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## CLASSIFICATION OF ERRORS IN RUSSIAN-ENGLISH TRANSLATIONS OF SCIENTIFIC ARTICLES IN PHYSICS

The article considers some of the most common mistakes in the Russian-English translations of technical reports and scientific articles made by the authors writing in English as a foreign language. From year to year, the number of publications by Kazakhstani scientists in the English-language journals, where articles should be submitted in English, is growing. Therefore, a very important problem facing teachers of the English language is to teach students of engineering specialties, future scientists, how to write articles in English at such a level that they are not rejected by the editors of the English-language journals. Therefore, the students must achieve a level of English proficiency not lower than B2. The authors of this article consider the use of machine translations as a way of forming correct translations of scientific texts. There is an ambiguous attitude of various authors to the use of machine translations in the process of teaching English. The authors of this article believe that the proper use of machine translations is a useful tool in teaching translation of scientific texts. Students learn to understand the meaning of the correct use of terms in translation and their ambiguity, get acquainted with the sources of errors and ways to correct them. The authors consider the most common mistakes in Russian-English translations of technical texts – incorrect use of terminology, violation of the presentation logics, word-for-word translation and give recommendations for their correction.

**Key words:** translation of scientific-technical texts, machine translation, terminology, grammar mistakes.

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### Физика пәні бойынша ғылыми мақалалардың орысша-ағылшынша аудармаларындағы қателерді жіктеу

Мақала авторлары ағылшынша жазылған техникалық баяндамалар мен ғылыми мақалалардың орысша-ағылшынша аудармаларында жиі кездесетін кемшіліктерге, қателіктерге тоқталған. Бүгінгі таңда ғалымдар өздерінің жазған мақалаларын, зерттеу жұмыстары мен оның қорытындыларын әлемдік ғылыми қоғамдастыққа белгілі болуы үшін ағылшын тілінде жарық көретін журналдарда жариялаулары керек. Ол үшін әр автор өз туындысын ағылшын тілінде жазулары, не сапалы аудартулары міндетті. Сондықтан ағылшын тілі пәні мұғалімдерінің, ғалымдардың алдында тұрған өте маңызды міндет студент-инженерлерді, болашақ ғалымдарды барынша ағылшын тілінде сауатты жазуға үйрету. Өйткені, олар әзірлеген мақалалар, зерттеу жұмыстары журнал редакторлары мен пікір жазушылардың сынына ұшырамаулары абзал. Ал студенттердің алдына қойылған басты міндет – шәкірттер ең кем дегенде ағылшын пәнінен B2 деңгейіне жетулері. Олардың білікті маман атанып мәтіндерді сауатты аударуы, жасаған еңбектерінің сапасын жақсартуы үшін пайдалы құралы – машиналық аудармаларды пайдалану және осындай аударымдарда кездесетін қателерді түзету әдістерінің қыр-сырын байқай білулерінде. Сондықтан студенттер мен болашақ ғалымдар техникалық мәтіндерді аудару барысында ең көп кездесетін қателіктері терминологияны дұрыс пайдаланбауында. Аударма логикасына мән бермеуі және сөзбе-сөз аудару ісіне бой ұруы болып табылады.

Мақала авторлары өздерінің бай тәжірибелерін арқау ете отырып, аударма саласында кездесетін әртүрлі қателіктерді мысалдармен келтіре білген. Оларды түзету жолдарын нақты мысалдармен түсіндірген. Бұл еңбектің басты ерекшелігі де осында.

**Түйін сөздер:** ғылыми-техникалық мәтіндерді аудару, машиналық аударма, терминология, грамматикалық оқшылықтар, лексикалық қателіктер.

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### Классификация ошибок в русско-английских переводах научных статей по физике

В статье рассматриваются некоторые из наиболее распространенных ошибок в русско-английских переводах технических отчетов и научных статей, написанных авторами на английском языке как иностранном. С каждым годом растет количество публикаций Казахстанских ученых в англоязычных журналах, где статьи должны представляться на английском языке. Поэтому очень важной проблемой, стоящей перед преподавателями английского языка, является обучение студентов-инженеров, будущих ученых, умению писать статьи на английском языке такого уровня, чтобы они не отвергались редакторами англоязычных журналов. Следовательно, студенты должны достичь уровня знания английского языка не ниже, чем В2. Авторы данной статьи рассматривают использование машинных переводов как способ формирования правильного перевода научных текстов. Существует неоднозначное отношение различных авторов к вопросу использования машинных переводов в процессе обучения английскому языку. Авторы данной статьи считают, что правильное использование машинных переводов является полезным инструментом при обучении переводу научных текстов. Студенты учатся понимать значение правильного использования терминов в переводе и их неоднозначность, знакомятся с источниками ошибок и способами их исправления. Авторы рассматривают наиболее распространенные ошибки в русско-английских переводах технических текстов – некорректное использование терминологии, нарушение логики изложения, дословный перевод и дают рекомендации по их исправлению.

**Ключевые слова:** перевод научно-технических текстов, машинный перевод, терминология, грамматические ошибки, лексические ошибки.

#### Introduction

The problem of mistakes in the Russian-English translations of technical reports and scientific articles made by the authors writing in English as a foreign language is not new and seems to have an easy solution in finding an English editor and signing a contract on translating/editing the text. However, nowadays many of the scientists submitting their manuscripts to the English-language journals do not have an opportunity to find such a translator. Therefore our task is to teach students to comply with such a task with a minimum number of mistakes and help them to prepare drafts of manuscripts.

For this purpose, it is necessary to consider the main sources of mistakes in the manuscripts submitted for publication.

Today, to make the results of research known to the world scientific community, scientists have to publish their scientific articles in the English-language journals, and hence have to write them in English. On the way to perfection of their writing they have to overcome a lot of lexical and grammatical problems. In addition, they have to know the scientific style of English scientific articles, to understand the important role of correct use of terminology and construction of sentences. Therefore, a lot of effort should be made to make our texts translated into English to sound more English than they

often do now. To be able to translate technical texts at a rather high level one must be a scientist, or engineer, a linguist and a writer.

When two languages, as it is the case of Russian and English, have different syntactic and lexical structures, very often it is necessary to change the structure of sentences. Russian, as a highly inflected language can have long chains of nouns, which the translator stumbles upon in writing a translation. It becomes necessary to paraphrase such sentences and only then translate them. The translator must always keep in mind that there are no little things in translation, and he/she must be attentive to tiny details, as they may be of primary importance. Scientific translation is always a set of problems which must be solved to get the result. Analyzing the translation errors we must find out their sources and learn how to avoid such errors.

#### Experimental part

The most common translation errors are the incorrect use of terminology, grammar mistakes and stylistic defects. A very important place among translation errors is occupied by the errors in terminology, very often it is general scientific terms.

Though these sources of mistakes are well-known, the translators stumble upon them again and again. Here we will consider different types of errors

in scientific texts because of which Russian-English translated articles are not accepted by the English-language journals. Let us first consider mistakes in terminology in physical texts, some of which have been repeatedly discussed, however, they are made again and again. Therefore, it is necessary to consider such terms as “value” and “quantity”, “resistor” and “resistance”, “facility” and “device”. They are very often misused, which sometimes makes the sentence hardly understandable. The importance of studying collocations of scientific terms and usage of special patterns such as *atomic absorption spectrophotometry, nuclear magnetic resonance, chromatographic techniques, etc.* was pointed out by S.M. Kapina (S.M. Капина, 1977: 30).

Let us consider the following examples of incorrect translations and their corrections:

*Incorrect:* The material is preliminarily subjected to intensive mechanical treatment in pumps, auxiliary equipment, in the elements of local *resistances*, etc.

*Correct:* ... intensive mechanical treatment in pumps, auxiliary equipment, in the elements of local *resistors*.

In the English language “*resistance*” is *the measure of the degree to which a conductor opposes an electric current through that conductor*, whereas “*resistor*” is *a device designed to increase the ability of an electric circuit to stop the flow of an electric current through it*. Therefore, the mistake is quite obvious. Such a mistake is usually made by the low qualified translators.

Now let us consider the difference between “value” and “quantity”. It is very important for correct translation of the Russian term “*величина*”. Here are some examples.

*The Russian sentence:* Если имеют в виду *величину* во втором смысле, то к названию *величины* добавляют название объекта, который *величина* характеризует, или слово “конкретная”.

*Incorrect translation:* If we mean the *value* in the second sense, the name of the object that characterizes the *value*, or the word “specific” is added to the name of the *value*. (Google.translation.com)

*The Russian sentence:* “Методы и средства измерения и контроля динамических *величин*” is translated as “Methods and means of measurement and control of dynamic *values*.”

In the above examples we have errors, which make the sentences not understandable. The problem is that in the Russian language the words “value” and “quantity” are often translated by the same word “*величина*” in English “value” means “*величина, значение*”, which is often misinterpreted

ed in translations. For example A.L. Pumpyansky (A.L. Pumpyansky, 1965: 28) gives the following translations of word “*величина*” – *value, size, magnitude, quantity, amount, intensity*. Therefore it is often difficult to choose the correct term if it is not given in the dictionary.

One more example of the proper use of the term *value*: It should be noted that for both limiting sections, the values of  $\mu_0$  and  $\mu_2$  are real viscosity characteristics of non-Newtonian fluids (Askarova, 2017: 14).

Let us consider a widely used Russian phrase “*найти практическое применение*”. It seems quite natural to translate it as “*to find practical application*”. However, the use of the Russian-English dictionary gives “*to have practical application*”. Therefore the sentence “*Результаты этой работы могут найти практическое применение в таких областях, как отделение и удаление частиц пыли из плазменного кристалла.*” should be translated as “*The results of this work can have practical application in such areas as separation and extraction of dust particles from the plasma crystal.*” Two more examples from the Internet: Does the problem of infinity have any practical application? It has countless practical applications. The source is: (<https://math.stackexchange.com/questions/284982/>).

A lot of mistakes are made in translation of the Russian term “*устройство*”. Below we present an extract from the Russian-English dictionary (АВ-ВYYLingvo. [www.lingvo.com](http://www.lingvo.com)).

*Устройство* 1) (действие) arrangement; organization; для устройства своих дел – to settle one’s affairs, 2) (оборудование) equipment; facilities; (механизм) device; (приспособление) arrangement; аппаратное устройство – hardware device; зарядное устройство аккумулятора – battery charger; 3) structure; (система) system; государственное устройство – state/government system 4) (расположение) arrangement, layout.

In translation of the sentence “*Оксид азота (NO), который составляет более 90% от общего количества его оксидов, выделяемых устройствами для сжигания, далее окисляется в атмосфере до NO<sub>2</sub>*” the words “*устройства для сжигания*” were translated as *combustion devices* whereas it should be *combustion facilities* and the sentence must be worded as “*Nitric oxide (NO), which makes more than 90% of the total amount of its oxides emitted by the combustion facilities, is oxidized further in the atmosphere to NO<sub>2</sub>.*” The other example is translation of “*энергобережение*” in the sentence “*Компания Digital Group предлагает комплексный системный подход в области*

энергосбережения.” The Digital Group offers an integrated system approach in *energy conservation*. It was translated as *energy conservation*, which is not *energy saving* but *energy preservation*. The correct variant is *energy saving*.

One more example on *savings*: the sentence “Если проводимые на предприятии работы по стандартизации не меняют качество выпускаемой продукции, то затраты на их проведение перекрываются экономией сырья” was translated as “If the work on standardization carried out at the enterprise does not change the quality of the products manufactured, the costs of their implementation overlap with the *economy* of raw materials”, where the word *economy* was used instead of *savings*. Here is the example of misuse of the words *excitement* and *excitation*.

*Incorrect*: In the second case, after the preliminary *excitement*, the plastic properties of the material are retained.

*Correct*: In the second case, after the preliminary *excitation*, the plastic properties of the material are retained.

Mistakes arise not only in translation of terms but also in translations of adjectives. For example, the phrase “Такое поведение частиц было в полне закономерным” – “This behavior of the particles was *logical*” though it would be better to use *quite natural*. The students must remember that it is often incorrect to copy translations from the other areas of science. For example, for political texts *закономерный* could be translated as *legitimate* but it usually does not work in scientific texts and, in general, this word is often tricky for translation (L. Visson, 2003: 177).

The terms used separately as *engineering* can change their meaning in collocations, for example, *system safety engineering* (обеспечение системы безопасности) or *industry engineering* (организация производства) (Klimzo, 2006:21).

An important feature of English scientific and technical style is a wide use of elliptical constructions, incorrect understanding of which often leads to ridiculous mistakes in the translation (Hutchinson, Tom and Alan Waters. 1987).

Further we will consider some of the most common grammar mistakes, which are encountered in the overwhelming majority of the Russian-English translations.

The first one that must be noted is the wrong use of verb *to allow* (*to*), *to permit* (*to*), *to enable* (*to*). When it is used to mean *make it possible to*, *allow to* cannot be used without a grammatical object, so we cannot say: At present, the statistics available does

not *allow to take into account* all these situations: “*allow*” needs to be followed by a noun or pronoun such as “us” (the statistics does not *allow us to take* all these situations into account). There are many cases where this construction is used wrongly. The same is applied to *permitto* and *enable to*. Here are some examples of Russian-English translation with the wrong use of this construction.

*Incorrect translation*: “The studies carried out in the work *allowed to* determine the basic laws of the distribution of radiation heat in the combustion space and to determine the quantitative values of the heat flow due to radiation in different directions.”

*Incorrect translation*: “This research *enabled to determine* the basic laws of the radiation heat distribution in the combustion space and to obtain quantitative values of the radiant heat flux in different directions.

*Incorrect translation*: “The least square method *allows to find* the errors of parameters in the linear dependence, which are determined by formulas (20) and (21):”

*Incorrect translation*: “However, the probability theory *allows to calculate* the shape of the smooth curve, which is the limit for the histogram in case of an unlimited increase in the number of experiments.”

*Incorrect translation*: “Variations in the external field *allow to control* the position of the dust particles in the gas discharge.”

In the above numerous examples, taken from the latest manuscripts, we see the wrong use of the structure *allow to* and *enable to*. These errors can be explained by the presence of a similar construction in the Russian language but *without a pronoun*.

However, grammarmistakes, though they give a large percentage of gross mistakes, as well as the terminological ones, do not cover all the scope of mistakes.

The other part to be considered is stylistic defects in the text, which are subdivided into the following categories:

1) Amorphous sentences (such sentence structure when grammar relations between words become clear only with the consideration of meaning).

Let us consider the following example:

Substances reacting with water (metallic potassium, sodium), not de-energized electrical equipment and calcium carbide are not allowed to extinguish *with water due to the possibility of explosion in which acetylene is released*.

Water cannot be used to extinguish substances reacting with water (metallic potassium, sodium), not de-energized electrical equipment and calcium carbide as they may explode releasing acetylene.

The whole structure of the sentence was changed to remove the amorphous phrase.

2) Formation of “parasitic” relationships between words (because of incorrect construction of the phrase there seems to be a relation between words, when there is no relation) (Matukihn.<http://earchive.tpu.ru/bitstream/11683/36696/1/dx.doi.org-10.1051-mateconf-20179201041.pdf>).

It is important not to miss essential information or, on the contrary, to introduce something that is not in the text (or at least in a sufficiently obvious subtext) of the original (Gudova, Poltavskaya, 2016).

A vivid example of such “parasitic” relationships is the translation of the phrase “Высокодисперсионные электростатические зеркала вращательной симметрии с время пролетной фокусировкой по энергии третьего порядка,” which was translated as “High-speed electrostatic mirrors of rotative symmetry with time flight focusing on third order energy” and can be considered as the mistakes in the wrong translation of terms, for example, “rotative symmetry” instead of “rotational symmetry” and an example in the wrong translation of a chain of nouns. “High dispersive electrostatic mirrors of rotational symmetry with the third order time of flight focusing by energy”.

The Russian structure “фокусировкой по энергии третьего порядка” was incorrectly understood by the translator, therefore we see “third order energy”, though it is *focusing of the third order*

but not *energy of the third order*. This is a vivid example of wrong translation of chains of nouns in Russian. The other example is: “Кос – коэффициент передачи цепи обратной связи”, which was translated as “circuit transfer feedback coefficient” instead of “the transfer coefficient of the feedback circuit.” When we read *circuit transfer feedback coefficient* we understand that there is a *circuit transfer* but not a *feedback circuit*.

In the textbook *Learn to Translate by Translating*, Meshkov and Lambert write that the process of translation is a process of making decisions by the translator. Numerous examples of extra words are given in the book. These examples refer to scientific texts: *В течение длительного промежутка времени*. It is suggested that the translation “for an extended period of time” should be changed for “for a long time”. Another example: “Результатом любого процесса является изменение энергии”. This sentence was translated as “The result of proceeding of any process is a change in energy. The authors suggest a better interpretation as “Any process results in a change in energy” (Meshkov and Lambert, 1997: 112).

## Results and discussion

There are a lot of examples of usage of the expression “the fact that...”, which very often appears in the translations of such Russian phrases as “характерен тем, что...”, “объясняется тем, что...”, “связано с тем, что ...”.

Text for translation	Variant before correction	Variant after correction
Центробежный метод <i>характерен тем, что</i> чувствительный элемент реагирует на центробежную силу, развиваемую неуравновешенными массами вращающегося вала.	The centrifugal method is characterized by <i>the fact that the sensitive element responds</i> to centrifugal force developed by unbalanced masses of the rotating shaft( <a href="https://translate.google.com/">https://translate.google.com/</a> ).	The centrifugal method <i>is based on there-sponse</i> of the sensitive element to the centrifugal force developed by unbalanced masses of the rotating shaft.
Если случайный характер результатов наблюдений <i>связан с тем, что</i> они имеют ошибки измерения, результаты наблюдений имеют нормальное распределение.	If the random nature of the observation results <i>is due to the fact that</i> they have measurement errors, the results of observations have a normal distribution.	If the random nature of the observation results is caused by measurement errors, the results of observations have a normal distribution.
Деление погрешностей на основные и дополнительные <i>связано с тем, что</i> свойства средств измерений зависят от внешних условий.	The division of errors into basic and additional <i>is due to the fact that</i> the properties of measuring instruments depend on external conditions.	The division of errors into basic and additional is explained by the dependence of the properties of measuring instruments on external conditions.

Let us consider some more widely spread mistakes in the Russian-English translation where the adverb is used after *to* before the *infinitive* which splits the infinitive (incorrectly used structures and their corrected variants are given in italics).

*Splitting of the infinitive:*

*Incorrect:* Physicochemical purification makes it possible *to intensify sharply* mechanical purification of sewage.

*Correct:* Physicochemical purification makes it possible *to provide sharp intensification* of mechanical purification of sewage.

*Incorrect:* Environmental monitoring data are used *to comprehensively analyze* the state of the environment.

*Correct:* Environmental monitoring data are used *to carry out a comprehensive analysis* of the state of the environment.

It is seen that in these examples we had to change the structure of the sentence.

*Incorrect:* *To more definitively* demonstrate this mechanism....

*Correct:* *To demonstrate* this mechanism *more definitively*

*Incorrect:* In this case it is much more difficult to find the optimal values of  $D_{opt}$  and  $T_{opt}$  as it is necessary *to correctly take into account* non-Newtonian properties.

*Correct:* ... it is necessary *to take into account* non-Newtonian properties *correctly*.

*Incorrect:* It has been shown that this method enables us *to effectively manipulate* both structural and dynamical properties of the system of dust particles.

*Correct:* It has been shown that by his method enables us *to manipulate* both structural and dynamical properties of the system of dust particles *effectively*.

*Incorrect:* Channels of this diameter allow the cell *to very quickly get rid* of the highly toxic end product of metabolism.

*Correct:* Channels of this diameter allow the cell *to get rid* of the highly toxic end product of metabolism *very quickly*.

*Incorrect:* It is important *to simultaneously measure* the angular distributions of the differential cross sections (URDS) of elastic scattering.

*Correct:* It is important *to measure* the angular distributions of the differential cross sections (URDS) of elastic scatterings *simultaneously*.

*Using a preposition at the end of the sentence:*

*Incorrect:* AT2-R is only one of the resistors *that* AngII is connected *to*.

*Correct:* AT2-R is only one of the resistors *to which* AngII is connected.

*Incorrect:* Gangliosides were first found in ganglia of the nerve system, *where the name came from*.

*Correct:* Gangliosides were first found in ganglia of the nerve system, that is why *they are called gangliosides*.

We have considered some examples of incorrect use of prepositions at the end of the sentence. Teaching General English we spent a lot of efforts to make students use the verbs with prepositions at the end of the sentence, especially, at the end of questions. A well-known example, 'What are you thinking about?' or 'Where are you from?' However, such a structure is not used in the scientific language.

The above examples show how important it is to use terminology properly and fatal mistakes that can appear as a result of incorrect use of terminology.

Much attention is to be paid to the vocabulary studied by the student. It forms their understanding of a proper use of words, which may seem to be synonyms. For example, Sipols (Sipols, 2007: 125) shows the importance of studying different meanings of words, considering "rather" as an example, where it is used as a linking word rather than, as an adverb intensifying the other adverb "slowly" and as an introductory word. It is necessary to teach students to find the correct meaning of words. In solving this task it is useful to compare two parallel texts in the source and target languages in order to identify their differences. This helps students to study different tools used in translations.

## Conclusion

The article shows that the most dramatic mistakes in translations are caused by incorrectly translated scientific terms. Such mistakes can change the whole content of the sentence or even of the text if the wrong terminology is used throughout the text. The other types of mistakes considered in the article are grammar mistakes giving a large percentage of gross mistakes and stylistic mistakes such as amorphous sentences, parasitic relationships between words and bureaucratic words. We have also considered some examples of incorrect use of prepositions at the end of the sentence and wrong infinitive structures.

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