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# ОБЗОР МАТЕМАТИЧЕСКИХ, ФИЗИЧЕСКИХ И ГЕОМЕТРИЧЕСКИХ ТЕРМИНОЛОГИЙ В КАЧЕСТВЕ ОСОБОЙ ТЕРМИНОЛОГИИ ТЕОРЕТИЧЕСКОЙ МЕХАНИКИ

Научная статья

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#### Аннотация

Как известно, албанская терминология в специальных областях является более проблематичной, чем терминологии общих теоретических наук, таких как математика, физика, химия и.т.д. Общие терминологии являются более систематическими, стандартизированными и интегрированными в албанский язык. Безусловно, такое положение влияет на значимость данных терминов. Некоторые албанские понятия присутствуют почти во всех технических терминологиях. Изучение данных терминов дает понять их важность и для теоретической механики. Так, некоторые общие термины стали использоваться в теоретической механике: baraspeshë (равновесие), ndryshore (переменная), dallor (дискриминант) и.т.д. В некоторой степени следующие термины уже нашли свое применения в теоретической механике: zhvendosje (смещение) вместо spostim, или mbështetje (стойкость) вместо stojkë (термин, введенный из русского). В иных случаях наблюдаются колебания или паралельное использование «иностранного» и «албанского» термина, distancë и largësi (расстояние), uniform и i njëtrajtshëm (равномерность), translativ и tejmbartës (конвейер). Мы также можем наблюдать попытки ввести албанские термины: tejçim (передача/трансмиссия) вместо transmetim, ndemje (напряжения) вместо sforcim. Здесь необходимо сказать, что в некоторых случаях ряд албанских терминов не прижился, особенно в учебниках для старших классов: так вместо trysni (давление) используется чаще чем barazpeshë и т. д.

Ключевые слова: термины, математика, физика, геометрия, теоретическая механика, прикладная механика.

# OVERVIEW OF TERMS FROM MATHEMATICS, PHYSICS AND GEOMETRY AS A SPECIAL SUB-FIELD OF THEORETICAL MECHANICS

Research article

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#### Abstract

As it has been accepted so far, Albanian terminology in particular fields is more problematic than general terminology, such as mathematics, physics, chemistry, etc. The last one up to nowadays is even more systematized, standardized and adjusted in Albanian language (Albanized), which relates to the value of these basic fields of knowledge to all other fields, some of those terms are used in almost all technical terminologies. However, although the work conducted with these terminologies is also reflected in this one, it is worthwhile to see how these results are also taken into account in the terminology of theoretical mechanics, since some terminology of general theoretical fields have been borrowed from mechanics, for instance: baraspeshë (equilibrium; balance), ndryshore (variable), dallor/diskrimimant (distinctive), etc. Three cases can be observed: to some extent these Albanized terms are included in this field, which is reflected in the choice between the secondary terms of the Albanian terms, for instance: **zhvendosje** (**displacement**) instead of **spostim**; **mbështetje** (support) instead of stojkë (vertical, support tool; a term introduced from Russian). In some cases, oscillations are observed, such as the use of the foreign term and Albanian in parallel: distance and largesi (distance), uniform and i njetrajtshëm (uniform), translativ and tejbartës (conveyor, conveyer). In other occurrences, no attempts were done regarding the introduction of the Albanized terms, which function as such in the areas where they come from, such as: tejcim (drive, transmission) (for transmission), **ndemje** (stress) (for tension/strain). Here, can be mentioned that, in certain cases, a number of Albanized terms are not taken into account, which are found especially in some high school textbooks and are also reflected in dictionaries, such as: trysni (pressure)(for presion), barazpeshë (equilibrium; balance)(for ekuilibër), etc.

Keywords: terms, mathematics, physics, geometry, theoretical mechanics, applied mechanics.

#### Introduction

The work in the field of terminology of mechanics in the Albanian language has been characterized by some features that are common to the terminology of other fields. Firstly, the main feature can be emphasized by the undertaking of an extensive monograph work, but within the Albanian language, without comparing it with any foreign language. With respect to this, it is worth mentioning the monograph work defended as a dissertation topic by V. Dervishi [4, P. 12].

The terminology of this field has become object of observation mainly in the synchronous plane, although here and there have been attempts to address some practices, especially word formation in terminology in their historical development. During the study of this terminology in the historical context, an attempt has been made to identify some cases of the evolution of terms to this day, where it has been observed, the adaptation of the form of terms to their content, which has led to the modification of the form of the terms, replacement of existing forms with new forms, etc. The creation of new forms in many cases has led to the phenomenon of absolute synonymy, which has been studied extensively. Thus, for example, some significant examples can be cited as, for concepts "bosht motori" (crankshaft) and "rrotë me dhembë" (tooth wheel), in the course of the development of mechanics terminology for the first one as synonyms have been used: kolodok (from Ital. collo

d'oca) – punëtore (used before the year 1944 as Albanized term) – bosht me bërryla, bosht bërrylor (as calque from Russian)–bosht motori; while for the second: ingranazh, rrotë me dhëmbë, rrotë e dhëmbëzuar up to dhëmbëzor. In English terminology, for the first instance, the standard term is encountered: crankshaft, whereas; for the second on, fluctuations are still observed nowadays: gear, tooth wheel, dentate wheel [25. P. 83-84].

## **Sources of formation (composition from sources)**

The basic terms of mechanics, identified mainly in the two given subfields in TM-Theory of Mechanics and AM-Applied Mechanics are in large part not formations within the field, but they originate from different sources. In the process of their functioning in use, such as in the language of a text, they are introduced to their original form, coming from their original domain (system), but are further developed, expanding in form, depending on the new concepts they express. The element added at their end further specifies them, specializing in the field they serve, for instance terms such as: rreth, kënd, lartësi (Engl. circle, angle, height), originate from geometry and into these fields, they are either used as such or by forming other terms, which serve as units of word-combination to mark the concepts of the relevant, like in AM: rreth i bazës (së dhëmbit), kënd i trysnisë, lartësi e kokës (Engl. base circle, pressure angle, addendum height). Likewise, the term, ekuacion (Engl. equation) from mathematics is used in TM as an integral part of the term ekuacion i lëvizjes (Engl. motion equation). It can be readily observed that the constituent parts of the word-combination may also appear as combinations of two terms from two different fields, appearing as sources as ekuacion i lëvizjes (mat. + fiz.; Physics + Mathematics) (Engl. motion equation (Mathematics + Physics).

Given their entirety, a classification can be made of the fields, which serve as the source base from which the terms of these subfields come from. In the course of their further development, in combination with other non-terminological terms and units, constitute the terminology of the two basic subfields of mechanics [25, P. 54-55].

#### 1. Mathematics terms:

- a) with the existing form: ekuacion, baraspeshim, probabilitet/gjasë, rreth, varg, vijë (Engl.: equation, balancing, probability/set, circle, line).
- b) with further expansion: ekuacion i lidhjes, ekuacion i gjendjes, rreth i rrojullisjes (së rrotës dhëmbëzore), rreth i referimit (të rrotës dhëmbëzore), varg planetar, varg rrotash dhëmbëzore, vijë e ngërthimit (e rrotës dhëmbëzore; e ingranimit), vijë e forces, vijë helikoidore, vijë përmasore (Engl.: coupling equation, state equation, pitch circle, reference circle, planetary gear train, train of gears, line of action, line of force; field line, helical line; helix, dimension line).

#### 2. Physics terms:

- a) with the existing form: bobinë, lavjerrës, lëvizje, zhvendosje, shkallë, shpejtësi, shpejtim (përshpejtim) (Engl:. coil, pendulum, motion, displacement, scale, speed; velocity, acceleration).
- b) with further expansion: bobinë induktive, forcë gjatësore, forcë hidrodinamike, forcë kritike, lëvizje lëkundëse, lëvizje relative, lëvizje shkarrëse, zhvendosje aksore, shkallë ashpërsie, shkallë e mbinxehjes, shkallë fortësie, shpejtësi e kristalizimit, shpejtësi e nxehjes, përshpejtim këndor, përshpejtim qendërsynues, përshpejtim tangjencial (Engl.: induction coil, longitudinal force, hydrodynamic force, critical force, wobbling motion, jigging motion, creeping motion, axial displacement, roughness number, degree of superheat, degree of hardness, rate of crystallization, rate of heating, angular acceleration, centripetal acceleration, tangential acceleration).

#### 3. Geometry terms:

- a) with the existing form: kënd, hipotenuzë, trekëndësh, rreth, pikë, vijë (Engl.: angle, triangle, hypotenuse, circle, point, line).
- b) with further expansion: kënd i drejtë, kënd i fërkimit, kënd i gërshetimit, kënd i kthimit, kënd i lakesës, kënd i mprehjes, rreth rrote, rreth i rrokullisjes, pikë arbitrare, pikë rrotullimi, pikë ndërprerjeje, vijë e lakuar, vijë e ndërprerë, vijë e pjerrët (Engl.: right angle, angle of friction, shear angle, steering angle, angle of curvature, wedge angle, wheel rim, pitch circle, arbitrary point, rotation point, intersection point, curved line, dotted line, oblique line).

# 4. Terms from special subfields of mechanics:

- a) mainly with the existing form: bigël (kopilje), bosht, bulon, burmë, dado, disk, sustë, pulexhë, automobil, timon (aut.), rotor, helikë (term. tek.) (Engl.: cotter pin (splint pin), shaft, bolt, worm, nut, disk, spring, pulley, automobile, handle, bar, rotor, helix).
- b) with further expansion: bosht bërrylor, bosht gungor, bosht kardanik, bosht kryesor, bosht pinion, bosht ushqimi, bulon çengel, bulon balestre, bulon mbërthyes, dado bllokuese, dado e shlizuar, dado fiksimi, dado kësulë, disk freni, disk gungor, disk mbrojtës, sustë cilindrike, sustë fikatëse, pulexhë freni, pulexhë udhëzuese [Engl.: crankshaft, camshaft, cardan shaft, main shaft, pinion shaft, feed shaft, eyelet bolt, check nut; locking nut, slotted nut, adjusting nut, collar nut, brake disk, came plate; cam disk, plant blocker disk, spring bolt, fastening bolt, cylindrical spring, cushioning spring, brake pulley, guide pulley].
- **5.** Terms based on the meanings of common words, which constitute the terminology of subfields mainly with the existing form: *ijë* (dhëmbi), kokë (dhëmbi), shpatull, kreshtë (ashpërsie), lodhje (detali) (Engl.: flank, tip, lug, fatigue). They are used in the present form, but also in the composition of word-combinations, which emerge as expressions of concepts such as: *ijë* and *ijë* dhëmbi, kokë and kokë buloni and, as such, they are seen also in English language, like: flank and tooth flank, head and bolt head.

When used with existing forms, their conceptual content is revealed by context, for instance: "...ija që paraqitet në vizatim" (=e dhëmbit), koka që përbën pjesën kryesore të bulonit, and the same phenomenon is observed in English: "flank that is shown on the drawing", "the head which is main part of the bolt".

# State and problems of further development

The situation and fundamental problems of the further development of the terminology of mechanics are largely conditioned by the use of its basic terms. They are of particular importance because, as a basis, they determine the values of the

entire terminology. On the other hand, they have a high degree of frequency, and serve as the basis for formation of numerous terminological word-combinations.

The basic terms layer is important to be viewed in two ways: how is the real situation of the field terms by the terms of the degree of systematization, Albanization and standardization, hence how qualitative they are and how they respond to the realization of language communication. This is important to be noted, because the quality of the whole lexical system of the field concerned also depends on the quality of this layer. Nonetheless, their real state must be analyzed in terms of a layer that is not completely formed within the field. As has been noted above, some of them source from other fields, so this layer should be viewed from the standpoint of the state, located in the fields of origin.

For the reasons of this state of affairs, it is often written in linguistic literature and terminology in question, in which there are shortcomings which are especially related to the Albanianization [25, P. 232] of this terminology. The causes here are numerous, both subjective and objective. This problem will be addressed in the last chapter of this essay, which will specifically address the problem of systematization, Albanization and standardization in this terminology.

In terms of English terminology regarding this layer of terms, from the observations we have made in some texts of the fields in question, a more stabilized state is observed, especially in the absence of synonyms, although they are present in some occasions, for example: *pully* and *sheave*, *joint* and *hinge*, *pair* and *couple*. [19, P.44-68]. The stabilized state of this terminology is related to two factors: as has been argued above, the terminology of this field is already a consolidated terminology which has gone through the stages of zigzag developments still observed in Albanian. On the other hand, it should be mentioned that the terminology of this field in the English language, like all other terminologies, serving as a standardization condition internationally, serves as a basis for verification for other languages during their processing, systematization and standardization process.

In the context of the work that continues to be done even nowadays it can be argued that deficiencies in polysemy (homonymy) are also observed in English terminology  $filet\ddot{e}_{1,2} = thread_{1,2}$ ,  $makin\ddot{e}_{1,2} = machine_{1,2}$ ,  $zinxhir_{1,2} = chain_{1,2}$ . At the level of absolute synonymy, fewer synonymous pairs are observed, whereas in the Albanian language this rises to the level of secondary pairs. However, in English, even when secondary pairs are met, one of the couple's elements is definitely more embedded; whereas in Albanian, the priority of one element over the other is indefinable. Thus, for instance, in English, we have gear before tooth gear, whereas in Albanian they are met in indefinitely manner: rrotë me dhëmbë - rrotë e dhëmbëzuar ingranazh - dhëmbëzor (gear wheel). This is also due to the tendency to Albanize foreign terms from time to time and consequently, the addition of Albanian secondary pairs beside the foreign ones is met. This further complicates the situation, which also leads to confusion in scientific-technical communication. Looking at the situation from this point of view in both languages, it can be argued that in English it can be observed the tendency to preserve the advantage of preserving one element of the couple to move towards its embodiment (e.g. gear before tooth gear); whereas in Albanian, it is set as task directly selecting the most appropriate secondary pair and removing whole secondary in pairs or ranges. This is important to note, because in recent times in Albanian there is a shifting towards reusing terms that once were out of language use, which complicates the situation more. Thus, for example, foreign terms are predominantly used before the ones settled in Albanian. This is also observed in the basic terms of mechanics, like presion before trysni (preasure), distancë before largësi (distance), ingranazh before rrotë e dhëmbëzuar (tooth wheel).

#### The value of studying basic terms

The basic terms are units of relatively broad conceptual content and some of them have a dual relation to the lexicon of the language; because of their specific conceptual content they can also be used in other terminologies, close to the terminology in question or even more distant, for instance, naming of medical device parts such as: bulon, vidhë, kapak, kuti, rrotë (Engl. bolt, screw, cover, box, wheel), as well as in general language, in ordinary discourse, when using objects, their elements in the field of mechanics in everyday life, such as: kushinetë, sustë, valvol (Engl. bearing, spring, valve) (on a device for ordinary home use, on a device manual, etc.). This means that, in terms of the functional value of language use, they approach this function with the usual words. As well as names of common objects, they fall into competence activity in the common language of the Albanian speaker and, as such, find their place in the explanatory dictionaries of the language [7] besides the common words. Their study according to their functional value in language is important in order to determine the limit to which should go their involvement in an explanatory dictionary. This makes necessary, in many cases, the collaboration of lexicographers with terminologists, even specialists of the field, to determine the range of terms used in the general language that should be included in an explanatory dictionary. The biggest problem here may be the limit of their use in a medium-type dictionary. However, it must be said that as the bigger the dictionary is, the greater must be the degree of their representation in them. In their introduction, especially in middle-class dictionaries (e.g., Dictionary 1980 and 2006), the proportion and symmetry of their representation are not always maintained. In some cases there are less commonly used terms that are included in the Dictionary and vice versa: more commonly used terms are missing. Likewise, problems also arise in their definition, mixing borders with common words, etc... Thus, e.g. as mentioned before, in the dictionary 1980, the term kushinetë (bearing) [7, P. 928] is rendered deficient by definition, where features not characteristic of it are introduced: rreth, saçme (circle, shot) etc., while the conceptual content for the term zinxhir (chain) is missing, when it is known that this term has widespread use in common language: chain (of bicycle), chain (of tractor) [7, P. 2243] etc. Likewise, what is meant with dado-feed screw (as a basic term in mechanics) in the Dictionary [7, P. 283] is given by definition in kundërvidhë, which, as a term, is not known at all in the terminology of this field.

Remarks can also be made on some basic terms of mechanics, which in the explanatory dictionaries of English (middle type) are treated indefinitely in their definitions of dictionaries like: *spring, chain, machine, mechanism, bearing*, etc. In some cases, it might be difficult to relate the meaning of the word with the term.

Without being able to address separately the representation of terms in the field of mechanics in English explanatory dictionaries, in regard to their inclusion in Albanian dictionaries, it can be argued that there are significant deficiencies in this respect. Without adding more values than the terminology lexicon of mechanics needs, we support the idea that terms

introduced from this field, as a relatively broad field, should deserve identification through the symbol **mek.** (mekanikë-mechanics) and not to be replaced by **tek.** (teknikë-technical). This symbol either should be omitted because is too broad (and includes many other fields that have their symbols) or it should be applied for broader fields. Here, some terms can be identified as terms of mechanics, when presented as a stand-alone unit or when they take first place in the semantic structure of the word (of the term), e.g. mekanikë (mek.), mekanizëm (mek.), manivelë (mek.), makara (mek.) [9, P. 346-363], kushinetë (mek.); likewise, we would advocate for the relevant terms in English, like: mechanics (mech.), mechanism (mech.), crank (mech.), block (mech.) bearing (mech.). In cases where the general meaning is mixed with the special (mechanical) solutions may be subjective, but also dependent on the size of the dictionary. Thus, they can be branded as terms of mechanics Alb. bosht and Eng. shaft, Alb. hallkë and Eng. link. There could also be identified bashkësi (jonit), lidhje (linkage), zinxhir (chain). Here, we have in mind those units that have value as terms even in their use in the general language.

In addition, once again we are returning to the function of basic terms, not only as denominational units used in the basic fields, but also in the special fields. It can be asserted that their value is extremely high, since they serve as basic building materials for creating word-combination on these two levels. Thus, for instance: hallkë (Engl.: link; member) can build word-combination into two levels: as a lexicon in the base field, as in AM: hallkë (Engl.: link) and hallkë e udhëzuar (Engl.: driving link (member)), hallkë udhëzuese, (Engl.: driving link (member) hallkë e lëvizshme (Engl.: movable link (member)), hallkë e palëvizshme (Engl.: stationary link (member)), hallkë e çernieruar (nyjëtesuar) (Engl.: hinge (joint) link (member)) and as a lexicon in a special field as in the field of auto-tractors: hallkë (chain) and hallkë traktori (track chain), hallkë pllakëzore (plate track), etc.. The same phenomenon is observed in English. Basic terms serve for multiple construction of word-combination on these two levels, as well, such as pair in (AM): driving pair, driven pair, moving pair, non-moving pair, hinged pair, and in the special field, as in aut.: track chain, plate track etc..

#### Conclusion

In this paper, what has become the treatment object as one of the most important layers of the vocabulary of terminology in the field of Mechanics is its base terminology vocabulary, viewed on the comparison level of both languages, Albanian and English.

By appearing as one worded units, on their own, as well as in wider compounded units (word group), these units serve as compound elements of around 70-80% of the whole Mechanics vocabulary, as they are in Albanian and respectively in English: mekanizëm – mechanism, makinë – machine, hallkë – link, zinxhir – chain, zhvendosje – displacement, lëvizje – motion, rrotullim – rotation, rrotulloj – rotate, rrotullues-e – rotary, kinematik-e – kinematic, kinematikisht – kinametically etc

All of this base vocabulary appears mainly in the basic subfields of Mechanics, like in the Theory of Mechanics, as well as in the Applied Mechanics, in the special subfields, and in the subfield of Mechanical Technology, of Automobiles, of heat technology etc., but it connects also with the base fields of knowledge which stands at the foundation of Mechanics, as with mathematics, geometry, physics, chemistry etc.

Precisely this circumstance motivates the focus of study on the base glossary of the field of Mechanics, seen from the comparison's point of view in both languages, resting mainly on two of its ground subfields, on the *Theory of Mechanics* (TM) and on the *Applied Mechanics* (AP).

The base terms of this terminology have been viewed from the level of both languages, Albanian and English, taken one by one, as well as compared with one another. It is important to emphasize that the English Language has been seen with precedence as a language with an international extend, whereas the terminology of Mechanics, as a special glossary, serves as a standardization sample not only for the Albanian language, but for other languages as well.

## Конфликт интересов

**Conflict of Interest** 

Не указан.

None declared.

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