность, хаос и порядок.

Благодаря взаимодействию открытых изменяющихся систем с внешней средой, они могут, как и открытые динамические системы, повысить степень своей организованности и снизить свою энтропию за счет роста энтропии окружающей среды. Если поведение систем (поведением будем называть любое изменение систем по отношению к окружающей среде) зависит от воздействия на него, мы говорим, что в такой системе имеется обратная связь – между воздействием и ее реакцией. Поведение системы может усиливать внешнее воздействие, это называется положительной обратной связью. Если же оно уменьшает внешнее воздействие, то это отрицательная обратная связь. Особый случай – гомеостатические обратные связи, которые действуют, чтобы свести внешнее воздействие к нулю. Пример: температура тела человека, которая остается постоянной благодаря гомеостатическим обратным связям [12, с.89].

Исследуя систему, в какой-то момент мы понимаем, что высшие уровни в ней не сводится к низшим. Исходным пунктом всякого системного исследования является представления именно о целостности изучаемой системы. Целостность системы означает, что все составные части, взаимодействуя и соединяясь вместе, образуют уникальное целое, обладающее новыми системными свойствами. Значит, свойства системы - это не сумма свойств ее отдельных элементов, а совершенно новые свойства, которые присущи только ей как единому целому. В концепции изменяющихся динамических систем основой является их неравновесность и неустойчивость, а равновесие таких систем становится исключением. В изменяющихся системах периодически меняются законы поведения, структура, пути эволюции, внутренние симметрии, происходит разделение систем на актуализированную и потенциальную части и т.п. Принцип самоорганизации и диссимметризация системы гласит, что движущейся материи, помимо тенденции к самопроизвольной деградации, присуща также тенденция к самопроизвольной организации в более сложные системы. Этот принцип является отражением того очевидного факта, что окружающая действительность являет нам наряду с процессами рассеяния энергии множество процессов, в которых энергия не рассеивается, а, наоборот, концентрируется с образованием более сложных систем из более простых.

Каждая целостная по какому-либо параметру организация круговорота энергии характеризуется своим балансом (равновесием) процессов рассеяния и концентрации энергии, как равенство мер хаоса и порядка. Это позволяет процессов рассеяния и концентрации энергии в трёх пространствах событий, определить уравнение симметрии мер хаоса и порядка, приводящее к золотой пропорции, особой характеристике взаимодействия этих процессов. До сих пор описание поведения сложных систем в терминах энтропии наталкивалось на методологические трудности. Поэтому использование методов термодинамики для исследования сложных систем, как правило, не проводилось.

Применение принципа самоорганизации и диссимметризация позволяет построить термодинамическую модель самоорганизующихся систем, во многом лишенную недостатков сложных систем и позволяющих получить ряд довольно интересных результатов. Диссимметризация системы происходит под воздействием диссимметризирующих факторов, т. е. факторов, нарушающих симметрию [13, с.180-195]. Начальные условия теории очень просты – сложная система должна быть материальной (не идеальной), открытой и неравновесной, чтобы обладать возможностью обмениваться с другими системами ресурсами в виде энергии, информации, вещества. Все эти периоды в полной мере отражаются в процессах симметризации ↔ диссимметризации степенями диссимметрического развития и критической точкой – диссимметрическим равновесием, формирующим новое состояние системы [14]. Диссимметрия, таким образом, выступает в роли и процесса, и его причины, что указывает на универсальный характер данного явления и имеет важное мировоззренческое значение.

Основная функция всякого рода методов, средств состоит в усилении естественных познавательных способностей человека, а также в их расширении и продолжении пользуясь традиционным философским языком, иногда говорят, что метод – это посредник между субъектом и объектом [15, с.103]. Энтропийный подход к увеличению и уменьшению порядка в системе позволил сформулировать закономерности энтропийного равновесия и энтропийного колебания и обосновать возникновение кризисов и конфликтов от воздействия человеческой деятельности на планету.

Для грубого уяснения сути очень важной закономерности энтропийного равновесия скажет несколько слов об энтропии открытых и закрытых систем. Открытые системы, имеющие сложную структуру (биологические, общественные,

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естественные), обмениваются с внешней средой энергией или веществом, или информацией, и за счет этого могут изменять свою структуру и соответственно уменьшать энтропию (меру неопределенности, неорганизованности) системы. Примерами служат все эффекты самоорганизации в живой и неживой природе, биологическая эволюция, возникновение и развитие человеческого общества.

При любом изменении состояния открытой системы изменение ее энтропии  $\Delta\mathcal{E}$  можно разложить на две составляющие:

$$\Delta\mathcal{E} = \Delta\mathcal{E}_1 + \Delta\mathcal{E}_2,$$

где,  $\Delta\mathcal{E}_1$  есть изменение энтропии системы за счет обмена данной системы с внешней средой энергией, веществом, информацией, а  $\Delta\mathcal{E}_2$  есть изменение энтропии в результате процессов, происходящих внутри самой системы без влияния внешней среды. Если изменение  $\Delta\mathcal{E}_1$  вынужденно и направлено (естественным или искусственным образом) в сторону неравновесности и уменьшения энтропии за счет роста энтропии окружающей среды, создавая новые возможности для системы, то изменение  $\Delta\mathcal{E}_2$  самопроизвольно и всегда направлено к равновесию. Для необратимых процессов всегда  $\Delta\mathcal{E}_2 \geq 0$ , а для обратимых процессов  $\Delta\mathcal{E}_2 = 0$ .

Для закрытых, или изолированных, систем, которые ввиду своей закрытости не обмениваются с внешней средой энергией, веществом, информацией, выполняются условия: показывающее, что энтропия закрытых систем в отличие от открытых систем не может уменьшаться, а может увеличиваться. Поэтому необратимость изменения закрытых систем есть постепенное разрушение первоначальной структуры этих систем за счет нарастания в них неопределенности и хаоса, вызываемых возрастанием энтропии.

Поскольку в силу второго закона термодинамики для любой, в том числе открытой, системы, имеет место  $\Delta\mathcal{E}_2 \geq 0$ , то общее уменьшение энтропии открытых систем возможно лишь за счет составляющей  $\Delta\mathcal{E}_1$ . В этом случае должно иметь место  $\Delta\mathcal{E}_1 < 0$ . Только при этом условии открытые системы могут уменьшать свою энтропию и увеличивать свою организованность за счет роста энтропии окружающей среды или других систем, с которыми взаимодействуют. Так, живой организм может «оставаться живым», только постоянно извлекая из окружающей среды отрицательную энтропию, или неэнтропию. Чтобы повысить степень организованности, открытые системы должны быть обязательно неравновесными. В неравновесных системах  $\mathcal{E} < \mathcal{E}_{\text{макс}}$ , и неравновесные системы более организованны, чем равновесные.

В открытых системах, второй закон термодинамики выполняется столь же строго, как

и в изолированных системах, но при этом благодаря взаимодействию с внешней средой открытые системы могут повысить степень своей организованности за счет роста энтропии окружающей среды. Их поведение многоальтернативно, и эволюция открытых систем не обязательно направлена в сторону термодинамического равновесия, или "космического уравнивания", и может идти различными путями. Присущая им неустойчивость, неравновесность и наличие критических значений параметров делает их поведение неопределенным и порождает историю развития, в которой прошлое влияет на будущее поведение системы. Наличие универсальных законов и закономерностей и системных изоморфизмов открывает возможности для перенесения знаний из одной предметной области в другую.

### Энтропийные закономерности в системе управления обществом

Большинство людей хорошо усваивает то или иное понятие лишь в том случае, если может связать его с практикой, с опытом. Потому что, познание начинается с изучения самых элементарных, доступных непосредственному наблюдению и имеющих очевидный смысл объектов и процессов. Поэтому, установление принципиального сходства и аналогий различных, на первый взгляд, систем имеет практический интерес, так как дает основание использовать одни и те же закономерности для их изучения и провести граничные условия "что есть, что может быть, а чего не может быть в принципе". В экологических системах действует ряд законов и закономерностей функционирования, которые существуют и в других сложных системах, например в экономике, и поэтому при их структурном изоморфизме знания из одной предметной области можно перенести в другие области.

Воздействуя на природу, человек увеличивает или уменьшает в ней порядок. Изменение порядка в системе характеризует энтропия, являющаяся количественной мерой беспорядка. При этом увеличение энтропии соответствует росту беспорядка (дезорганизованности) в системе, а уменьшение – упорядочению (организованности) системы. Таким образом, изменяя порядок в окружающей среде, человечество изменяет ее энтропию. Однако делать это произвольно оно не может, так как энтропия подчиняется вполне определенным закономерностям[16].

В современном мире основными причинами увеличения энтропии можно считать[17]:

➤ преступность, терроризм, разрушительные войны и межнациональные,

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межрелигиозные, межгосударственные конфликты;

➤ природные и техногенные бедствия и катастрофы, исчерпание энергии и природных ресурсов;

➤ эпидемия, болезни, быстрое старение, сокращение народонаселения;

➤ экономические и социальные кризисы;

➤ отсутствие доверия к власти и средствам массовой информации, боязнь за завтрашний день;

➤ обогащение не по результатам труда, коррупция и упадок дисциплины;

➤ несправедливость, неопределенность и безысходность.

Для снижения энтропии, по видимому, необходимо первую очередь увеличить негэнтропии общественного сознания и через него увеличить негэнтропия материального мира.

У любой предметной или общественной системы имеется определенный уровень ее организованности, называемый критическим. Если система организована ниже этого уровня, то в системе преобладают процессы упорядочения, если выше – преобладают процессы дезорганизации. На самом критическом уровне, иногда называемым уровнем энтропийного баланса, процессы упорядочения и дезорганизации уравниваются друг друга, и система принимает стационарное состояние [16, с.56].

Законы и закономерности природы являются объективными, независимыми от нас именно потому, что они совершенно не зависят от желаний, воли и сознания людей. Их нельзя отменить, запретить, заменить. Все, что происходит в материальном мире, может осуществляться только материальным и никаким другим законом и закономерностью. Законы и закономерности в природе и обществе носят всеобщий характер. Все биологические, духовные и социальные законы и закономерности, присущие человеку, зиждутся на природных законах и не отменяют их.

К сожалению, человечество последние 5 тыс. лет объективные материальные проблемы пытается решить, во многом игнорируя существующие помимо нас объективные природные законы и закономерности, субъективными средствами при помощи идеологии, социального устройства общества, национализма, сепаратизма, собственности, религиозности и т.п. Не лишне отметить, что случайность – это цепь невыявленных закономерностей, скрытых за порогом нашего понимания. Вероятность появления случайных величин также подчиняется законам.

Известно, что эволюция в природе и обществе может привести как к самоорганизации

открытой системы, в ходе которой возникают более сложные, устойчивые и более совершенные диссипативные структуры, так и к деградации системы. Поэтому самоорганизация открытой системы является одним из возможных путей эволюции. Для сравнительного анализа развития, или эволюции, открытых систем иногда используют понятие степени упорядоченности (или хаоса) различных состояний рассматриваемой открытой системы.

Многообразие форм при единообразии методов их построения обязано проявлению удивительной особенности Природы – взаимосвязи явлений симметрии и уравновешенности. Каждое из них заключается в большей общности результатов по сравнению с физическими законами, а их сочетание образует фундаментальное явление Природы – гармонию. Гармония – это качественная и количественная характеристика соединения частей системы в единое целое. Значения скрытых пропорций структурирования, поиск законов симметрии и гармонии, управляющих развитием в Природе, всегда занимали умы учёных. В синергетике уже понимаются [18, с. 189], но ещё не применяются методы анализа гармонии. Это затрудняет познание закономерностей саморазвития; свободы выбора постбифуркационных путей в нужном направлении совершенствования систем. “Это, в свою очередь, в сложных системах, а также в политической, социальной сфере не даёт возможности созидания законов, принципов, подзаконных документов, постановлений на долгосрочное устойчивое развитие. Общество – сложнейшая мегасистема, порядок (или симметрия) в которой образуется не только путем самоорганизации, но и сознательно создается в процессе управления. Однако нельзя рассматривать структуру общества, сформированную на основе синергетики, как “чисто” объективную реальность” [19, с.45].

В проявлениях асимметрии развития природных и искусственных систем и заключается роль гармонии.

В этом аспекте главная задача состоит в раскрытии количественных свойств гармонии. Критерий золотой пропорции (сечения) отображает, по-видимому, минимизацию энергетического состояния системы. Золотое сечение является инвариантом, связывающим закономерности саморазвития физических явлений и порождающей их материи. Для систем Природы роль саморазвития универсальна. Золотое сечение предлагается на роль физической константы, играющей определяющую роль при формировании внутренних механизмов самоструктурирования Природы. В книге [20], это понятие рассматривается с наиболее общих позиций. Показано, как ряды связывают гармонию

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и асимметрию с золотым сечением. Свойства гармонии и подобия описываются с помощью золотых геометрических прогрессий, установлена их связь с рядами Фибоначчи.

В связи с мировоззренческим контекстом связи обращает на себя внимание конгруэнтность еще одного мировоззренческого вывода, свойственного синергетическим построениям и построениям на основе диссимметрии. Обе точки зрения признают материальное единство мира на его различных структурных уровнях. И если в синергетике в этой связи делается акцент на представлении о Вселенной как о «целостной системе»[21].

### ЗАКЛЮЧЕНИЕ

Общим для явлений самоорганизации в системах самой разной природы следует считать взаимодействия, носящие когерентный и резонансный (сфазированный на единой частоте) пространственно-временной характер, упорядочение с соответствующим понижением симметрии. Порядок, означающий логическую взаимосвязь частей и согласованность их действий, обеспечивает соответствующую функцию системы. Возникновение нового порядка обусловлено появлением дополнительных связей (корреляций) между величинами, характеризующими систему. Источником упорядочения здесь выступают нелинейность, диссипация и неравновесность.

Наконец, еще раз отметим, что равновесие между беспорядком и порядком в целом по всем параметрам системы предполагает их неравенство для отдельных частей и отдельных параметров. Эволюции природы соответствует сложное

изменение границ между двумя равными противоположностями – порядком и беспорядком; увеличение упорядоченности, организованности системы обусловлено увеличением порядка по одним определенным параметрам системы и увеличением беспорядка (деорганизованности) по другим параметрам, а не путем общего перехода от беспорядка к порядку, или, наоборот, по всем параметрам системы. При этом устойчивость системы определяется отношениями значений меры порядка или беспорядка для соответствующих параметров по методу Фибаначи и «золотой пропорции» [22].

В заключение можно сказать, что энтропия равна количественной мере беспорядка только при постулате равновероятности событий. Что касается общего случая, то при неравновероятности событий энтропия равна сумме мер беспорядка и порядка. Современная модель равновесия рассматривает круговорот природы, где соотношения частей и целого описывается по правилу «золотой пропорции»; его иногда называют законом гармонии природы, который наблюдается при описании ряда общих свойств живой и неживой природы, общества, экономики. Равенство мер порядка и беспорядка определяет равновесие круговорота природы и общества.

В процессе ускорения научно-технического прогресса нельзя переступить ту грань, за которой в результате воздействия человека на природу начинаются необратимые разрушения самих условий существования общества и цивилизации. Диссимметрия является двигателем прогресса в гармоничном человеческом сообществе.

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## IMPROVING THE EFFECTIVENESS OF TEACHING NUCLEAR PHYSICS USING THE PRINCIPLE OF HISTORICITY

**Abstract:** The article examines the place and significance of the principle of historicism in teaching physics based on historical data, which played an important role in the development of nuclear physics, as well as information about the life and work of scientists working in this field, and analyzes the method of using historical data. It is shown that a multi-faceted approach to teaching physics, including the use of historical information, not limited to a brief presentation of the topic, is an important factor for future teachers preparing in higher education institutions to become highly qualified specialists-perfect and multi-faceted personnel with knowledge in their field, but at the same time educated as a person, studying the life and scientific activities of physicists.

**Key words:** Nuclear physics, training of future physicists, integrated approach, historicism, interesting historical facts, motivation, training effectiveness, scientific Outlook, personality formation.

**Language:** Russian

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### ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ ПРЕПОДАВАНИЯ ЯДЕРНОЙ ФИЗИКИ ИСПОЛЬЗОВАНИЕМ ПРИНЦИПА ИСТОРИЧНОСТИ

**Аннотация:** В статье рассматривается место и значение принципа историзма в обучении физике на основе исторических сведений, сыгравшие важную роль в развитии ядерной физики, а также сведений о жизни и деятельности ученых, работающих в этой области, проанализирована методика использования исторических данных. Показано, что многосторонний подход в преподавании физики, в том числе использование исторических сведений, не ограничиваясь кратким изложением темы, служит важным фактором для того, чтобы будущие педагоги, готовящиеся в высших учебных заведениях, стали высококвалифицированными специалистами-совершенными и многогранными кадрами, обладающими знаниями в своей области, вместе с тем образованными как личность, изучая жизнь и научную деятельность ученых-физиков.



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**Ключевые слова:** Ядерная физика, подготовка будущих физиков, комплексный подход, историзм, интересные исторические факты, мотивация, эффективность обучения, научное мировоззрение, формирование личности.

### Введение

Физика занимает важное место в жизни общества как исследователь общих законов природы и как научная основа многих технологических процессов. В XX веке были сделаны великие открытия в области естествознания, в том числе физики, и эти открытия оказали огромное влияние на развитие цивилизации. Роль фундаментальных физических теорий в формировании современного естественнонаучного мировоззрения, создании единой физической картины Вселенной от элементарных частиц до космических объектов неопределима. Поэтому подготовка зрелых специалистов для различных сфер деятельности путем углубленного изучения физики служит преобразованию общества, в целом мировоззрения человеческой цивилизации, образа жизни в лучшую сторону. Учитывая это, в настоящее время в системе непрерывного образования реализуются меры по повышению эффективности преподавания физической науки: совершенствуются учебные программы, учебная литература, методики преподавания. В настоящее время разработано множество методик преподавания физики, применение которых подробно анализируется в научно-педагогических исследованиях. Но каждая отдельно взятая методика имеет определенное место и границы применения в учебном процессе и именно в этих пределах данная методика позволяет получить ожидаемого эффекта. Педагогические исследования и опыты показывают, что методика комплексного подхода, включающая в себя несколько методик в физическом образовании, дает высокую эффективность. Потому что этот метод, включающий научные, исторические, междисциплинарные связи, философский анализ и другие подходы, служит не только для обучения об отдельном физическом явлении, но и для всесторонней подготовки зрелых специалистов[1].

В данной статье анализируются сущность и содержание исторического принципа, являющегося составной частью комплексного подхода в преподавании физической науки при подготовке будущих учителей физики в педагогических высших учебных заведениях, а также методика реализации данного принципа.

Использование исторических данных по изучаемой теме в преподавании физики началось в конце XIX века [2]. С этого времени во многих учебниках и научной, научно-методической литературе заложены элементы исторического подхода. В число таких элементов в большинстве

случаев входят биографические данные о жизни и деятельности изобретателя физических законов, относящиеся к теме, а в редких случаях и события, связанные с открытием данного физического закона, или воспоминания участников данного процесса. Научные педагогические исследования показывают, что использование исторических данных в преподавании физики или, другими словами, реализация принципа историчности дает высокую эффективность обучения [3,4]. Значение принципа историчности в преподавании физики было изучено в исследованиях таких ученых-педагогов, как В.Мошанский [5], Б.Спасский[6], Я.Савелова[7], А.Усова[8]. Важность принципа историчности в изучении и преподавании физики подчеркивается также в трудах многих всемирно известных великих физиков. Например, немецкий ученый, внесший большой вклад в развитие атомной и ядерной физики, лауреат Нобелевской премии В. Гейзенберг в своей работе «Философские проблемы атомной физики» писал:

*«Чтобы понять основы атомной физики, необходимо проследить историю ее возникновения. Мы должны будем шаг за шагом последовать за теми идеями, которые еще две с половиной тысячи лет назад привели греческую натурфилософию к атомистической теории, и затем попытаться найти связь этих основных идей с самыми последними достижениями современной атомной физики»[9, с. 90]*. Похожие мысли были высказаны в научных и научно-популярных работах А. Эйнштейна, П. Дирака, П. Капицы и др.[10] Американский физик С.Вайнберг в своей работе «Открытие субатомных частиц» писал: «Содержание физики XX века невозможно понять без классических представлений и методов в физике»[12].

Реализация принципа историчности в преподавании физики остается актуальной педагогической темой и в настоящее время. Потому что до сих пор последовательная методика использования исторических данных для отдельных разделов физики не исследована с научно-педагогической точки зрения с учетом всех аспектов исторического принципа. Для этого необходимо разработать системную классификацию исторических данных, цели их использования, а также методику использования исторических данных в учебном процессе.

Исторические данные, используемые в преподавании физики, их роль и значение в учебно-воспитательном процессе можно увидеть в таблице 1.

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**Таблица 1.**

№	Исторические данные	Цель использования исторических данных.
1	Биографические сведения об исследователе изучаемого физического закона.	Формирование роли, устремлений и идеалов студентов в жизни посредством проникновения в духовный мир великих представителей физики.
2	История открытия изучаемого физического закона.	Изучение истории открытия физических закономерностей, с одной стороны, углубляет суть исследуемой темы, показывая, насколько просты на первый взгляд научные открытия, а с другой - какие трудности преодолеваются до осмысливания этой простой закономерности.
3	Исторические сведения об этапах открытия физических закономерностей, борьбе и единстве противоположных идей.	Противоречивость идей, несоответствие теоретических и экспериментальных результатов в развитии науки приводит к тому, что ученые продвигают новые идеи и которые служат стимулирующим фактором для научного прогресса.
4	Интересные исторические факты, связанные с изобретателем изучаемого физического закона или процессом открытия данного закона.	Всестороннее раскрытие психологического портрета и результатов деятельности великого ученого полноценным изучением жизни великой личности посредством исторических данных.
5	Предоставление информации о научных трудах отечественных ученых.	Предоставление информации о вкладе отечественных ученых в мировую науку служит формированию у студентов чувства национальной гордости и патриотизма.
6	Исторические задачи и исторические опыты.	Углубление знаний по предмету, повышение компетентности будущих учителей физики путем повторения решения исторических задач и опытов великих ученых по конкретным физическим явлениям.

Классификация исторических данных в приведенной таблице и их цели применения в процессе обучения являются условными, и эти обстоятельства часто дополняют друг друга, и тем самым служат повышению эффективности принципа историчности.

Приводя биографию ученых-физиков, не следует описывать их в идеале - как людей без недостатков. С другой стороны, не следует забывать, что смысл жизни ученых прежде всего является результатом их научных исследований, поскольку вклад ученых в точную науку определяет их социальное положение.

При изучении истории открытия исследуемых физических закономерностей также необходимо будет объяснить мотивы, по которым ученый обращает внимание на ту или иную проблему, чаще всего возникающую из-за необходимости выработки потребности в изучении физической проблемы. В этом контексте следует помнить, что изучение науки может быть вызвано не только социальным спросом, но и внутренним логическим требованием этапов развития науки, в которых один этап является решением другого, который, в свою очередь,

создает новую проблему. Анализ истории открытий при объяснении физических явлений на уроках физики служит для формирования у студентов представлений о сложности познавательного процесса, углубления знаний по учебному материалу, физическому предмету и в целом творческому мышлению. Знакомство с заблуждениями в науке и историей их исправления станет ключевым фактором формирования профессиональной компетентности студентов, будущих специалистов в подготовке их к практической деятельности. Следует отметить, что ученые, проводившие исследования в разных странах и при разных условиях, в конечном итоге пришли к одному и тому же выводу, несмотря на любые заблуждения в науке. Это показывает, что научные исследования имеют свою объективную внутреннюю логику развития, не зависящей от субъекта и времени.

Интересные события, связанные с жизнью великих физиков - создателей физики и историей открытий, свидетельствуют о том, что, несмотря на разнообразие характеров и судьбы ученых, их объединяет одна цель. Цель состоит в том, чтобы

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служить науке без всякой корысти, самоотверженно работать на пути к научной цели, усердно и целеустремленно заниматься научными исследованиями, критически подходить к полученным результатам и признавать свои ошибки. Реализация принципа историчности в преподавании физики позволяет учащимся не только формировать элементы научного мышления, но и раскрывать общие закономерности и принципы научного познания. Это обеспечивает согласованность принципа историчности с законами и категориями диалектики.

При ознакомлении студентов с достижениями отечественных физиков необходимо объективный подход к достижениям, а также необходимо констатировать что ученые одного государства не могут решить все научные и технические проблемы, но каждый кирпичик, заложенный в фундамент науки, служит решению научных проблем, созданию единой физической картины вселенной. Вместе с тем следует отметить широту кругозора мышления, интуицию и смелость предвидения, а также стремление ученых применять свои знания на благо своего народа. Информирование будущих специалистов о том, что не важно кем и в каком государстве была решена научная проблема а важно, что найдено решение этой проблемы, окажет положительное влияние на развитие их профессиональных и социально-психологических взглядов. Как уже упоминалось выше, классификация исторических данных является условным, поскольку данные в этих классах часто могут быть обобщены как дополняющие друг друга, и эффективность этого зависит прежде всего от уровня знаний, квалификации и навыков учителя. Методологически можно выделить следующие положительные эффекты использования исторических данных в повышении эффективности образования:

1. Мотивация - учитель добивается формированию заинтересованности студента в изучении теме и формулирует необходимость ее изучения.

2. Формирование научного мировоззрения студентов путем проникновения в суть поставленной задачи изучением этапов развития, борьбы и единства различных противоречивых идей помимо общепризнанного состояния рассматриваемой физической закономерности.

3. Формирование у студентов – будущих ученых физиков и педагогов духовного облика, позитивного психологического, этико-эстетического мировоззрения путем предоставления интересной информации о жизни и научном наследии великих ученых, об их характере, особенностях личности.

4. Физиологами доказано что воздействие исторических сведений на физиологические процессы в мозгу человека способствует усилению памяти.

Формирование таких качеств в процессе подготовки будущих педагогов станет еще более актуальной темой на современном этапе развития научно-технического прогресса, компьютеризированного и массового интернет - атаки и послужит сохранению человеческих качеств и отношений в сознании будущего поколения.

Рассмотрим реализацию принципа историчности на примере преподавания раздела ядерной физики. Для формирования мотивации к изучаемой теме можно использовать различные исторические данные разными способами. Например, в лекциях по ядерной физике, преподаватель в начале урока на тему «Деление тяжелых ядер, атомная бомба и ядерный реактор» приводит отрывок из художественно - исторического романа Чаковского А. «Победа»[13, с. 324]: «Во время Потсдамской конференции 1945 года с участием Америки, Англии и Советского Союза в Германии, президенту США Гарри Трумэну принесли телеграмму следующего содержания:

*Совершенно секретно.*

*Срочно*

*Военный 33556.*

### **Военному министру от Гаррисона.**

Доктор вернулся с уверенностью, что малыш оказался озорником как свой брат и полным интузиазмом. Его взори достигли до Хайхольда. Я смог услышать его ридание на своей ферме.

После прочтения данного отрывка преподаватель обращается студентом следующими вопросами:

### **Вопрос 1. В чем смысл этой телеграммы?**

Чтобы расшифровать смысл этой зашифрованной телеграммы, необходимо определить скрытые значения слов, по сведениям из романа. Согласно содержанию романа: «брат» - это бомба номер один, взорванная на авиабазе Аламогордо (**Big boy**).

- "Мальчик" - малокалиберная бомба второго порядка, пригодная для транспортировки (**Little boy**)

"Хайхольд" - населенный пункт в пятидесяти милях от Вашингтона.

С помощью этого уникального словаря можно вывести содержимое зашифрованной телеграммы: «Испытания новой бомбы прошли успешно и стало известно, что ее мощност

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значительно выше чем ожидалось и по сравнению с предыдущим».

### Вопрос 2. Речь идет о какой бомбе?

Ответ на поставленный вопрос мы узнаем по теме «Деление тяжелых ядер, атомная бомба и ядерный реактор».

В этом методе, с одной стороны, у студента создается интерес-мотивация к предмету, а с другой в взаимосвязи с литературой и историческими интерес к художественному произведению, также посредством этих исторических данных формируются мировоззрения студентов и изучаются различные аспекты темы с непосредственным использованием атомной энергии в различных целях.

В качестве примера использования на уроках исторические сведения о физических открытиях

рассмотрим историю открытия нейтрона, которая служила основой для создания современной ядерной физики. Известно, что начало современной ядерной физики принято считать 1932 годом, несмотря на то, что ядерная структура атома стала известна в 1911 году. Причиной этому является открытие нейтрона в 1932 году. Чтобы облегчить понимание этого процесса открытия, приведем в виде хронологической таблицы научных исследований и их результаты по определению нейтрона (Таблица 2).

Представление этапов научных исследований в виде хронологической таблицы позволяет целостно представить, насколько сложен процесс научной проблемы и ее решения, труды ученых на этом пути и зарождение новой идеи.

Таблица 2. История открытия нейтрона.

№	Дата	Проблемы, возникающие при экспериментальном изучении физического явления.	Теоретическое объяснение результатов эксперимента.
1	1920	<u>Э. Резерфорд</u> , <u>Г. Мозли</u> . Масса атомного ядра примерно в два раза больше массы протонов в нем	В ядре содержится нейтральная частица, масса которой близка к массе протона. Это может быть нейтральная система, состоящая из протона и электрона ( $p^+, e^-$ ) – нейтральный диполь
2	1930	<u>В. Боте и Х. Беккер</u> . $Be + \alpha \rightarrow Be + ?$ Выход неизвестного луча из бериллия под действием альфа-частиц	Бериллиевые лучи могут быть новым видом электромагнитного излучения.
3	1931 18.01. 1932	<u>И. Кюри</u> , <u>Ф. Жолио-Кюри</u> . При облучении парафина бериллиевыми лучами вылетают протоны большой скорости.	Бериллиевые лучи не являются электромагнитным излучением, потому что энергия излучения очень велика.
4	1932 27.02. 1932	<u>Дж. Чедвик</u> : Результаты, полученные Жолио-Кюри, нельзя объяснить эффектом Комптона.	Излучение, исходящее из бериллия, состоит из потока нейтральных частиц - потока нейтронов $m_n \approx m_p$ .
5	1932	<u>Д. Иваненко</u> , <u>В. Гейзенберг</u> . Ядерная масса определяется общей массой содержащихся в ней нуклонов - протонов и нейтронов.	Ядро-это система, состоящая из протонов и нуклонов.

Из этой таблицы видно, что открытие нейтрона является результатом научных исследований ряда ученых, проходящих через сложные этапы. Такое развитие хода исследований Дж.Чедвик в своей статье «Воспоминания о поисках нейтрона» описал

следующим образом: «надеюсь, что я не буду неправильно понят, если добавлю послесловие к этой истории. Нет необходимости говорить о моем удовлетворении и восторге в связи с тем, что продолжительные поиски нейтрона в конце концов увенчались успехом. Решающий шаг,

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однако, был сделан другими. В этом нет ничего необычного: прогресс знания в общем является результатом деятельности многих умов и рук. И все же я не могу избавиться от чувства, что должен был бы добиться цели быстрее. Я мог бы выдвинут в свое оправдание ряд извиняющих обстоятельств: нехватку оборудования и т.д. но, несмотря на все это, я должен признать, хотя бы для себя, что не смог достаточно глубоко продумать свойства нейтрона, особенно те из них, которые ясно свидетельствуют о его существовании. Это успокаивающая мысль»[14.с.9-10]. Действительно, решающий шаг был сделан Чедвиком, но в тоже время он признавая заслуги своего учителя Э. Резерфорда утверждал: «Утешаю себя тем, что всегда гораздо труднее сказать первое слово о предмете, каким бы очевидным он впоследствии ни оказался, чем последнее слово. Это известная истина, и, может быть, она послужит мне извинением»[14.с.9-10].

В преподавании ядерной физики важным фактором повышения эффективности урока является своевременное и правильное использование интересной исторической информации, связанной с жизнью и деятельностью ученых-физиков, а также с процессом определенных открытий. Исторические сведения могут быть предоставлены по-разному в зависимости от педагогического опыта и умения учителя, в зависимости от того, в какой момент и как применяется данные сведения:

1. *Обобщенная вводная лекция по историческим сведениям.* Этот метод служит для обоснования новых знаний.

2. *Обобщенная итоговая лекция по историческим сведениям.* При этом систематизируются и обобщаются знания студентов.

3. *Описание истории осуществления отдельных открытий и фундаментальных экспериментов.* При этом закрепляются знания, полученные на занятиях.

4. *Полная биография и краткие биографические фрагменты ученых,* служат формированию личности студентов.

5. *Экспериментальные опыты,* моделирующие исторические опыты, формируют у студентов экспериментальные навыки.

6. *Задачи исторического содержания,* имеет важное значение в формировании навыков использования теоретической информации.

Интересную информацию о жизни великих ученых в истории развития ядерной физики, их взаимоотношениях с учителями и учениками, дискуссиях между учителями и учениками, противоречивых мнениях можно встретить в статьях, воспоминаниях их коллег, учеников и

научно-педагогических исследователей, занимающихся историей науки[3,4,5,6,7,8,9,10]. Например, Э. Резерфорду часто пришлось услышать замечания от руководства из-за шума в классе, когда он преподавал в школе. Причиной этого стало его углубление в научные проблемы, связанные с темой, изучаемой в процессе занятий, но непонятной ученикам. Но впоследствии работая в научной сфере, он стал наставником многих всемирно известных физиков, лауреатов нобелевской премии.

Лауреат нобелевской премии Ю.Б. Харитон в своих воспоминаниях о Резерфорде пишет: «Резерфорд был учителем в самом высоком смысле слова. Он никогда не пытался навязать своим ученикам свои идеи и взгляды, и был сторонником любого самостоятельного мышления»[10]. Нобелевский лауреат П. Л. Капица, в своих воспоминаниях о Резерфорде написал: «Резерфорд был человеком подвижным и с громким голосом. Интонация его речи показывал его настроение. В отношениях с своими учениками он краткими и лаконичными словами направлял их к правильному пути, что показывает высокий уровень его педагогического мастерства». Приведем следующий эпизод из воспоминаний о Резерфорде: «Когда один из учеников Резерфорда сказал, что он работает в лаборатории круглосуточно, в ожидании похвалы учителя, Резерфорд помрачнел и коротко бросил: - Послушайте, а когда же вы думаете?, и, недовольный учеником вышел из лаборатории»[11].

Жизнь и деятельность академика А.Д. Сахарова, лауреата Нобелевской премии, великого ученого внесшего огромный вклад в развитие и практическое применение ядерной физики является образцом для многих. После смерти великого ученого было опубликовано множество статей о его богатой сложными конфликтами, многогранной жизни и деятельности[15]. А.Д. Сахаров активно участвовал в проекте по созданию атомных и водородных бомб и позднее стал научным руководителем этого проекта. Для многих было непонятно обращение А.Д. Сахарова к прекращению и запрета ядерных испытаний[15]. Дело в том, что после каждого испытания атомной бомбы А.Д. Сахаров проводил расчеты и оценивал количество радиоактивных веществ, выделяемых в результате этого испытания в окружающую среду, и его влияние на живые организмы. В 1962 году, после испытания 50 мегатонной водородной бомбы на ядерном полигоне на российском острове Новая Земля, мнение Сахарова о выполняемой им задачи кардинально меняется. В обсуждениях результатов испытания как то он сказал своему учителю И.Я. Тамму: «Для меня

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очень мучительно признать, что мы занимаемся ужасным делом»[15]. Когда его спросили: - «Тогда почему же вы так увлеченно и инициативно взялись за осуществление этого проекта?», великий ученый ответил: «Во-первых, потому, что я считал, что баланс в вооружении служит сохранению мира, а во-вторых, потому, что мне было интересно научно-техническое решение поставленной задачи». При упоминании о жизни и деятельности Сахарова необходимо констатировать тот факт, что многие представители общественности, коллеги, всемирно известные ученые выступали за защиту Сахарова, который был наказан правительством (домашний арест) за выступления против политики того периода. Один из примеров таких действий является письмо лауреата нобелевской премии П.Л. Капицы Генеральному секретарю Коммунистической партии Советского Союза Л.И. Брежневу[15]:

Из содержания этого письма мы видим такие понятия, как искренность среди великих ученых, гуманизм, равнодушие к судьбам людей, судьбе будущего поколения, будущему развития науки. А формирование в сознании молодежи таких качеств одно из актуальных задач на все времена.

Одной из основных трудностей в методике использования вышеперечисленных

*Письмо П.Л. Капицы  
Л.И. Брежневу*

*4 декабря 1981 г.*

*Глубокоуважаемый Леонид Ильич!*

*Я уже очень старый человек, и жизнь научила меня, что великодушные поступки никогда не забываются.*

*Сберегите Сахарова. Да, у него большие недостатки и трудный характер, но он великий ученый нашей страны.*

*С уважением*

*П.Л. Капица*

исторических данных является ограниченность времени. Потому что учитель должен будет в кратчайшие сроки раскрыть динамику развития изучаемых явлений и понятий, их закономерностей. Поэтому описание исторических данных учителя должно быть кратким и максимально обобщенным. Конечно, трудно дать много информации на одном аудиторном занятии. Поэтому принцип историчности в преподавании физики желательно реализовывать дополнительно в следующих видах уроков: самостоятельные работы; уроки – семинары; курсовая работа; выпускные квалификационные работы; уроки конференции; на занятиях кружков.

Использование информационных технологий и инновационных педагогических методов на занятиях, позволит во - первых, эффективно использовать время, а во - вторых, за короткое время предоставить и проанализировать большой информации.

Анализ вышеперечисленных исторических примеров показывает, что многосторонний подход в преподавании физики, включающий в себе использование исторических данных, не ограничиваясь кратким изложением темы, служит важным фактором для того, чтобы будущие педагоги, готовящиеся в ВУЗах, стали высококвалифицированными специалистами, которые владеют глубокими знаниями в своей области, тем самым сформировав личность путем изучения жизни и научной деятельности ученых-физиков.

Компетентное применение принципа историчности в процессе преподавания физики побуждает у студентов повышенный интерес к науке, к изучению дополнительной литературы, не ограничиваясь определениями и готовыми выводами в учебниках. Знания студентов об истории науки создают почву для того, чтобы они могли овладеть закономерностями развития науки и найти свой путь в открытии новых закономерностей, сравнивая прошлое, настоящее и будущее в процессе познания физики, выделяя в них общие закономерности.

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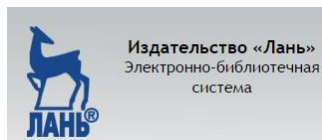
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