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NOVEL APPROACH TO INDIRECT ACTIONS OF MILITARY THEORY

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INTRODUCTION

The major object of the study of the military theory is a military action. There are many variants of its definition, ranging from simple rather complex interpretation.

According to general consensus military action is a result of human civilization, of armed confrontation between the formal and informal groups of society, their mutual apparition and offering of resistance to one another.

The given definition directly paints to the fact that the nature, essence, scale and results of the armed action are in functional relationship with the economical, technological, ideological, sociopolitical, and diplomatic standards of the development of society. It is also in direct relationship with real conditions of state, national, armament, armed action waging and many other components and the processes of their variation dynamics.

The FOCAL PLANE of all directions of military science is the major motive – armed action - was, is and will be one of the main tasks of military history and modern studies.

Armed action, in accordance with many variants of its parametric manifestations, is a systematized and non-systematized manifestation of the dynamic processes of mutual armed action of opposed parties.

Armed action may be manifested in the form of wars, military conflicts, armed rising and guerilla movement. Their realization may be based on military operations, fighting actions, campaign, operation, strike or battle.

Besides, armed action is divided into separate groups by its scale and mastery of space.

Armed action in general, as a function, is conditioned by the forces, movements, appropriate space and relevant time.

Thus the question may be asked - whether one could discuss on the bases of existing theoretical concepts of ARMED ACTION, at least the priorities creating a military security system and to use all

the existing theoretical principles and definitions that are generally recognized.

This position is not simple and requires elucidation.

On the one hand, military science, as the process and result of study, is developing and modifications naturally occur in it – negation, recognition of novelty, additions and amendments. In addition, there are controversial approaches to many topical issues of the military theory and, in such a case, researchers should, if necessary, recognize or give priority to one of them in each concrete work. Moreover, according to the reality, they should prove and adopt the new position with a special approach.

On the other hand, the CANONICAL PROPOSITIONS of modern military theory, which have effect in Georgia and in states having a similar type military security environment, in many concrete cases, are not compatible with and effectual in modern realities of armed actions, that are predominantly manifested in asymmetric wars, indirect approach or indirect action military strategy and generally in various modern military conflicts.

Accordingly, it is not only natural, but necessary for Georgia and states with similar type military security space to contribute to the development of military science in general so as to perfect and develop military theory proceeding from reality and practically realizable scenarios of military art.

The present work contains researches on such issues of military art, as FIGHTING CAPACITY, indirect action strategy, conditions of asymmetric warfare, military operations planning and the cornerstone of military art - configuration of the interrelationship of tactics, operational art and strategy.

The researches are provided with formalized parameters, models and logic of armed action.

FIGHTING CAPACITY OF THE COMBATANTS

The starting parameter of conducting the armed action is the FIGHTING CAPACITY of individual subunits, parts, units, small and large units of troops and formations.

FIGHTING CAPACITY should be considered in functional dependence with its major argument - fighting resources.

Accordingly, FIGHTING CAPACITY is a condition established in complex by systematizable and non-systematizable circumstances and conditions of forces and means which, in a particular armed action determines the parameters of realization of FIGHTING CAPACITY in a definite time period and space.

Along these lines, the concept of fighting stability already exists in military theory, but its traditional definition is imprecise [156]1, it is not concretized, lacks assessment of its essence and importantly, it does not contain arguments for use in researches in the military theory field.

Thus, it is necessary to work out a proposition that would define the parameter of FIGHTING CAPACITY, the parameter - FIGHTING STABILITY should also be specified and its place assigned. To this end, FIGHTING CAPACITY, as major parameter of armed action, should be discussed more extensively.

In this respect, the following questions should be asked:
1. What may possess FIGHTING CAPACITY;
2. What is that possesses FIGHTING CAPACITY;
3. How and with what can the parameters of FIGHTING CAPACITY be replaced.

It should be defined in practical form and content that FIGHTING CAPACITY is possessed by any armed formation founded based on integration of force and means.

Traditionally, in military organization, for the purpose of realization of FIGHTING CAPACITY, subunits and diverse large and small units are considered to be in the FIGHTING CAPACITY condition. This approach is of course right in individual cases, but is not

acceptable for the purpose of systematizing the issue in generalized form.

According to the logic of battles, operations and armed actions, the combatants participating in an armed action and possessing FIGHTING CAPACITY, are complex systems that can conventionally be called FIGHTING SYSTEM.

FIGHTING SYSTEM should be regarded as a set of FIGHTING ELEMENTS deployed in space and connected to one another by means of FUNCTIONING LINKS in a certain lay-out, i.e. by FIGHTING LINKS (fig. 1).
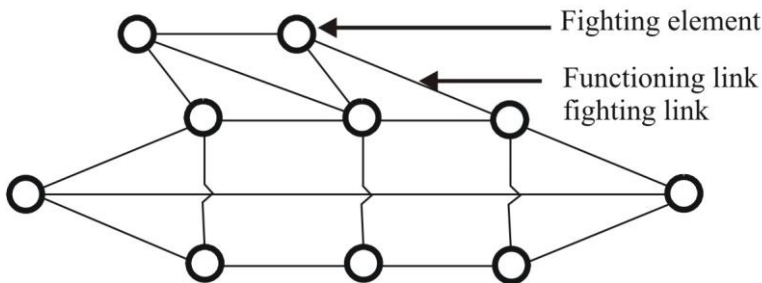

Fig. 1. Fighting System

FIGHTING SYSTEM and FIGHTING ELEMENTS have different meanings in different cases. For example, if FIGHTING SYSTEM is an association, then its FIGHTING ELEMENT is a unit, while if a unit is regarded as a FIGHTING SYSTEM, its FIGHTING ELEMENTS are military units, and so forth.

Such possible graded meanings of FIGHTING SYSTEM point out that the upper grade FIGHTING ELEMENT is itself a FIGHTING SYSTEM consisting of lower grade FIGHTING SYSTEMS (fig. 2).
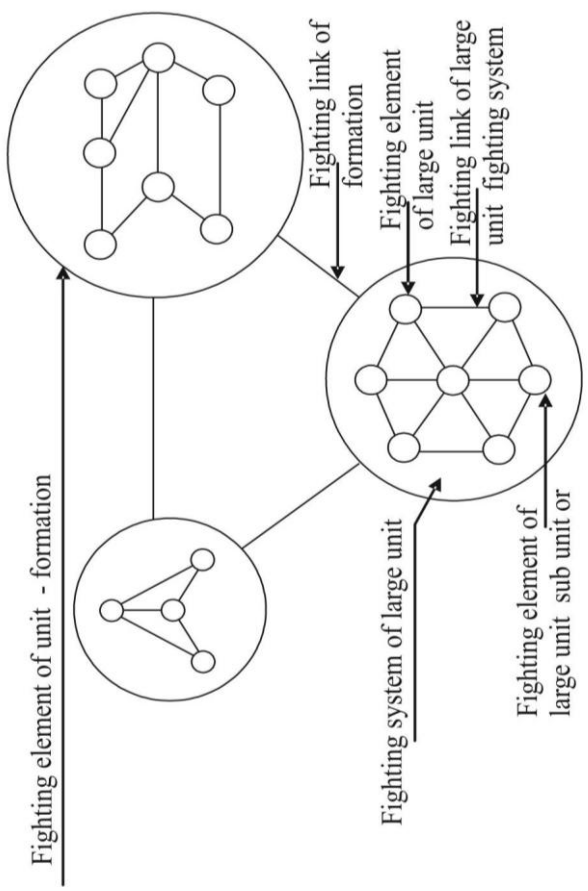
Fig. 2. The step-like scheme of the Fighting System on formation level

Fighting link of formation

Fighting element of large unit

Fighting link of large unit fighting system

Fighting element of unit - formation

Fighting system of large unit

Fighting element of large unit sub unit or

A FIGHTING SYSTEM possesses its own FIGHTING CA-PABILITY defined by two conditions - FIGHTING CAPABILITY of an individual FIGHTING ELEMENT, form, geometry, content, efficiency and reliability of the FIGHTING LINKS of the functioning of the FIGHTING SYSTEM.

Thus it can naturally be concluded that FIGHTING CAPABIL-ITY of a FIGHTING SYSTEM may be less than, equal to or more than an algebraic sum of FIGHTING CAPABILITIES of creating a FIGHTING ELEMENTS, depending on the geometry of FIGHTING SYSTEM establishment and effectiveness of the FUNCTIONING LINKS.

Accordingly, an answer to the question of what possesses FIGHTING CAPACITY is FIGHTING SYSTEM.

As to the question - how can FIGHTING CAPACITY parameters be changed, the answer to this is subject to the following logic.

Since FIGHTING CAPACITY is possessed by a FIGHTING SYSTEM represented as set of elements associated to one another and constituting a whole three variants of change are possible:

I.   Change of a system by changing features and quantity of its component FIGHTING ELEMENTS;
II. Change of a system by changing the feature, nature, lay-out geometry and quantity of functioning between its component FIGHTING ELEMENTS, i.e. of FIGHTING LINKS;
III. Change of a system in combination - by jointly changing the FIGHTING ELEMENTS and FIGHTING LINKS.

Insofar as armed action is a dynamic process and it is realized by means of a FIGHTING SYSTEM, it is natural that change of the FIGHTING SYSTEM proceeds continuously or intermittently in time and space at every stage of preparing, conducting and completing the armed action, which conditions change of the FIGHTING CAPACITY or its retention.

Accordingly, the first of the above described three variants implies change of the FIGHTING SYSTEM, weakening or enhancing the property of its FIGHTING ELEMENTS - FIGHTING CAPA-BILITY, by destroying, enhancing or adding a new feature.

In this regard, if we link analogies of military mechanical systems to the logic of armed action modeling, it can be concluded that one of the determining factors of the FIGHTING CAPACITY is the firmness of the FIGHTING SYSTEM. It is a potential of FIGHTING CAPABILITY which, under fighting stress conditions, is in inverse proportional dependence on the breakdown of FIGHTING CAPABILITY of the FIGHTING ELEMENTS.

The second determining factor of FIGHTING CAPACITY of the FIGHTING SYSTEM is the fighting stability of the FIGHTING SYSTEM. This is case II noted above, when the FIGHTING ELEMENTS of the FIGHTING SYSTEM retain sufficient FIGHTING CAPABILITY, but the FIGHTING SYSTEM structure is subject to breakdown or deformations owing to changing properties, nature, lay-out and geometry of functioning between the FIGHTING ELEMENTS i.e. - FIGHTING LINKS. Such situations lead to loss of local fighting stability or entire fighting stability of the FIGHTING SYSTEM by changing the FIGHTING CAPACITY.

Local fighting stability and entire fighting stability are components of their generic concept - fighting stability.

Loss of LOCAL FIGHTING STABILITY is a process under which the FIGHTING CAPACITY of the FIGHTING SYSTEM decreases or sometimes even completely lost by losing the overall stability of the FIGHTING SYSTEM and its individual FIGHTING ELEMENTS.

Losses of the OVERALL FIGHTING STABILITY are a process of loss or sometimes decrease of the FIGHTING SYSTEMS FIGHTING CAPACITY through losing the stability of the overall FIGHTING SYSTEM.

Thus, it can be said that FIGHTING CAPACITY depends on two conditions −firmness of the FIGHTING CAPACITY and the stability of FIGHTING CAPACITY (fig. 3).
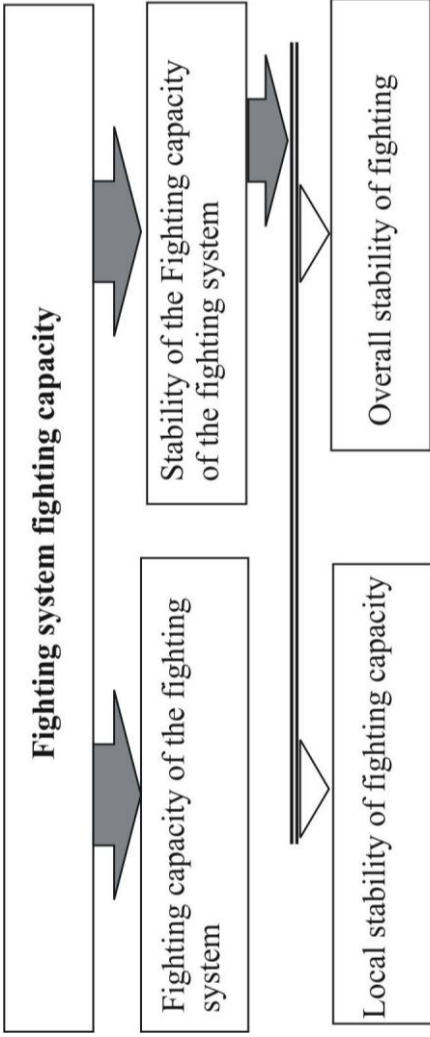
Fig. 3. Structure of the fighting systems fighting capacity

The present systematization of the FIGHTING CAPACITY is based, as noted above, on the logic of the dynamics of material systems, which is a definite idealization of the process of armed action conducted by the forces and means in space and time, involving both conditional assumptions and approximations.

Besides, it should be noted that principles of mechanics in the systematization of issues are used maximally simply laconically with restrictions and purposefully and so as not to allow overloading of the essence of standards and basics of military art, on the one hand, and unnatural modeling thereof, on the other.

According to the definitions in military literature, FIGHTING CAPACITY is one of the components of combat readiness. It is intrinsic to troops and forces to successfully conduct an armed action and properly use the FIGHTING CAPABILITY. According to the assessments of the history of wars, elimination of the personnel and military equipment up to 50-60 percent is considered partial loss of FIGHTING CAPACITY, while disabling over 50-60 percent of forces and resources is total loss of FIGHTING CAPACITY.

As to the concept of fighting stability, in accordance with the assessments found in military literature, its essence is practically reduced to the property of troops and forces to retain their FIGHTING CAPACITY and fulfill the fighting tasks under set to them conditions of the active actions of the enemy. This depends on their combat readiness, fighting ability and management system as well as on the viability of the forces and resources.

The aforementioned meaning of concepts existing in military art does not contain any systemic basics from the standpoint of FIGHTING CAPACITY and fighting stability. It can be said that actually they are not ready to be used as a concrete parameter in military theory studies and, especially, in military planning. Moreover, these two concepts differ little from each other according to the existing definitions, which even lead to confusion of their meanings.

It is natural that partial or full loss of FIGHTING CAPACITY is conditioned by the scale of its damage, of the fighting damage in the given case. Accordingly, also important are the existing definitions of the adopted concept of damage. It can be said that the defini-

tion, even from this point of view, is not based on systemic consideration of the armed action processes and generally point out that the damage caused to the enemy in the armed fighting process by impact of forces and resources, determines partial or full loss of its FIGHTING CAPACITY. However, there exists still one more noteworthy element in some of the existing definitions, where reference is made to temporary loss of FIGHTING CAPACITY, along with its partial loss. This element already contains certain meaning finding reflection in a systemic approach.

Thus the existing definitions of the FIGHTING CAPACITY, fighting stability and fighting damage are directed to the static picture of eventual result only because they characterize the situation by the same phrases in all these three cases and, importantly, without any classification, which is why they are not based on systemic analysis. Besides, as an argument of military function, military stability and fighting damage cannot be used for predicting and planning the dynamic processes of armed action in accordance with the existing definitions.

Accordingly, it becomes necessary to classify, on the basis of the worked out model, not only FIGHTING CAPACITY, FIGHTING CAPACITY STABILITY and FIGHTING CAPACITY STRENGTH, as a phenomenon, but their variation due to the impact of FORCE OF ARMS on the FIGHTING SYSTEM in the process of armed action. This in turn will be elucidated and defined by systematized processes.

Resolution of the set, task was practically achievable when the parameters of FIGHTING CAPACITY and respective FIGHTING CAPACITY STRENTH and FIGHTING CAPACITY STABILITY of the FIGHTING SYSTEM as an overall mechanism of FIGHTING ELEMENTS united by FIGHTING LINKS had been concretely analyzed. Despite this, it is still necessary to a certain extent to complete the discussion, so as to define the types of and interrelations between the loss of FIGHTING CAPACITY and, respectively, damage of FIGHTING SYSTEM on the analogy of the proposed systemic model.

By the systematization, developed the essence of FIGHTING CAPACITY is concretely defined by FIGHTING CAPACITY STRENGTH and FIGHTING CAPACITY STABILITY. Thus it is again emphasized that the loss of FIGHTING CAPACITY can be defined by the processes when the loss or decrease of the FIGHTING CAPACITY STRENGTH and FIGHTING CAPACITY STABILITY occurs by damaging the FIGHTING SYSTEM.

Also, if we recall the definition worked out, the FIGHTING CAPACITY STRENGTH of FIGHTING SYSTEM depends on its ability and potentialities of retaining the quantity of its component FIGHTING ELEMENTS, their fighting potentialities and functioning ability of appropriate FIGHTING LINKS up to at least limit values under the impact of FOREC OF ARMS in the armed action process.

In this respect, as concerns FIGHTING CAPACITY STABILITY of the FIGHTING SYSTEM, it depends on the FIGHTING SYSTEM capacity to retain the existing FIGHTING LINKS between FIGHTING ELEMENTS, their properties, nature, lay-out, geometry and also, planned or desirable position of FIGHTING ELEMENTS in space under the impact of FORCE OF ARMS during the armed action.

With such approach, FIGHTING SYSTEM is subjected to overall deformation in any kind of its damage by the FORCE OF ARMS during armed action, which is a result of variation of the values of the "FIGHTING CAPACITY STRENGTH, on the one hand, and of the FIGHTING CAPACITY STABILITY, on the other hand. The word SUBJECTED in this context suggest that the FIGHTING SYSTEM may also undergo FIGHTING CAPACITY variation with appropriate deformations under the impact of FORCE OF ARMS in accordance with the decision and plan of its own side, which is not a matter of discussion here.

Forced deformation (damage) of the FIGHTING SYSTEM by FORCE OF ARMS can be only of three kinds - elastic deformation (damage), elastic-plastic deformation (damage); plastic deformation (damage). Systemic analysis of each kind of deformation allows classifying the FIGHTING CAPACITY variation.

- The forced elastic damage of the FIGHTING SYSTEM by FORCE OF ARMS is deformation of the FIGHTING SYSTEM by LOADING WITH ARMED ACTION, which is created not by breakdown or destruction of the FIGHTING ELEMENTS of the FIGHTING SYSTEM but by alteration of the geometrical and physical parameters of the FIGHTING LINKS, with preservation of the capabilities of self-restoration in the future.

In this regard, the elastic damage of the FIGHTING SYSTEM belongs to its FIGHTING CAPACITY STABILITY" sphere, when the deformations caused by the FORCE OF ARMS are completely recoverable (fig. 4).
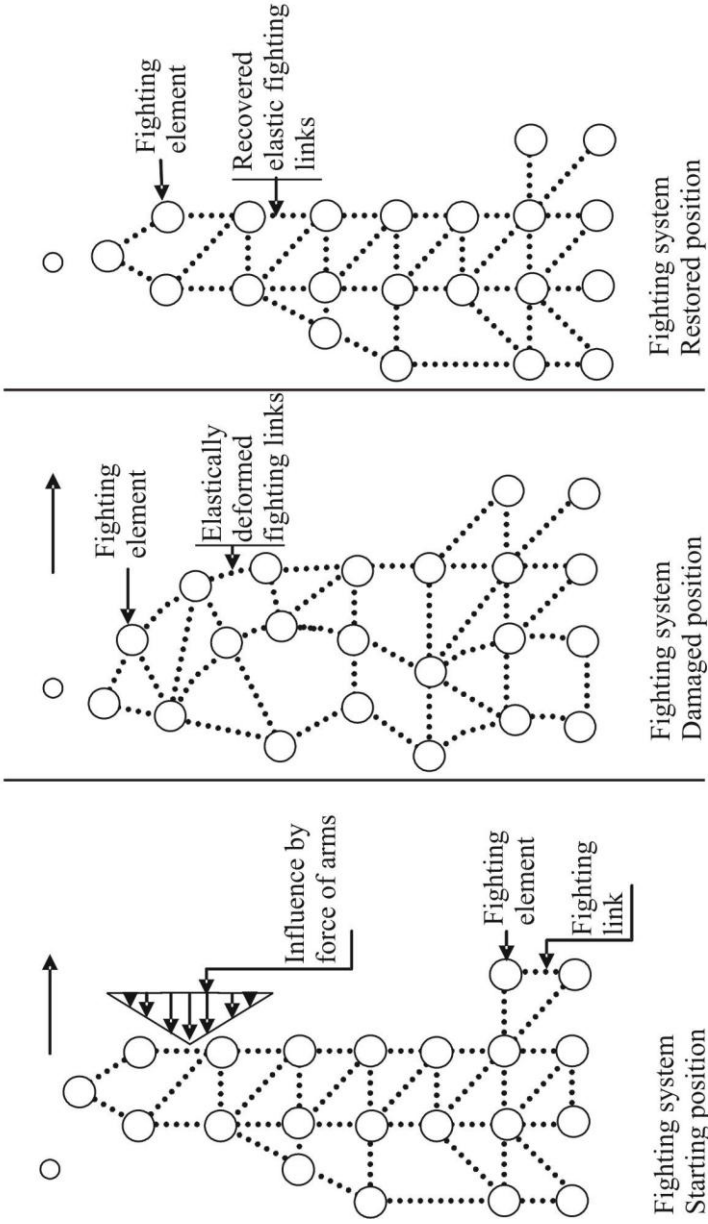
Fighting element

Recovered elastic fighting links

Fighting system
Restored position

Fighting element

Elastically deformed fighting links

Fighting system
Damaged position

Influence by force of arms

Fighting element

Fighting link

Fighting system
Starting position

Fig. 4. Stages of possible sche
mes of elastic damage of the fighting system by force of arms

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The forced elastic-plastic damage of the FIGHTING SYSTEM by FORCE OF ARMS is an intermediate form of damage, belonging to the spheres of both FIGHTING CAPACITY STABILITY and "FIGHTING CAPACITY STRENGTH, when the deformations caused by the FORCE OF ARMS are partially recoverable.

The above case suggests that impact on the FIGHTING SYSTEM by the FORCE OF ARMS results in partial breakdown of a number of FIGHTING LINKS and a certain number of FIGHTING ELEMENTS to the extent that their recovery in the original form becomes impossible.

Besides, the FIGHTING SYSTEM still retains the functioning FIGHTING LINKS and FIGHTING ELEMENTS conditioning the recovery of certain part of the entire FIGHTING SYSTEM deformations, i.e. the FIGHTING SYSTEM partially retains the FIGHTING CAPACITY (fig. 5).
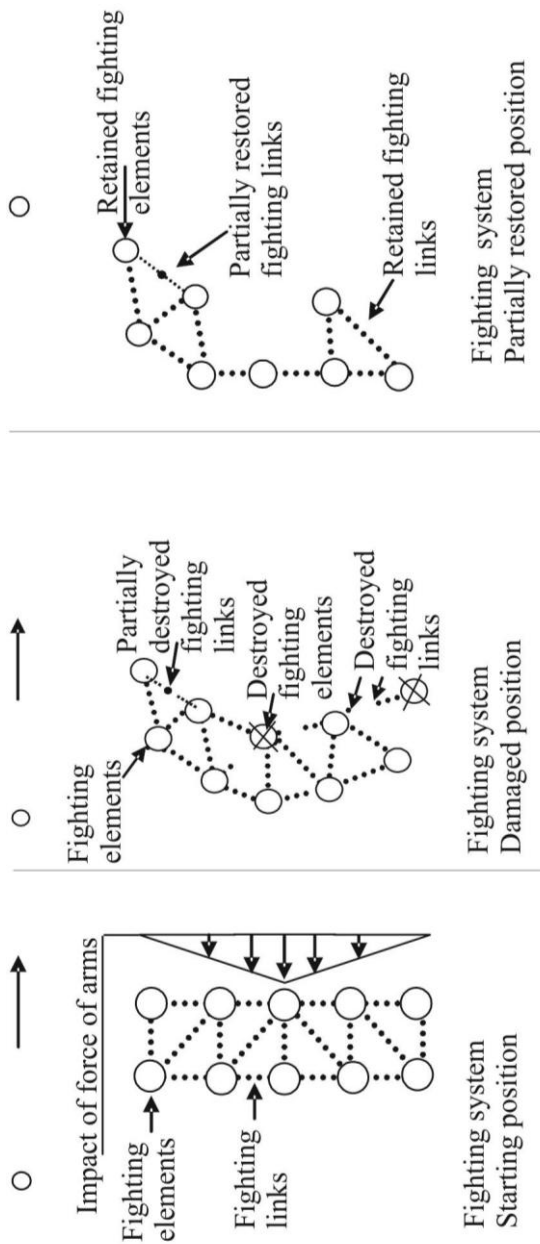
Fig. 5 Stages of possible schemes of elasto-plastic damage of the fighting system by force of arms.

- Forced plastic damage of the FIGHTING SYSTEM by FORCE OF ARMS is deformation caused by the loading the FIGHTING SYSTEM by armed action, that is created by the break-down and destruction of the FIGHTING LINKS and FIGHTING ELEMENTS to the extent that the deformations of the FIGHTING SYSTEM are no longer subject to self-restoration (fig. 6).
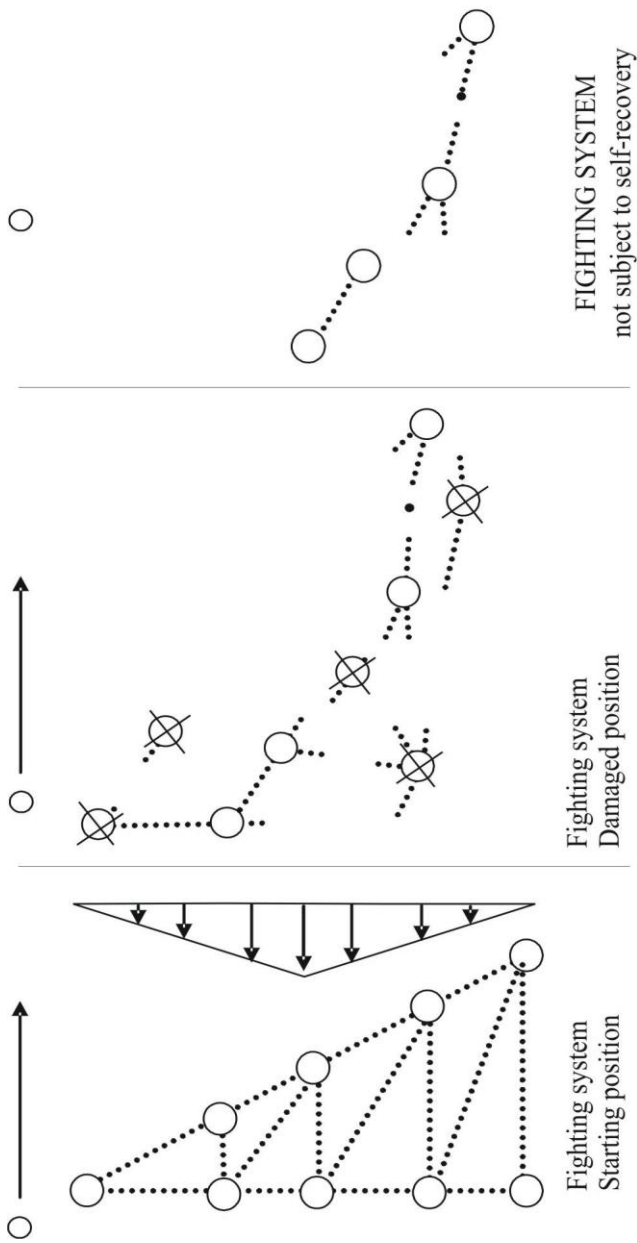
Fighting system
Starting position

Fighting system
Damaged position

FIGHTING SYSTEM
not subject to self-recovery

Fig. 6 Stages of possible schemes of plastic damage of the fighting system by force of arms

Accordingly, when the scale and form of the damage of the opposing FIGHTING SYSTEM is planned at the military planning stage, the parameters categorized as: elastic load by armed action, elastic- plastic load by armed action and plastic load by armed action should be determined by appropriate calculations.

Application of the ideology and principles of mechanics in military theory as logical basics of systematization is not a novelty at all in military science and, especially, for practical assessments of military art, and it has prospects in the future. Examples of these are the notions established and approved in military theory - battle field geometry, stress theory, center of gravity, friction theory, asymmetry, indirect action, density, and many other evaluations, even the statement of Napoleon Bonaparte, according to whom the analogy of product of the multiplication of mass by its velocity of movement was pronounced the principal parameter of FIGHTING CAPACITY.

In this regard, evaluations made by one of the founders of military theory are even more convincing. Karl Von Clausewitz noted that conducting a war looks like an operation of a complicated mechanism having enormous friction, therefore combinations that are easily planned on paper can be accomplished only by making considerable efforts. Besides, he added that war proceeds in many directions at the same time and has no clearly defined limits, whereas any system or module is of finite nature. It is for this reason that there is a permanent irreconcilable conflict between theory and practice.

The above two evaluations made by Clausewitz may be said to be fundamental for drawing a boundary line between the practical positions of military art theory as a science and of military art. In this regard, military history knows similar pronouncements and proposition of well-known military leaders. They are not based on empirical logic and, accordingly, retain merely the opinion status. Clausewitz's FRICTION THEORY and then CENTER OF GRAVITY recognized with high reliability the application of principles of mechanics in armed action modeling by systematization of a number of issues. Besides, Clausewitz himself defined the errors existing between the natures of model and reality.

Such double approach made a significant contribution to the development of military art theory.

By way of example, it can be said on the one hand that by the existence of the notion of CENTER OF GRAVITY in the military art, the essence of many essential trends and opposite positions that emerged in the conceptual work of Liddel Hart - STRATEGY OF INDIRECT ACTION [157], can be explained.

On the other hand, the position – IRRECONCILE CON-FLICT ALMOST ALWAYS EXISTS BETWEEN THE THEORY AND PRACTICE, which has been defined by thy empirical logic of Clausewitz, called in question the validity of the systemic model which considers military theory and practice in combination or, on the contrary, as completely different matters. In terms of scientific approach, it is impossible to adopt a theory if it almost invariably contradicts practice.

The study of the above two cases has been conducted in a certain direction and for particular purposes within the framework of the present monograph. This was necessary due to the requirement to contribute to the solution of the above problems of military science on the one hand, and by the fact that for Georgia and states having similar military security environment, which are in potential asymmetric warfare conditions, it is very important to gain exact understanding of and apply the indirect action strategy on the other hand.

Also of prime importance for the state of Georgia is to define the theoretical basics of preparations for war and waging an armed action, which would be oriented to predictable results of possible practical scenarios of military art. This is to a certain extent necessary for Georgia due to the ratios of its own military potential and potential of the states situated on the theatre of military actions, which practically rules out the resource of reserve.

DYNAMIC AND GEOMETRICAL PARAMETERS OF THE FIGHTING SYSTEMS

Determining the FIGHTING SYSTEM parameters is a necessary condition of systematization in researches and for mathematical modeling of many problems in military theory. Besides, many parameters may correspond to a system modeled by the logic of mechanical processes. These parameters reflect and characterize diverse manifestations and situations of armed action in a certain range and by a certain approximation. However, such generalized approach, which would surely require development of principles of universalization, would quite often create insuperable difficulties. It would be too artificial, also overloaded with mathematical apparatus and less adapted to the real nature of armed action in which the share and significance of non-systematized parameters are considerable.

Within the framework of the preset study, the task is more specific, laconic and purposeful. The studies mainly involve such parameters of the FIGHTING SYSTEM that are close to the commonly known mechanical systems and parameters of their dynamical processes by their content, form of manifestation and nature. Besides, which is most important, the problems are related to the identification of parameters the systematized consideration of which will allow to determine and study the gravity center and indirect actions in the ARMED ACTION model by use of mathematical logic in a formalized way.

Introduction of widespread proposition into the military theory from mechanics, at least center of gravity and indirect actions, contradict, on the one hand, their base model - mechanical system, and on the other hand, being already transformed in military theory without argumentation, they have acquired completely different interpretations in a number of cases.

The necessity of conducting the above mentioned study is to use and realize the methods and principles of the strategy of indirect actions purposefully, with fever errors.

As defined above, the FIGHTING SYSTEM represents a system of a set of FIGHTING ELEMENTS associated to each other by means of FIGHTING LINKS.

Accordingly, the geometry of redistribution of FIGHTING SYSTEM masses, which as a rule considers the redistribution of masses in a mechanical system, is a component of the field of dynamics, which in the armed action model naturally implies redistribution of the FIGHTING ELEMENTS in the FIGHTING SYSTEM.

Idealization with the FIGHTING ELEMENT of the mechanical system mass, known in classical mechanics and defined by the geometry of masses requires establishment of the following conditions:

- an individual FIGHTING ELEMENT in the FIGHTING SYSTEM is regarded as a material point that possesses a fighting mass characterized parametrically by the FIGHTING CAPACITY of a particular FIGHTING ELEMENT.

- an individual FIGHTING ELEMENT as fighting mass represented as a material point, has its own location coordinates in a concrete reference system in the FIGHTING SYSTEM, which is considered to be a set disposed in space. Moreover, the FIGHTING ELEMENT, being represented as a material point, has its own dimensions in reality, which requires determination of the coordinates by which it will occupy its own location in the FIGHTING SYSTEM to be defined in the FIGHTING ELEMENT space itself, as its component material point having its own FIGHTING MASS.

- in the FIGHTING SYSTEM, between the FIGHTING MASSES of the FIGHTING ELEMENTS regarded as material points there are FIGHTING LINKS of functioning, which belong to the internal links of the system.

- the FIGHTING SYSTEM has its own external links as well. In the instance where the movement of the FIGHTING SYSTEM in space is restrained due to the existence of external links, the system is a NON-FREE FIGHTING SYSTEM. Otherwise, when the links do not restrain the movement of the FIGHTING SYSTEM, the system is a FREE FIGHTING SYSTEM.

In the instance when the FIGHTING SYSTEM is assessed according to its property being FREE or NON-FREE, another term - FIGHTING BONDS may be used instead of EXTERNAL LINKS for the purpose of clarity. Such definition gives concrete expression to the fact that in essence FIGHTING LINKS are the FIGHTING LINKS of functional provision between the FIGHTING ELEMENTS of the FIGHTING SYSTEM. As to the FIGHTING BONDS, their essence rather corresponds to virtual or physically existing circumstances, conditions, situations, capabilities and decisions which condition the realities - to give a degree of freedom to the FIGHTING SYSTEM or to restrain its movement in time and space.

- FIGHTING LINKS and FIGHTING BONDS as links, irrespective of whether their manifestation and essence is material, intellectual or virtual, from the systemic point of view are basically classified as follows:

  - bilateral FIGHTING LINK;
  - unilateral FIGHTING LINK;
  - stationary link that depends on time;
  - non-stationary link that depends on time and situations;
  - low efficiency link;
  - high efficiency link;
  - reliable link;
  - non-reliable link;
  - linear link;
  - planar link;
  - spatial link;
  - remote link;
  - close link;
  - link that depends on physical nature;
  - link that depends on virtual nature.

The above listed and established conditions allow to study dynamical processes virtually in terms of symbolic modeling in view of concrete problems specified herein.

The dynamical processes of the FIGHTING SYSTEM may be conditioned by the following three circumstances:

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Situation I - to initiate the processes of movement and variation of the system, as FREE FIGHTING SYSTEM, by provision of internal energetic means (fig. 7).
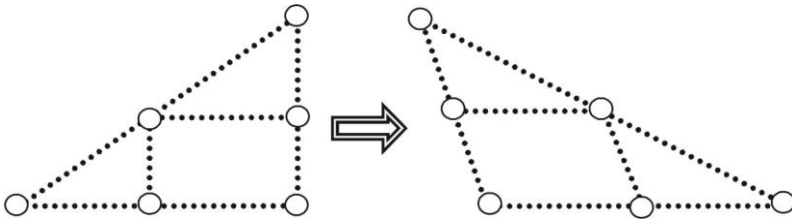

Fig. 7   Schemes of motion and variation processes of a free fighting system with inner power support.

Situation II - to initiate processes of movement and variation of systems as a NON-FREE FIGHTING SYSTEM by provision of internal energy means. As distinct from the preceding case, overcoming of the FIGHTING BOND by overcoming its disintegration or FIGHTING BOND reaction is necessary. The FIGHTING BOND may be conditioned by the situation and conditions of own side and disposition, also by counteraction caused by opposing FIGHTING SYSTEM, or other artificial, natural or physical or virtual factors without any direct fighting contact from the opposing FIGHTING SYSTEM (fig. 8).
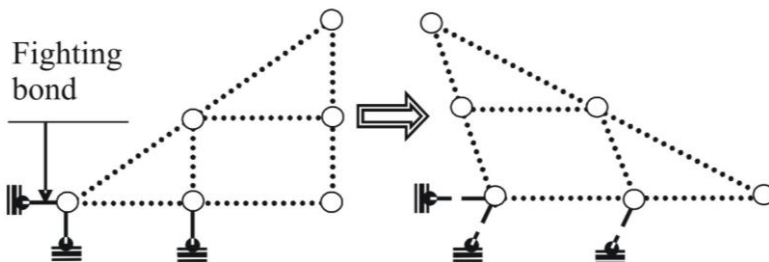

Fig. 8   Schemes of motion and variation processes of a non-free fighting system with inner power support.

Since the term FIGHTING CONTACT has been used in discussing the problem, it should be defined that it characterizes scenarios of armed action on land, water, under water, in air and outer space.

In all circumstances, fighting contact defines the mutual disposition of integrated groups of the opposing forces and means whereby they are capable of acting on each other without additional movement, in a fixed time period.

Situation III – impact of the opposing FIGHTING SYSTEM or several FIGHTING SYSTEMS on each other with their own energy means - as factor of impact by means of armament.

Mutual impact of the FIGHTING SYSTEM is defined by locations of the FIGHTING SYSTEM in space, their movements and spreading area, and relevant type of damage (fig. 9).
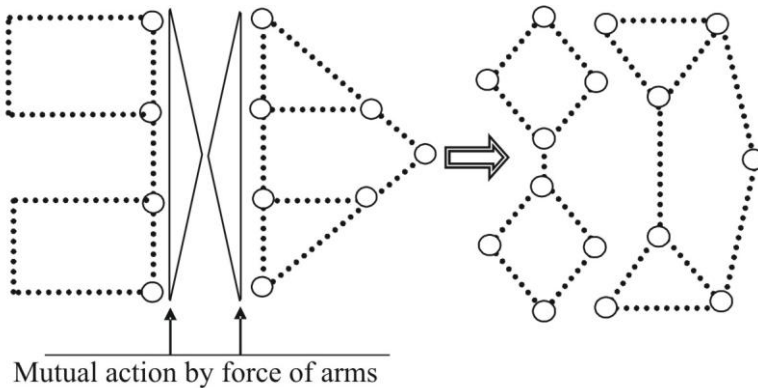

Mutual action by force of arms

Fig. 9. Schemes of motion and variation processes by mutual action of the opposing fighting systems with their own power provision.

In this respect, each FIGHTING SYSTEM has a two-step spreading area –FUNCTIONAL AREA and ACTIVE AREA of the FIGHTING SYSTEM.

The FUNCTIONAL AREA embraces GEOMETRIC AREA of the spread of a set of FIGHTING SYSTEM's component FIGHTING ELEMENTS, which is confined by the boundary defining the geometrical form of the set.

The ACTIVE AREA embraces the maximal area of spread of the FIGHTING CAPABILITY of the set of the FIGHTING SYSTEM's component FIGHTING ELEMENTS - of the capabilities of ARMED IMPACT. This is an area of armed impact confined by the limit of maximum capabilities of the FIGHTING SYSTEM – limit of the armed impact (fig. 10).

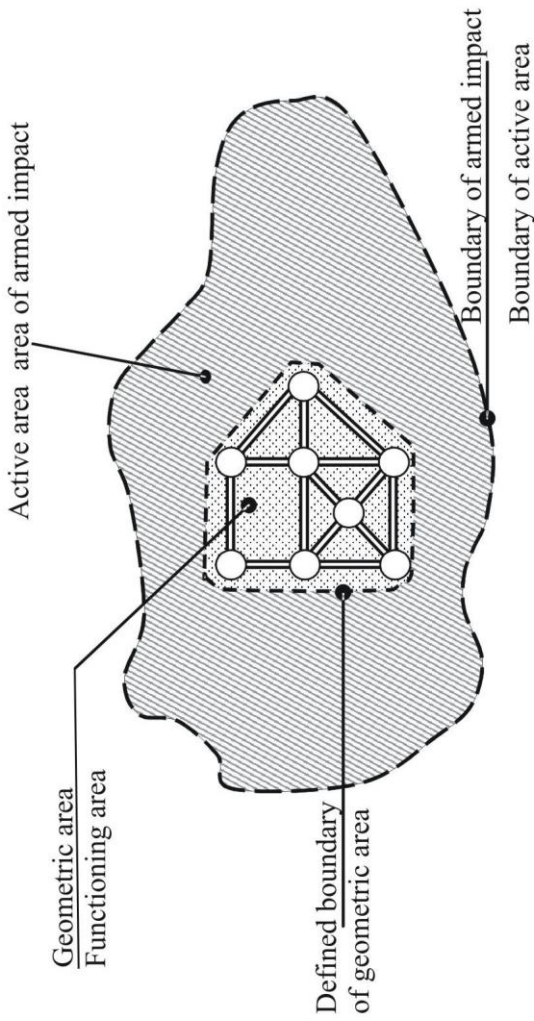**Fig. 10 Possible scheme of the geometric and active areas of spread of the fighting system.**

Active area   area of armed impact

Boundary of armed impact

Boundary of active area

Geometric area
Functioning area

Defined boundary
of geometric area

The mutual action of the opposing FIGHTING SYSTEM, which corresponds to variant III, may be accomplished in certain instances by transition from the spreading area - GEOMETRICAL AREA of the first step of the opposed FIGHTING SYSTEM to the spreading area of the second step - AREA OF ARMED IMPACT. In this case, the material points possessing FIGHTING MASS that are equivalent to the FIGHTING ELEMENTS of the FIGHTING SYSTEM do not change the lay-out geometry in space at the initial stage, i.e. the set of FIGHTING ELEMENTS remains unchanged in its mathematical sense (fig. 11).

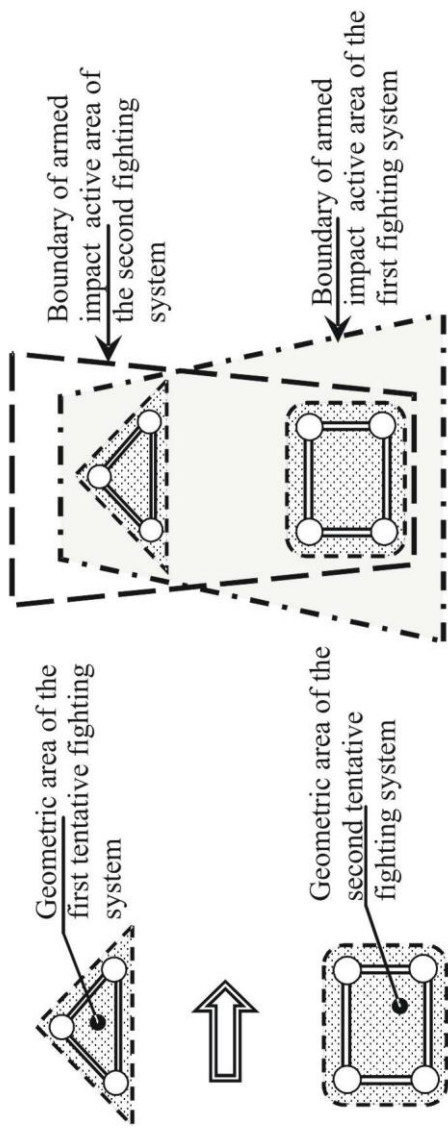**Fig. 11. Scheme of armed confrontation between fighting systems with active spreading areas, without change of the geometric areas of spreading.**

Boundary of armed impact active area of the second fighting system

Boundary of armed impact active area of the first fighting system

Geometric area of the first tentative fighting system

Geometric area of the second tentative fighting system

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In another case, mutual impact of the opposing FIGHTING SYSTEMS, which corresponds to variant III, is possible by mutual displacement of the opposing FIGHTING SYSTEMS. In this instance, the material points having the FIGHTING MASS, that are equivalent to the FIGHTING ELEMENTS of the FIGHTING SYSTEMS, change the layout geometry in space so that the form, composition and structure of the set of FIGHTING ELEMENTS remains unchanged at the initial stage (fig. 12).
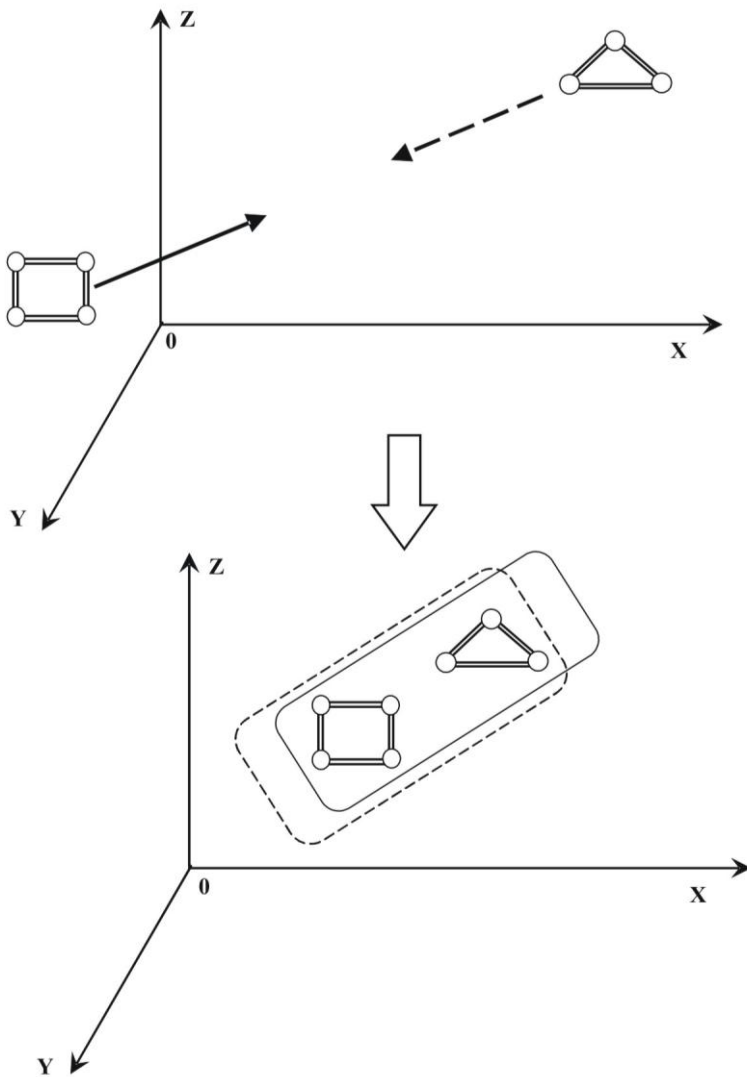
Fig. 12. Armed impact of opposing fighting systems on each other, by their movement in space and their own structures, without change of geometric area.

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In still another case, the mutual impact of the opposing FIGHTING SYSTEMS, which corresponds to variant III, is possible by variation of the set of material points possessing FIGHTING MASS that are equivalent to the FIGHTING ELEMENTS of the FIGHTING SYSTEMS, i.e. by movement of the material points with respect to each other, by changing the number and FIGHTING MASS of the FIGHTING ELEMENTS and, of course, by changing the system structure (fig. 13).
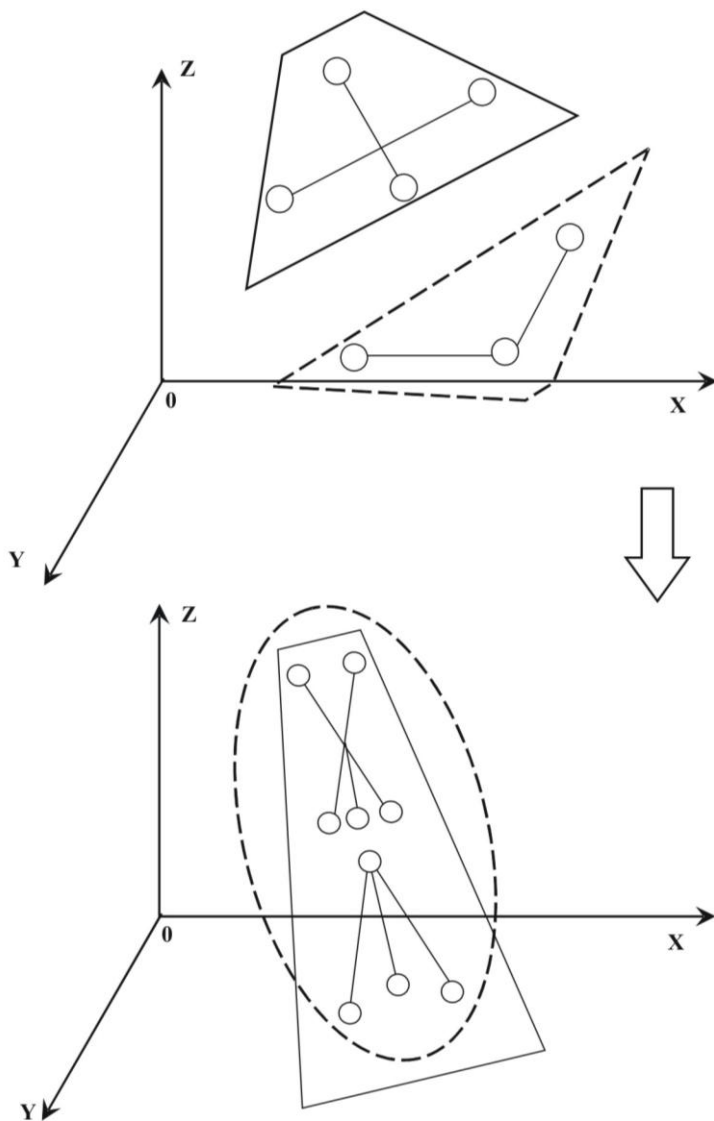
Fig. 13. Armed impact of opposing fighting systems on each other by changing their geometric and active areas.

In this case GEOMETRIC AREAS and the ARMED IMPACT AREA of the FIGHTING SYSTEMS are altered in such a manner that the limit of the armed impact intersects the GEOMETRIC AREA of spread of the opposing FIGHTING SYSTEM and/or its ARMED IMPACT AREA.

In all the above cases, the mutual impact of the opposing FIGHTING SYSTEMS in the above described variants or combinations thereof is accomplished in the fighting contact regime, like the contact task of attaining the fighting stress by armed impact in the mutual contact space.

In the model, the mutual impact of opposing FIGHTING SYSTEMS is regarded as a dynamical process of impact by the force – FORCE OF ARMS .

More precisely, the impact of a FIGHTING SYSTEM and a combination of its component FIGHTING ELEMENTS, as material points with the FIGHTING MASSES, is considered on another FIGHTING SYSTEM and a combination of its component FIGHTING ELEMENTS by FORCE OF ARMS , as well as on material points that have FIGHTING MASSES.

This is also given ground by the fact that in the case of mutual impact, i.e. armed action of the FIGHTING MASSES, the idealized expression of FIGHTING ELEMENTS with FIGHTING MASSES, i.e. MATERIAL POINTS, interacts concretely.

Accordingly, in the given model, reduction of the essence of the interaction of the FIGHTING SYSTEMS to the processes of interaction of material points, when one material point attempts to change the state of immobility (calm) or movement of a material point of the opposing FIGHTING SYSTEM is in full correspondence with physical essence of force. Besides, the term FORCE OF ARMS used in the model also fully corresponds to the logic of model building.

In the opposing FIGHTING SYSTEMS, impact of one particular material point on another material point to change the peaceful state or movement of each other also causes impact of another material point on the first material point, which is regarded as counteraction.

It should be noted that reduction of the interaction of the FIGHTING SYSTEM with FORCE OF ARMS – to force and, accordingly, to change the immobility (calm) state or movement of material points, allows the introduction of the concept of inertia and phenomena related thereto in the formalized systematization of the armed action, which expands the extent of the studies.

In the presented model, the impact by opposing FIGHTING SYSTEMS on the FIGHTING SYSTEM by use of FORCE OF ARMS is LOADING WITH THE ARMED ACTION.

In the process of armed action, LOADING WITH ARMED ACTION is the interaction of the opposing FIGHTING SYSTEMS by use of FORCE OF ARMS, which conditions the kind of damage and degree of an individual FIGHTING SYSTEM. In this respect, elastic, elasto-plastic and plastic damage with appropriate systematization has been developed (see fig. 4, 5 and 6). At the given stage, the already additionally introduced parameters allow to consider in a systemic manner the logical basics and accompanying phenomena of LOADING WITH ARMED ACTION itself.

By its physical nature, LOADING WITH ARMED ACTION is action of a combination of ACTIVE EXTERNAL FORCEs - FORCES OF ARMS on the FIGHTING SYSTEM.

Introduction of the term ACTIVE EXTERNAL FORCE in the definition of the impact on the FIGHTING SYSTEM by FORCE OF ARMS is conditioned by its essence.

Active force, which is also called motive force, has the property of causing movement.

Active force in the elements of a system, and, generally, in a system on which it exerts influence causes the creation of passive forces. In the given case, to model armed action, it is better to introduce the notion FORCE OF FIGHTING RESISTANCE, which, in itself, is a passive force emerging by setting the material points in motion.

In its physical nature, the LOADING WITH ARMED ACTION can be direct or indirect.

DIRECT LOADING WITH ARMED ACTION is action on the FIGHTING SYSTEM by the opposing FIGHTING SYSTEM direct-

ly with the use of FORCE OF ARMS. In this case, the functional - ACTIVE AREA of the FIGHTING SYSTEM along with its own LIMIT OF ARMED IMPACT will overcome the LIMIT OF ARMED IMPACT of the opposing FIGHTING SYSTEM and will begin to spread in its ACTIVE AREA and GEOMETRICAL AREA as well.

According to the definition of military art, the above described ideology of systematized model describes the scenario when events develop by disposition, movement and interaction of opposing forces in the space of mutual fighting contact.

As to the INDIRECT LOADING WITH ARMED ACTION, it is a different phenomenon in which actual opposing forces are not in mutual fighting contact, or are in mutual fighting contact but not using weapons against each other.

In the present model, unlike DIRECT LOADING WITH ARMED ACTION, INDIRECT LOADING WITH ARMED ACTION implies that the FIGHTING SYSTEM does not act on the opposing FIGHTING SYSTEM directly by FORCE OF ARMS.

In terms of variation in time, the LOADING WITH ARMED ACTION, which is regarded as armed action on the FIGHTING SYSTEM, may be CONSTANT LOADING WITH ARMED ACTION, VARIABLE LOADING WITH ARMED ACTION, or DYNAMICAL LOADING WITH ARMED ACTION.

CONSTANT LOADING WITH ARMED ACTION which is effected by IMPACT OF FORCE OF ARMS at an established time period, is invariable by its value, it does not change its direction and material point of impact.

As to variable LOADING WITH ARMED ACTION, which is also effected by IMPACT OF FORCE OF ARMS, it changes the value, direction and contact point parameters and coordinates within certain limits in time and space.

Whereas the DYNAMICAL LOADING WITH ARMED ACTION has a variable value, i.e. appropriate IMPACT OF FORCE OF ARMS" varies in the smallest interval of time.

According to military art use of the definition movable LOADING WITH ARMED ACTION should be considered very characte-

ristic. This is the case when the IMPACT WITH THE FORCE OF ARMS is effected on the FIGHTING SYSTEM so that force of arms exerts an impact on individual FIGHTING ELEMENTS of the FIGHTING SYSTEM at different times.

LOADING WITH ARMED ACTION has still another parameter - intensity of impact with armed action which is defined by LOADING WITH ARMED ACTION exerted on a unit of the FIGHTING MASS of the FIGHTING ELEMENTS of the FIGHTING SYSTEM per unit of time.

LOADING WITH ARMED ACTION is characterized not only by physical but by geometrical manifestation as well.

In this respect the two forms of LOADING WITH ARMED ACTION must be emphasized:
- CONCENTRATED LOADING WITH ARMED ACTION is a case when impact with an appropriate force of arms is effected on a single point of the FIGHTING ELEMENT of the FIGHTING SYSTEM.
- CONTINUOUS LOADING WITH ARMED ACTION is a case when impact with appropriate force of arms, in various geometrical forms, is simultaneously effected on various points of the FIGHTING ELEMENTS of the FIGHTING SYSTEM or various FIGHTING ELEMENTS themselves.

Impact by the force of arms does not always achieve the goal. More often than not force of arms is only partially utilized purposefully. In this case, USEFUL LOADING WITH ARMED ACTION takes place.

The given model extensively utilizes the notion LOAD as one of the dynamical and statistical characteristics of a mechanical system. With this approach, the essence of the LOAD, as a concept notion, is unity of the external forces acting on the entire system and its material points.

In the given case, in military art theory, introduction of the above mentioned concept of LOADING into the model of armed action implies generalized definition of forcible nature, value, direction, variation, intensity and the form of spatial disposition of the impact of the FIGHTING SYSTEMS on each other by the force of

arms during the armed action process. Surely, other terms being more HABITUAL in military art could be used in lieu of the term LOADING, but they would not be carriers of the essence and meaning of this rather capacious term.

In the given case, a question may again be asked whether the principles of mechanics are excessively used in the formalized systematization of the ARMED ACTION.

Surely, the degree and accuracy of reality reflection is appreciably deformed in the systematizations adopted in studies, especially in creating a model by use of formalized logic when idealization concerns such a hard to systematize area, as military art. Besides, in the given specific case, in which FIGHTING SYSTEMS created by integration of force and means and their interaction by FORCE OF ARMS is discussed, conformity, nature of events and processes, especially dynamic processes, are very close and in many cases conform to the laws of mechanics.

Forcible influence of missiles and explosive weapons on the armament, hardware and environment of the enemy and, in many cases, on its personnel who are protected or not protected by armor are explained by the principles of mechanics in accordance with their breakdown destruction, spatial displacement, failure and other scenarios. Owners of the weapons, hardware, military infrastructure and other components that in the given case are the basic components of FIGHTING SYSTEM's FIGHTING ELEMENTS and their FIGHTING LINKS are also unequivocal curriers of the properties of mechanical systems.

Using this approach, the most significant three types of LOADING WITH ARMED ACTION - are considered at the next stage of the study, namely: maximum LOADING WITH ARMED ACTION, DEMOLISHING LOADING WITH ARMED ACTION and CRITICAL LOADING WITH ARMED ACTION.

Prior to their separate characterization it should be explained why they are considered to be most significant types. To this end, additional assessments of the physical or dynamical nature of the FIGHTING SYSTEM itself are required.

As noted above, the FIGHTING SYSTEM has FIGHTING CAPACITY, which is manifested in two components - FIGHTING CAPACITY STRENGTH and FIGHTING CAPACITY STABILITY.

The FIGHTING SYSTEM retains the FIGHTING CAPACITY STRENGTH and FIGHTING CAPACITY STABILITY until the LOADING WITH ARMED ACTION which has an impact on the FIGHTING SYSTEM exceeds the LIMIT LOADING WITH ARMED ACTION.

The condition of the FIGHTING STRENGTH of the FIGHTING SYSTEM is the requirement and reality according to which demolition and destruction of the system's FIGHTING ELEMENTS do not occur at MAXIMUM LOADING of the FIGHTING SYSTEM in an amount and to the extent that FIGHTING SYSTEM could lose its FIGHTING CAPACITY, i.e. FIGHTING CAPACITY STRENGTH in the given case.

Accordingly, it is impossible to satisfy the condition of the FIGHTING STRENGTH of the FIGHTING SYSTEM at the moment where LOADING WITH ARMED ACTION conditioned by the IMPACT BY FORCE OF ARMS exceeds the maximum loading by armed action.

Under the circumstances, when the FIGHTING CAPACITY of the FIGHTING SYSTEM is lost by losing the FIGHTING CAPACITY strength, there occurs impact by DEMOLITION LOADING by the armed action on the FIGHTING SYSTEM.

As to the condition of "FIGHTING RIGIDITY" of the FIGHTING SYSTEM, it is a requirement and reality according to which there occur no demolitions, failures and deformations at maximum loading armed action exerted on the FIGHTING SYSTEM, in an amount and to the extent that the FIGHTING SYSTEM could lose its FIGHTING CAPACITY, in particular, FIGHTING CAPACITY STABILITY in the given case.

According to the foregoing, it is impossible to satisfy the condition of FIGHTING RIGIDITY of the FIGHTING SYSTEM at the moment where the value of LOADING WITH ARMED ACTION conditioned by the IMPACT BY FORCE OF ARMS on the FIGHT-

ING SYSTEM exceeds the CRITICAL LOADING BY THE ARMED FIGHTING. Under the circumstances, when the FIGHT-ING SYSTEM loses its FIGHTING CAPACITY by losing the FIGHTING CAPACITY STABILITY or by unacceptable deforma-tion of the FIGHTING SYSTEM, there occurs the impact of critical LOADING WITH ARMED ACTION on the FIGHTING SYSTEM.

The losses of FIGHTING CAPACITY of a FIGHTING SYS-TEM by FIGHTING CAPACITY STRENGTH and FIGHTING CAPACITY STABILITY, and the definition of the notions - DE-MOLITION LOADING BY ARMED ACTION and CRITICAL LOADING WITH ARMED ACTION can have diverse implications in military theory (see fig. 10).

With this approach, retention of the FIGHTING CAPACITY of the FIGHTING SYSTEM requires the conditions of both FIGHT-ING CAPACITY STRENGTH and FIGHTING CAPACITY RIGID-ITY to be met.

Accordingly, in the process of creation of the FIGHTING SYSTEM, i.e. in the process of integration of forces and resources, it is necessary for the determination of the FIGHTING CAPACITY resource of the FIGHTING SYSTEM to depend on the equivalence of values of the FIGHTING CAPACITY STRENGTH and FIGHT-ING CAPACITY RIGIDITY or the required ratios thereof under the condition of maximum fighting loading. Such planning conditions full and purposeful activation of the FIGHTING CAPACITY re-source in the FIGHTING SYSTEM so that no excess and unused re-source and potential will be drawn on.

To model the dynamic processes of the interaction of opposing FIGHTING SYSTEM, the armed interaction is often regarded as one-time strike, strikes with various concrete directions at the same time, or single time or process of multiple strikes carried out under different regularities.

The essence, forms and types of strike, as a physical phenome-non, are fairly exhaustively systematized and classified in the field of mechanics.

A strike, including the IMPACT BY FORCE OF ARMS, is mutual action on bodies in a small time period, during which the quantity of their movement after in a finite number of times.

A strike in general, including that performed by weapons, possesses the strike line and strike normal.

In the present model, at armed interacting impacts in the FIGHTING SYSTEMS, the strike line is that line which runs between the two material points that as FIGHTING ELEMENTS possess FIGHTING MASS and their own FIGHTING CAPACITY.

In the discussed model of armed action, it is important to ascertain and adopt the geometric forms of interaction by FORCE OF ARMS" of the opposing FIGHTING SYSTEMS, that explain the power factors of LOADING WITH ARMED ACTION, including the bench-mark for identifying the strikes.

In this respect, it is necessary to consider the following types of forced interactions: direct, indirect, lateral, central, axial, and eccentrically impacts by FORCE OF ARMS.

Besides, prior to considering certain processes of armed action, it is necessary, from the ideological standpoint of creation of the proposed model, to provide not only systematized formalization of the internal structure and regularities of a FIGHTING SYSTEM, but to define the dynamic parameters intrinsic to the FIGHTING SYSTEM as an entire FIGHTING MECHANISM.

SYSTEMATIZATION OF DYNAMIC PROCESSES OF INDIRECT ACTIONS

Formalized consideration of the armed action on the basis of the presented model of a FIGHTING SYSTEM, which is based on the idealization logic of mechanical systems and their dynamics, does not mean that the parameters known in military art or conditional values introduced into the model should be calculated only by means of the formulas which are applied in mechanics. This is neither possible, nor is there any need for it. By way of an example, we can consider the parameters, such as FIGHTING CAPACITY or FIGHTING STRESS, FIGHTING POTENTIALITIES etc. Methods of their evaluation and ascertainment are well established in military practice. In a number of cases, especially in evaluation of the parameters depending mainly on non-systematized factors, preferable in practice are the factors of analogies, empirical data, and professionalism, experience and skills of military experts for defining the values and circumstances.

It can be emphasized again that, in the given case, the main task of modeling the dynamic processes of interaction by force of arms between the FIGHTING SYSTEMS is to define the main principles and approaches which will become a basis of an action ideology in armed actions at the strategic, operational and tactical levels.

The main purpose of the model worked out is also its application with a systemic approach for providing assessments and analysis of views existing in military theory often contradictory at that, and for making appropriate conclusions.

With this approach, the known trend of military art – indirect action, to which many approaches and attitudes exist, is considered.

Thus the question can be is brought up on what is an indirect action in the systematized form, what is its dynamics as a process, and what are the rules its realization is based on in the military field.

There may exist many possible scenarios of carrying out the LOADING WITH ARMED ACTION of the opposing FIGHTING

SYSTEMS, as interaction by FORCE OF ARMS in the armed action process, in a concrete area of space and in real time.

In the proposed model, for the purpose of further systematization of qestions, three possible basic and characteristic scenarios are considered:

A. Interaction by force of arms between the opposing static and moving FIGHTING SYSTEMS.
B. Interaction by force of arms between opposing static FIGHTING SYSTEMS, being in fighting contact with one another.
C. Interaction by force of arms between opposing moving FIGHTING SYSTEMS.

In the above three cases, dynamic processes take place both in the model and in reality. For their assessment and selection and definition of the main criteria, we should return again to FIGHTING SYSTEMS interacting by FORCE OF ARMS and based on the formalization logic.

The formal essence of FIGHTING SYSTEMS is based on the analogies of mechanical systems. As was mentioned above, they consist of FIGHTING ELEMENTS having FIGHTING MASSES that, as material points, are related to each other by FIGHTING LINKS. This creates the FIGHTING STRUCTURE of the FIGHTING SYSTEM.

In the given case, the already proved properties and regulations of the mechanical system are transferred to and applied in the much less studied and, accordingly, less systematized sphere – in the military art theory. This is based on the similarities between the objects of the analogies.

According to the existing preconditions, the regularities of the mechanical system do not allow to apply the wide spectrum of mechanical principles and appropriate mathematical apparatus in the proposed model of armed action without strict selection.

Besides, it should be noted that in the proposed model, at least within the scope of the given study, it is possible to define fairly accurately the values of various parameters of a dynamic system expressed by the mathematical apparatus and the concrete events of armed action by use of these values.

Such precedents are frequent in military theory studies, but excess MATHEMATIZATION of dynamical expression of armed action scenarios almost always leaves an impression of redundant and artificial systematization. However, in the given specific case where the FIGHTING SYSTEM is virtually based on the logic of the NATURE OF MECHANICS, these possibilities seem much more promising.

It is also possible to expand the scopes of systematization using various approaches of mathematics, even the logic of algebra of events and symbols, and, subsequently, to analyze and establish the method of perfection of systemic expression of non-systematized processes even by a use of the theory of probability and random processes. This possibility still remains, but such mathematization of the study would, in the given case, make it more difficult to comprehend particular issues.

On the other hand, the studies would shift to other fields of science, being within the competence of specialists of other areas.

In the given case, the subject of the study is not to define the concrete parameters in strictly systematized fashion, but to ascertain their nature, form of manifestation, meaning and tendencies of attaining appropriate values and basic principles of regularities, which will allow, on the one hand, to classify the basic conceptual trend of armed action, and, on the other hand, to create and use systematized materials for taking decisions in possible individual scenarios of armed action.

Accordingly, as was mentioned earlier and will also be emphasized hereinafter, the given model of armed action is mainly based on laws of mechanics, geometrical and dynamical regulations of mechanical systems, by the method of abstracting concrete content and prepositions. Accordingly, the proposed method of study and reflection of its results may belong rather to formal logic where maximum efforts are made, by the mathematical approach, to maintain the principle based on events logically associated to probability.

After this explanation, if we return to the above - described three possible cases of the mutual impact of the FIGHTING SYSTEMS by FORCE OF ARMS in the shape of LOADING WITH

ARMED ACTION, it becomes necessary to introduce, consider and apply a new concept – moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY.

The moment of inertia of a particular FIGHTING SYSTEM is FIGHTING CAPACITY, on the analogies of the moment of inertia of a mechanical system, is a dynamical parameter of a FIGHTING SYSTEM with its meaning, according to the value of which, the FIGHTING SYSTEM opposes the impact on it by FORCE OF ARMS. Numerically, its calculation can be made in any system of reference, with respect to both a particular point and an axis.

For the purpose of evaluation of the moment of inertia of a FIGHTING SYSTEM's" FIGHTING CAPACITY, the algorithm of its calculation which is used in mechanical systems should be taken into account. With this approach, the moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY with respect to a point or axis is expressed by the sum of the product of appropriate FIGHTING MASSES of individual: FIGHTING ELEMENTS of a FIGHTING SYSTEM into the squares of the distances from a given point or axis to the point of the FIGHTING MASSES.

While such formulation cannot be specified to a concrete numerical value due to the non-systematized character of the parameters necessary for the given case of military art, it still denotes that the more is the number of the FIGHTING ELEMENTS united by the FIGHTING LINKS, the more is the value of the "FIGHTING MASSES" corresponding to the FIGHTING ELEMENTS and, what is particularly important, justified by the reality, the more is the space occupied by the FIGHTING SYSTEM the more is the value of the moment of inertia of the "FIGHTING SYSTEM FIGHTING CAPACITY" (fig. 14).
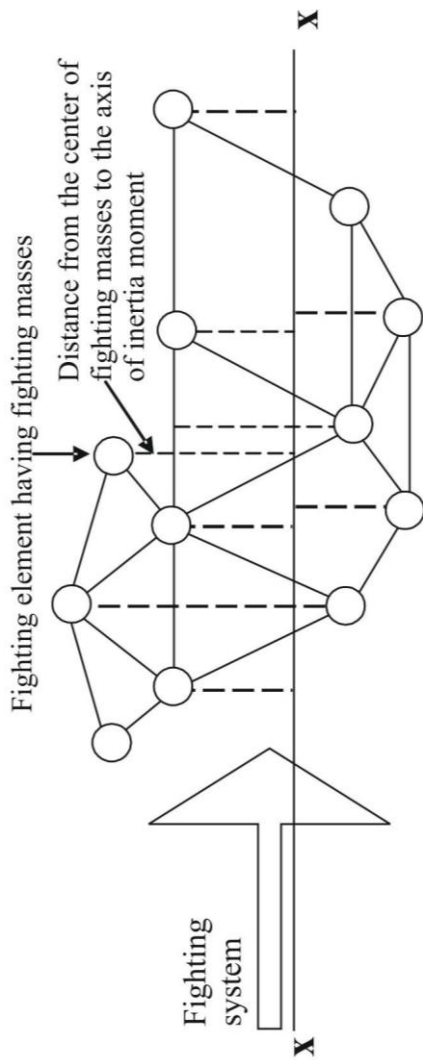
Fig. 14. Scheme for determining the value of the fighting system inertia moment

Here the question may be placed – after all, the FIGHTING ELEMENTS of the FIGHTING SYSTEM could be spaced at a considerable distance from one another and, thereby, the moment of inertia of the FIGHTING SYSTEM is FIGHTING CAPACITY could infinitely be increased.

Surely, this approach is not right. On the one hand, it is indeed necessary to space the FIGHTING ELEMENTS apart, but this must be done in such a way as to retain all necessary and existing properties of FIGHTING LINKS between them so as to enable the interconnected FIGHTING ELEMENTS, to demonstrate and use their FIGHTING CAPABILITY according to the situation as far as possible. It is just this approach to the selection of distances between the FIGHTING ELEMENTS that should be deemed optimal in accordance with military art requirements, excluding undesirable increase or decrease of the distances.

The considered mathematical model of the moment of inertia of the FIGHTING SYSTEM's FIGHTING CAPACITY can be used as an algorithm in military planning which will enable comparative assessment of the value of the moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY on the bases of the evaluation of FIGHTING CAPABILITY and potential of the FIGHTING MASSES of individual FIGHTING ELEMENTS, by defining of the effectiveness of the types of FIGHTING LINKS between them and by spatial layout geometry of the FIGHTING SYSTEM.

At the given stage, the proposed understanding of the moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY and the algorithm of its evaluation, which is a necessary step for the subsequent stage, proves the views already adopted in military art with a systemic approach.

To provide an illustration of this FIGHTING SYSTEM can be considered composed of a few FIGHTING ELEMENTS interconnected by means of FIGHTING LINKS - a structure intrinsic to the system. Let us dispose a greater number of FIGHTING ELEMENTS existing outside the system in the space adjacent to the FIGHTING SYSTEM which would use their FIGHTING CAPABILITY in autonomous mode due to the lack of interconnecting FIGHTING LINKS.

Under the circumstances, if we study the common indices of the moment of inertia of the FIGHTING CAPACITY for the FIGHTING SYSTEM and separately disposed FIGHTING ELEMENTS existing outside the system, we will see that despite the multiplicity of the FIGHTING ELEMENTs existing outside the system and considerable value of the FIGHTING MASSES, the share of the FIGHTING ELEMENTs existing outside the FIGHTING SYSTEM is negligible in the common indices of the moment of inertia of the FIGHTING CAPACITY. This fact emphasizes that a special requirement must be set to the interconnection of the FIGHTING ELEMENTS, i.e. FIGHTING LINKS, during armed action (fig. 15).
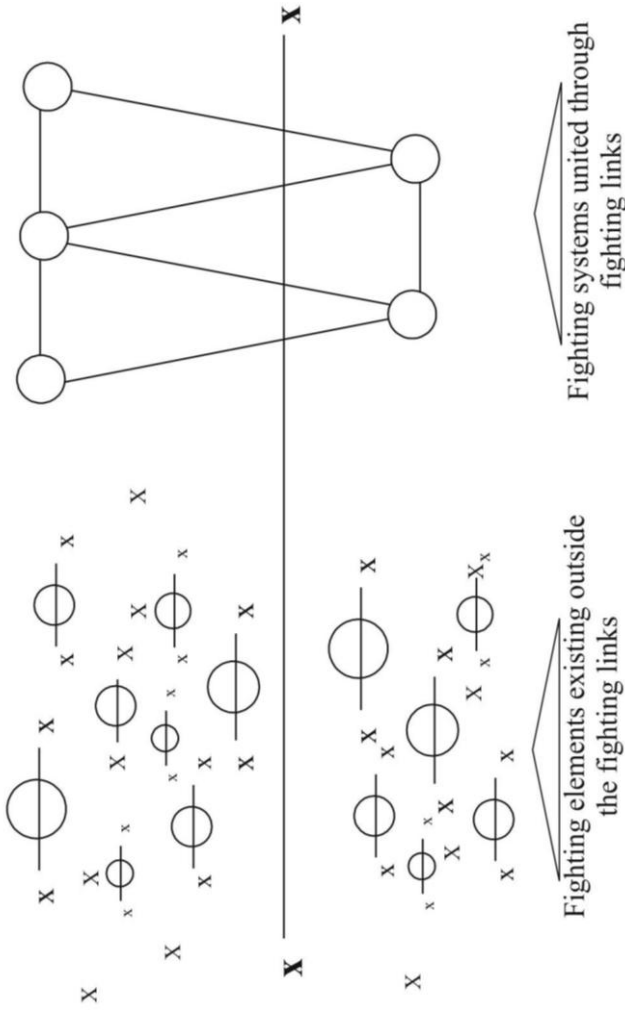
Fig. 15. Schemes for comparing the total inertia moment of existing outside the fighting links with that of fighting elements united through fighting links

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In the case when the FIGHTING SYSTEM moves in space, one more parameter – kinetic moment of the FIGHTING SYSTEM FIGHTING CAPACITY is algebraically added to the moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY.

The kinetic moment of the FIGHTING CAPACITY of the FIGHTING SYSTEM that is moving in space is an analogy to the sum of products of the masses of the moving mechanical system's component elements into the velocities of motion of the masses. According to the interpretation of such mathematical formulation, kinetic moment of the FIGHTING CAPACITY of the FIGHTING SYSTEM, as still another parameter of resistance against the influence of arms, is a sum of the product of "FIGHTING MASSES" of the FIGHTING SYSTEM's component FIGHTING ELEMENTS into the velocity of their motion.

With its meaning, the kinetic moment of the FIGHTING CAPACITY is exactly the value on the analogue of which special emphasis was placed by Napoleon Bonaparte in the military art – mass multiplied by velocity [158].3

With this approach, if, at a single glance, the direction of the guiding line of resistance of the FIGHTING SYSTEM, with respect to the impact of the opposing FIGHTING SYSTEM by force of arms, coincides with the direction of movement of the FIGHTING SYSTEM in space, the entire inertia moment of resistance must always be equal to the sum of moment of inertia of FIGHTING CAPACITY and of the FIGHTING SYSTEM in question and the own kinetic moment of FIGHTING CAPACITY.

In military art, a FIGHTING SYSTEM moving at a specific speed towards the opposing FIGHTING SYSTEM to exert armed impact has additional energy resources. Besides, in most cases, it is movable FIGHTING SYSTEM that faces the problem of weakening of internal links inside the FIGHTING SYSTEM, in certain cases, of their disruption and very often of the movement of FIGHTING ELEMENTS with respect to each other.

In the circumstances, when the advantage factor is reached by creation of a definite amount of kinetic moment of FIGHTING CAPACITY of the FIGHTING SYSTEM, quite often, in parallel to it,

the main power parameter - inertia moment of FIGHTING CAPACITY of the FIGHTING SYSTEM begins to decrease.

Therefore the suggested model of ARMED ACTION is somehow adapted to the above mentioned and widely spread action scenario in military art.

As far as we refer to dynamic indices - moment of inertia of the FIGHTING SYSTEM FIGHTING CAPACITY special emphasis should be laid on its character as an evaluation criterion. It is known that the moment of inertia of a mechanical system is variable according to its reference point coordinates, its configuration, redistribution of masses and, which is more important, to the area of its geometric definition in space.

Such manifestation of the moment of inertia creates additional possibilities and options for researches in military theory.

Before we refer to specific tasks of military art, it is necessary for FIGHTING SYSTEM to determine those additional parameters and algorithm for definition of their values, based on which the moment of inertia of FIGHTING SYSTEMs' CAPACITY can be characterized according to the orientation of the FIGHTING SYSTEM in space.

The moment of inertia of a FIGHTING SYSTEM has its own system of coordinates and relevant reference point or axis. Their selection depends on the requirement of specific tasks. But there is a parameter of the FIGHTING SYSTEM that according to the disposition in space of the FIGHTING ELEMENTS those are components of the FIGHTING SYSTEM, fighting capacities of FIGHTING MASSES and according to the disposition in space of FIGHTING ELEMENTS, comply with the strictly systematized definition. In this regard special importance is attached to the fighting masses center of the FIGHTING SYSTEM or INERTIA CENTER which is important not only for researches in military theory, but also it is of great importance for military planning (fig. 16).
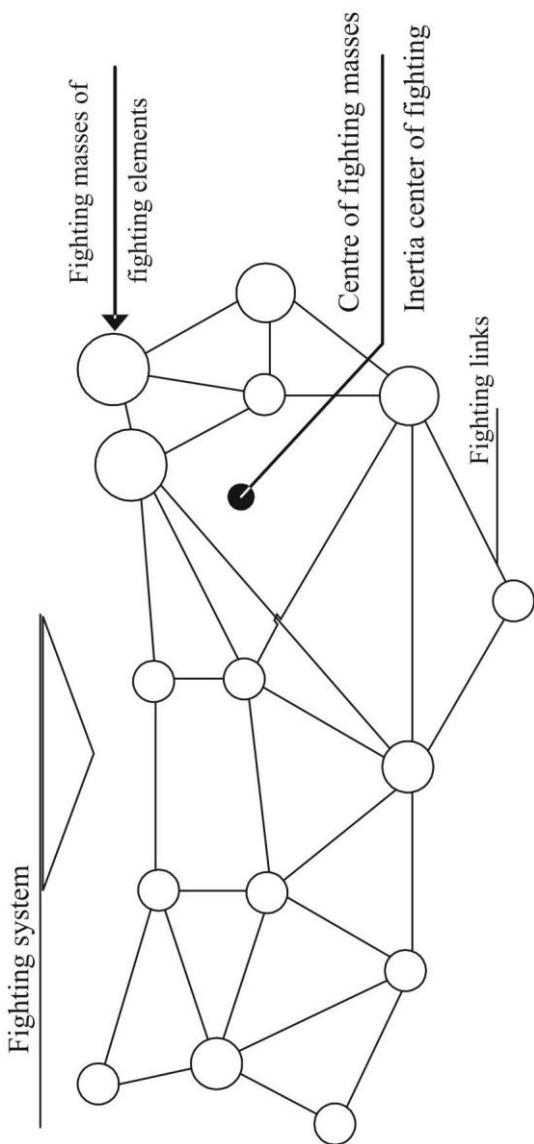
Fighting masses of
fighting elements

Centre of fighting masses

Inertia center of fighting

Fighting links

Fighting system

Fig. 16 Fighting system masses centre – inertia center

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Despite the fact that, as has been noted earlier, definition of location of inertia center of masses, even for the FIGHTING SYSTEM, is practically possible with the help of mathematical apparatus, in reality, masses inertia center itself is an idealized concept, which can be explained by and exists only in the imagination.

It should also be noted here that introduction of the term of inertia center of masses into the armed action model immediately calls for its association with the well known concept of Clausewitz - center of gravity. Here the center of masses and gravity center have the same meanings, but in the given context it, as a parameter, has a wider mission to look into many tasks. Moreover, it will be used for those tasks for which it was introduced by Clausewitz and then it became an object of discussion of Liddell Hart's well-known indirect action strategy. However, it would be better not to go ahead of events and to discuss matters in succession.

The concept of inertia center of the FIGHTING SYSTEM MASSES as a parameter requires systemic definition in the presented model of armed action. Accordingly, it can be defined that the inertia center of FIGHTING SYSTEM MASSES is a point located in space, in which, by virtual imagination, the sum of masses of the entire FIGHTING SYSTEM is located.

It is necessary to define still another concept – the static moment of the FIGHTING SYSTEM in order to determine the interior centre of the FIGHTING SYSTEM. The static moment of a material point with respect to any plan equals the sum of the static moments of FIGHTING MASSES of a real FIGHTING SYSTEM, defined respectively. Its value is defined by the sum of the products of the FIGHTING MASSES of FIGHTING ELEMENTS of the FIGHTING SYSTEMS into the distances from an appropriate point or plan to their center.

Prior to discussion of the issues of systematization of other parameters of the model of armed action, it is necessary to explain, on the basis of certain analogies, its important characteristic-inertia moment of FIGHTING SYSTEM's FIGHTING CAPACITY and of the FIGHTING SYSTEM static moment.

As has been mentioned, FIGHTING CAPACITY of a FIGHT-ING SYSTEM is determined by FIGHTING CAPACITY strength and FIGHTING CAPACITY stability.

In the given case, the status of FIGHTING CAPACITY strength can be evaluated by ratio of FIGHTING SYSTEM static moment to the sum of moments with respect to any FIGHTING ELEMENT that appear after the impact on the FIGHTING SYSTEM by FORCE OF ARMS.

Also, by the ratio of the inertia moment of the FIGHTING SYSTEM's FIGHTING CAPACITY to the sum of moments with respect to any FIGHTING ELEMENT that appear after the impact on the FIGHTING SYSTEM with the FORCE OF ARMS, the condition of the FIGHTING CAPACITY STABILITY can be evaluated.

Evaluation of FIGHTING CAPACITY strength and stability parameters on the basis of the suggested algorithm with their absolute values hardly complies with mathematical apparatus and, particularly, calculation by specific values. At the same time, in the event of change of positions of the FIGHTING ELEMENTS of the FIGHTING SYSTEM and increase or decrease of the parameters of impact on the FIGHTING SYSTEM by FORCE OF ARMS, it is practically possible to establish the dynamics of relative characteristics with relevant algorithm.

In the presented model, formalized and idealized systematization of armed action is directed towards establishment of final parameters of indirect action strategy. As for the individual parameters determined by logical succession, it is necessary for each specific task to develop a relevant method of their adoption and definition.

With such succession of researches there emerges an issue of the dynamics of the FIGHTING SYSTEM. The real picture of the possibility of using the FIGHTING CAPACITY of the FIGHTING SYSTEM with maximum concentration for a specific FIGHTING SYSTEM, at each specific moment of its existence, in the space of impact on it by FORCE OF ARMS of a definite direction, will be determined. Accordingly there will be defined options of selection of disposition and orientation of the FIGHTING ELEMENTS of the

FIGHTING SYSTEM and relevant FIGHTING LINKS against the enemy.

In the process of armed action, opposing FIGHTING SYSTEMS during armed impact on each other, according to their arrangement in space and their orientations, express different strength, stability and relevant fighting capacities.

During the impact of the FIGHTING SYSTEM on the enemy, dependence of the amounts of FIGHTING CAPACITY and relevant FIGHTING CAPABILITY on the geometry of FIGHTING SYSTEM and its orientation in space is determined by specific index of inertia - radius of gyration of FIGHTING SYSTEM.

The radius of gyration of the FIGHTING SYSTEM with respect to a point-pole or axis represents a distance in which a FIGHTING SYSTEM's material point having total FIGHTING MASSES should be disposed in concrete direction. In such a case the inertia moment of the material point with respect to the mentioned point-pole or axis should be equal to the total inertia moment of the FIGHTING MASSES of FIGHTING SYSTEM with respect to the same point or axis. (Fig. 17).
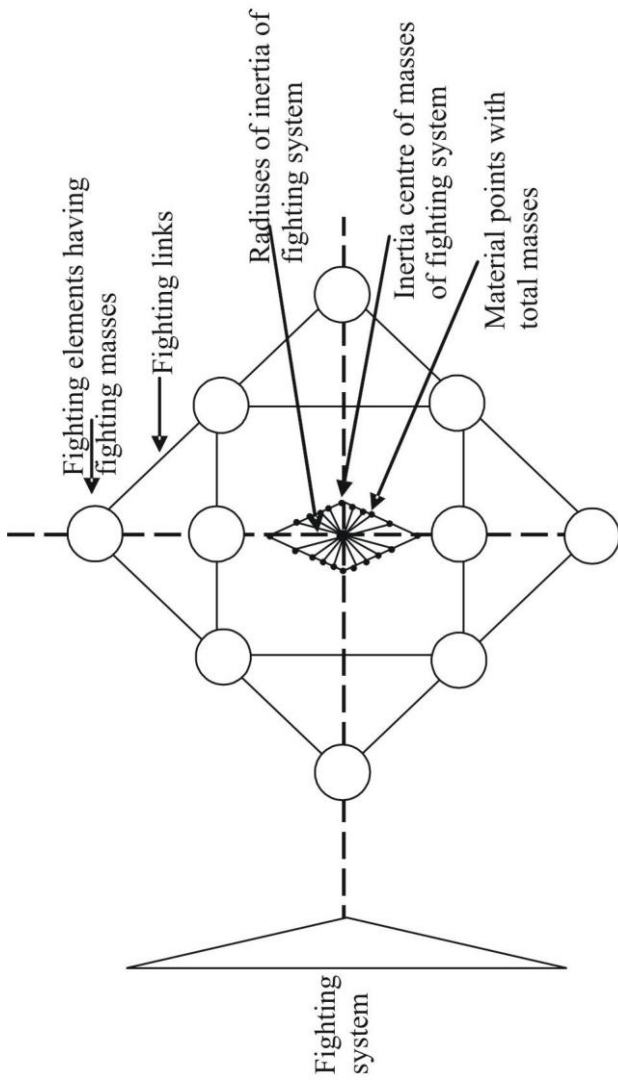
Fig. 17 General geometric scheme of the radiuses of inertia moments of the fighting system in different directions.

To solve the problem, hereinafter the radius of gyration of the FIGHTING SYSTEM will be considered from the position, when the coordinates of the initial point of the radius in any system of the reference frame coincides with the coordinates of the inertia centre of FIGHTING SYSTEM MASSES.

From the point of view of FIGHTING CAPACITY, military resistance of FIGHTING SYSTEM will be much greater in the case when the FIGHTING SYSTEM by its orientation coincides with the direction of the maximum radius of gyration of the FIGHTING SYSTEM with the direction line of the opposed FIGHTING SYSTEM's impact by FORCE OF ARMS .

The given parameter indicates in an analytic manner that the FIGHTING SYSTEM expecting an armed impact from the opposing FIGHTING SYSTEM should be able to relocate its FIGHTING ELEMENTS and their FIGHTING LINKS in time and space so that, at the starting moment of ARMED IMPACT, the already renewed FIGHTING SYSTEM could confront the enemy in the direction of its MAXIMUM RADIUS OF GYRATION.

Rapid relocation of the FIGHTING SYSTEM in time and space and taking up of a new position is the most important scenario of military art. It has specific explanations for specific cases. It can be a maneuver, operative and strategic deployment, operative arrangement, regrouping, etc. But its physical essence is unequivocal and it can be easily formulated.

A FIGHTING SYSTEM with its component FIGHTING ELEMENTS and with the FIGHTING LINKS existing between them changes its definition area as well as positions of its FIGHTING ELEMENTS in time and space while it maintains or changes its links, i.e. a new FIGHTING SYSTEM emerges from the original FIGHTING SYSTEM.

In the mathematical model, there are different ways of shifting from one system into another. Characteristic are two main options of rearrangement of a FIGHTING SYSTEM:

1. Rearrangement-regrouping of the FIGHTING ELEMENTS of the FIGHTING SYSTEM in space and time with disruption of FIGHTING LINKS and setting up of new FIGHTING LINKS.

Such rearrangement of one FIGHTING SYSTEM into another already renewed FIGHTING SYSTEM creates higher degree of freedom and possibilities of configuration - rearrangement of inner FIGHTING LINKS and FIGHTING ELEMENTS and allocation of new functions to them, which is very important for military art. But in such a case there is a restriction of an important requirement of military art-rearrangement in the quickest way (fig.18).

Fighting system awaiting an impact by force of arms

Fighting system rearranged by structural change to meet the impact by force of

Fighting elements

New fighting links

Fighting links

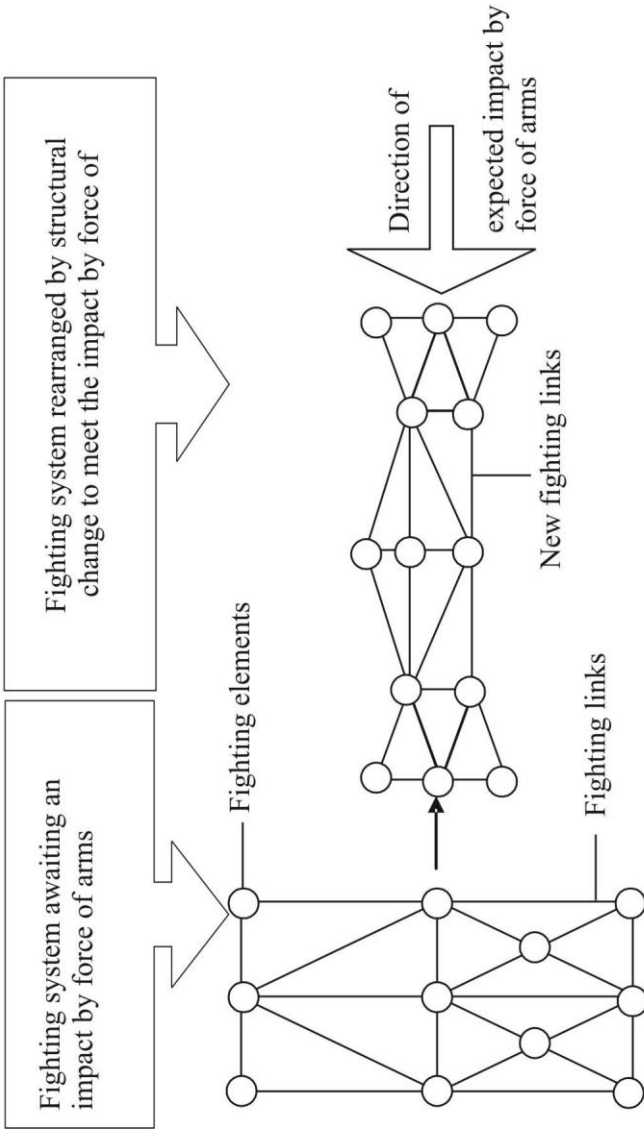Direction of expected impact by force of arms

Fig. 18. Rearrangement-regrouping of a fighting system by changing its structure, meet the direction of expected impact by force of arms with maximum moment of inertia

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2. Rearrangement-regrouping of the FIGHTING ELEMENTS of a FIGHTING SYSTEM in space and time without change of the structure of FIGHTING LINKS.

In the given case FIGHTING ELEMENTS take a predetermined position in the FIGHTING SYSTEM in such a way as to maintain the FIGHTING LINKS existing between them - i.e. structure of the system (fig. 19).
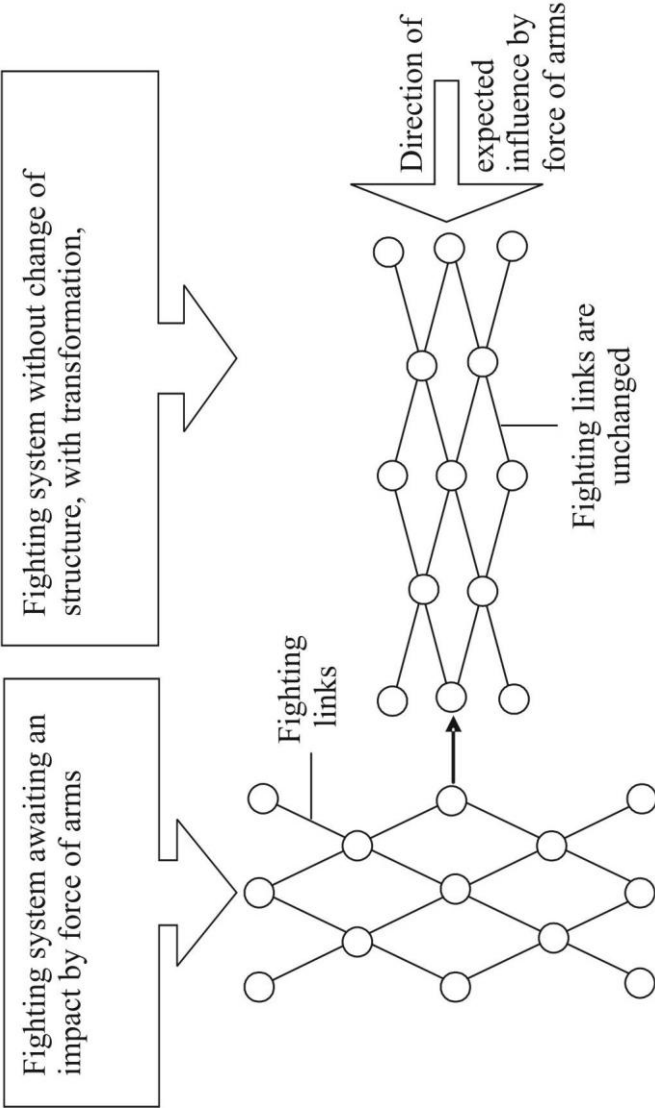
Fig. 19. Rearrangement-regrouping of fighting system without changing its structure, to meet the direction of expected impact by force of arms with maximum moment of inertia.

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In such a case regrouping takes place most rapidly and economically. Such a process in the theory of formation is intrinsic to TRANSFORMABLE SYSTEMS, which has been well studied by the author and is simulated with high compatibility with the analogies. [159].

To return to the issue of evaluation of the values of radius of inertia of FIGHTING SYSTEMS, account should be taken not only of the orientation by which FIGHTING SYSTEM meets the impact by armed action, but also which direction is selected by the opposed FIGHTING SYSTEM for application of FORCE OF ARMS and the way it will carry out LOADING WITH ARMED ACTION.

To this end the enemy's FIGHTING SYSTEM must have additional inertia parameters for specific action by force of arms.

Such parameters include main inertia axes of the FIGHTING SYSTEM as a dynamic system, the axes intersect each other at one point and are characterized by extremums reached by the values of the FIGHTING CAPACITY inertia moments. Accordingly, inertia moments of values read out on the main axes of inertia of FIGHTING SYSTEM may be called main inertia moments of the FIGHTING CAPACITY if the FIGHTING SYSTEM.

Having defined the FIGHTING CAPACITY and its different types – FIGHTING CAPACITY strength and its stability; FIGHTING SYSTEM with its constituent FIGHTING ELEMENTS that are characterized by FIGHTING MASSES and FIGHTING LINKS of interaction; FIGHTING SYSTEM inertia moment; radiuses of inertia, FIGHTING SYSTEM is centre of mass; LOADING WITH ARMED ACTION through the use of force of arms and many other additional parameters on the basis of development of the presented model and based on formalized and idealized systematization of armed action processes and their classification, and on the basis of analogies, it becomes possible to carry out systemic essential study, consideration and assessment of the strategy of indirect action. However, it should be emphasized that prior to discussing the specific task, some, possibly even repeated, evaluations can still be made.

One of the tasks of the present attempt of systematization was also to bring the non-systematized events of military art into the

sphere of systemic logic, which is directed, on the one hand, to provision of the correct understanding and adaptation of topical issues of military theory in the security sphere of Georgia and, on the other hand, to the understanding of the essence of a number of priority provisions in military theory at the given stage, which would rule out for exclusion of controversial positions and definitions.

Thus the aim of the present work is to shed light on specific issues and not to criticize other similar theories and bring its own original approach to the fore. Therefore, during discussion of issues no additional explanations pointing to the proximity of some researches with the logic, analogies, differences and novelties are given. Otherwise it could make the task extensive and overloaded and could turn its key points from specialization to their generalization, which is not the goal set within the framework of the present monograph.

In systemic analysis, analogies from the field of mechanics were applied as examples for purposes of comparison due to the fact that the model is based on the principles of mechanics, and for providing clear and laconic description of the essence of the issues. It does not mean at all that the ideology and logic of creation of the model implies definition of parameters of armed action in the model with the aid of formulas that are known in mechanics and of corresponding mathematical apparatus. Mathematical expression of mechanical analogies should provide accurate hints to military specialists during researches. Such an approach creates certain effects of systematization at assessing non-systematized military events.

Further, after the all preconditions have been ascertained and met, it is possible to consider the issues of classification of LOADING WITH ARMED ACTION of FIGHTING SYSTEM - as systemic impact by FORCE OF ARMS, which should also embrace specific cases of the strategy of indirect actions in their generalized sense.

The following are used as elements of the model meant for classification: integral FIGHTING SYSTEM; FIGHTING ELEMENTS having FIGHTING MASSES", FIGHTING LINKS; inertia centre of masses; inertia radiuses of FIGHTING SYSTEM; SYSTEM OF COORDINATES; LOADING WITH ARMED ACTION as impact on the joint FORCES OF ARMS or with force equipotent to

relevant arms; DIRECT LOADING WITH ARMED ACTION; TRANSMITED LOADING WITH ARMED ACTION and other parameters, the majority of which are defined and specified in the given research, while certain types of them will be defined in the process of research.

Let us represent a FIGHTING SYSTEM, mark FIGHTING ELEMENTS having FIGHTING MASSES" and FIGHTING LINKs between them, and put the whole FIGHTING SYSTEM in the coordinate system. Determine and mark inertia center of FIGHTING MASSES of the FIGHTING SYSTEM and draw a contour wherein the distances from each point to the of the inertia center of the FIGHTING MASSES will correspond to FIGHTING SYSTEM radius of inertia in an appropriate direction.

With such systemic readiness towards the FIGHTING SYSTEM, for the purpose of classification let us consider all the possible and typical cases of loading with ARMED ACTION, as a factor of impact of FORCE OF ARMS" or equipotent force.

First of all, two positions require a classified definition:
-   LOADING WITH ARMED ACTION of a FIGHTING SYSTEM, as a case of DIRECT LOADING WITH ARMED ACTION.

DIRECT LOADING WITH ARMED ACTION per se is an impact exerted on a FIGHTING SYSTEM by the enemy's FIGHTING SYSTEM when the IMPACT BY FORCE OF ARMS is exerted directly on and extends to the FIGHTING SYSTEM and to area its spread of in space.
-   LOADING WITH ARMED ACTION, exerted on enemy's
    FIGHTING SYSTEM by indirect impact.

LOADING WITH ARMED ACTION exerted on a FIGHTING SYSTEM by the opposing FIGHTING SYSTEM not directly in fighting contact regime, but through another intermediate system or factor of physical or virtual nature is indirect impact on the FIGHTING SYSTEM.

In the given case the aim of development of the proposed model was not to assign such a quality to it which would make it possible to acknowledge or reject generalized and practically accepted provi-

sions, but to develop important provisions in a systemic way by implementing the model.

According to the FIGHTING SYSTEM model, direct LOADING WITH ARMED ACTION "INDIRECT LOADING WITH ARMED ACTION or, generally, all possible impact by FORCE OF ARMS can geometrically be of the following forms:

I. Central, when the vector of impact by resultant force arms is directed towards the center of masses of the FIGHTING SYSTEM or it does not emerge from the FIGHTING SYSTEM crossing center - kern by its direction. Such LOADING WITH ARMED ACTION belongs to the central IMPACT BY FORCE OF ARMS" on the FIGHTING SYSTEM.

The newly introduced concept FIGHTING SYSTEM crossing center - kern requires certain consideration and definition. Its semantic consistency with military art should be defined by analogy with mechanics. FIGHTING SYSTEM crossing center - kern represents a collective set of virtual points in the FIGHTING SYSTEM propagation area. This set includes also masses of FIGHTING SYSTEM - inertia center, the FORCE OF ARMS acting on which can put all of the FIGHTING ELEMENTS of the FIGHTING SYSTEM into action in the opposite and coincident directions.

Interestingly, the developed model in its turn gives indications to such important terms that are based on Clausewitz's theory of gravity center and on "the enemy's force center itself. According to it "…. real annihilation of an enemy is achieved not through conquering a certain province of the enemy quietly, with application of excessive forces, and having this small loot we shall start to think about big victories, but with continuous movement to the center of the enemy and doing everything to achieve a victory…"

In the given case, too, Clausewitz, by empirical logic of research, point to the enemy's forces center as a parameter, at armed impact on which with intensive force great forces the potential of the enemy will be challenged and conditions created for its total destruction.

II. Eccentric, when the vector of impact of the force of equipotent to arms misses the FIGHTING SYSTEM MASS CENTER by

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a certain distance –eccentricity and at the same time its aiming line misses the area of crossing center – kern of the FIGHTING SYSTEM.

In this case, two particular cases are considered during the impact on the enemy's FIGHTING SYSTEM by FORCE OF ARMS :

1. When eccentric is disposed in the spreading area of the FIGHTING SYSTEM, i.e. the vector of force equipotent to arms" intersects the spreading area of the FIGHTING SYSTEM. This case is defined by the term inner eccentric IMPACT BY FORCE OF ARMS.

2. When the eccentric force cannot be placed in the space of spread of the FIGHTING SYSTEM i.e. the vector of force equipotent to arms with its direction line misses the spreading area of the FIGHTING SYSTEM. This means that the enemy's FIGHTING SYSTEM cannot or does not act on the concrete FIGHTING SYSTEM by its force of arms. This case is defined by the term external eccentricity IMPACT BY FORCE OF ARMS.

Thus, with respect to military art it is possible to define by systemic approach that the central and inner eccentric impacts represent direct mutual impact of the opposing FIGHTING SYSTEMS by force of arms in the form of armed action. At the same time, indirect interaction of the FIGHTING SYSTEMS by FORCE OF ARMS represents impact by external eccentric force. In the given case we can use a term of great eccentricity.

Central and inner eccentric impact of FIGHTING SYSTEMS on each other with the use of FORCE OF ARMS comprises several cases, namely: 1.1.central direct impact; 1.2. Central lateral impact; 1.3. Central indirect impact and II.1. Eccentric direct impact; II.2.eccentric lateral impact; II.3. Eccentric indirect impact.

Each of the discussed cases referring to the mutual impact of opposing FIGHTING SYSTEMS by FORCE OF ARMS during armed action requires explanations with the aid of relevant schemes.

I.1. Central direct impact by FORCE OF ARMS" on the opposing FIGHTING SYSTEM during armed action.

In the given case LOADING WITH ARMED ACTION on the opposing FIGHTING SYSTEM, considered as IMPACT BY FORCE OF ARMS, is carried out with the equipotent force of arms, the vector of which is located on the main line of disposition of the FIGHTING SYSTEM - maximum inertia radius, or in parallel to it. It is directed towards mass centre of the FIGHTING SYSTEM or any point in the space of FIGHTING SYSTEM crossing center-kern (fig.20).

With such a geometry, Clausewitz's approach to the impact on the opposing force by force of arms was as follows – it is really possible to annihilate the enemy if we find the kern of its forces and direct all our forces towards it [59].5

Probably Clausewitz meant central direct action on the enemy by FORCE OF ARMS, which has been discussed herein. In such a case maximum concentration of FIGHTING CAPACITY and relevant fighting resource and potential takes place. At the same time it is directed to the centre of relevant masses - against the maximum values of inertia moment of their FIGHTING CAPACITY, inertia radius and, also, crossing center - kern.

In such circumstances, Clausewitz's appeal is realizable as far as it is possible to act on the opposing FIGHTING SYSTEM with force of arms when the enemy demonstrates its highest possible capability and in the event of its defeat it will fully exhaust its FIGHTING CAPABILITY and will lose its FIGHTING CAPACITY respectively.

I.2. Central lateral impact by FORCE OF ARMS on the opposing FIGHTING SYSTEM during armed action.

In such a case, LOADING WITH ARMED ACTION of the opposing FIGHTING SYSTEM, considered as IMPACT BY FORCE OF ARMS, is carried out with the equipotent force of arms, whose vector is located on the main line of disposition of the FIGHTING SYSTEM - minimum inertia radius, or in parallel to it. Besides, it is directed towards the masses centre of the FIGHTING SYSTEM or any point in the space of FIGHTING SYSTEM is crossing center-kern (fig.20).

Main axis of inertia with maximum radius of inertia is located on it

Central indirect impact on fighting system by force of arms

Fighting elements with fighting masses

Eccentric indirect impact on fighting system by force of arms

Main axis of inertia with minimal radius of inertia is located on it

e

Fighting masses centre of the "fighting system"

"fighting system" crossing center

e

Eccentric lateral impact on fighting system by force of arms

Central lateral influence on fighting system by force of arms

Fighting system fighting links

E

Eccentric external indirect impact on fighting system

E

Central direct impact on fighting system by force of arms

Eccentric direct impact on fighting system by force of arms

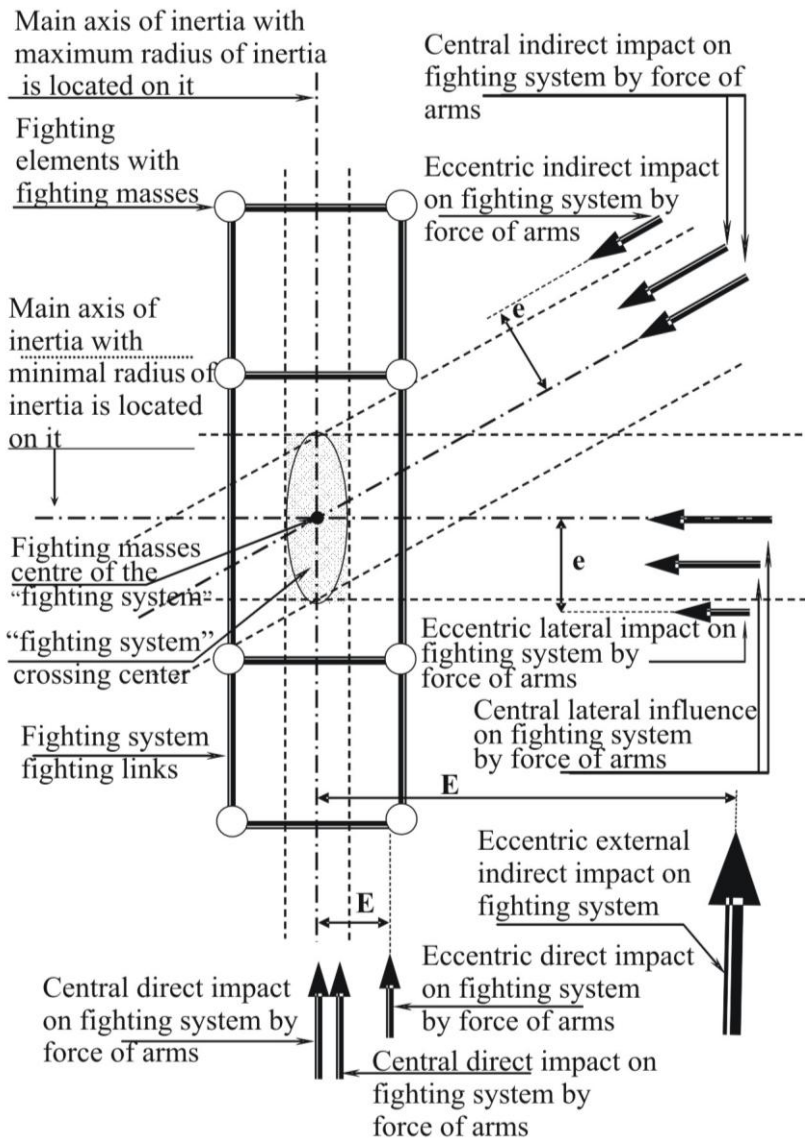Central direct impact on fighting system by force of arms

Fig. 20 Possible scheme of impact on fighting system by force of arms

In military art, the central lateral impact is directed towards an optimal result. In such a case the goal is to carry out CUTTING ATTACK on the enemy, i.e. to split the opposing FIGHTING SYSTEM into much smaller, at least two FIGHTING SYSTEMS having much lesser fighting capacities and being isolated from each other by FIGHTING LINKS.

I.3 − Central indirect impact by FORCE OF ARMS on the enemy's FIGHTING SYSTEM during armed action.

In the given case LOADING WITH ARMED ACTION of the opposing FIGHTING SYSTEM, considered as IMPACT BY FORCE OF ARMS, is carried out with the equipotent force of arms, whose vector is located on the line disposed at an angle between or in parallel to the disposition lines of the main - maximum and main − minimum inertia radiuses. Besides, it is directed towards the mass centre of FIGHTING SYSTEM or any point in the space of the crossing center - kern of the FIGHTING SYSTEM (fig.20).

Classic example of the indirect attack in military theory and specifically in military history is the indirect military dispositions - indirect attack applied by Frederick II during the Seven Years' War (1756-1763) on the territory of contemporary Latvia, by that time a part of the Polish state, near Leuthen, on December 5, 1757. By this action Frederick II, whose army was comprised of 40 thousand warriors and 167 cannons, annihilated the Austrian army which numbered 66 thousand warriors and 300 cannons. Interestingly, the Austrian army lost 27 thousand warriors and 116 cannons, whereas the losses of the Prussian army of Frederick II equaled 6.5 thousand warriors.

Since then an indirect attack in military art has been recognized an important principle of military tactics.

If in the developed model we consider the central lateral attack more widely it will be clear that with such a geometry the opposing FIGHTING SYSTEM starts to lose its FIGHTING CAPACITY in two aspects simultaneously − FIGHTING CAPACITY strength and, which is more important, FIGHTING CAPACITY STABILITY, after which decrease of FIGHTING CAPACITY strength occurs even more dramatically.

And again, LATERAL ATTACK is that intermediate and convenient reference point of impact on the enemy, when by application of a rapid maneuver with less effort it becomes possible to change, depending on the situation, the reference point of impact on the enemy by force of arms and to shift it to the position of central direct or central lateral attack, and, thereby, to create additional difficulties for the enemy.

That which also belongs to the direct impact on the opposing FIGHTING SYSTEM by force of arms is inner eccentric impact, whose geometric parameters and physical character have already been discussed. In the given case, all of its three cases require to be discussed separately: II.1-eccentric direct impact; II.2-eccentric lateral impact and II.3-eccentric indirect impact. It should be also agreed that the listed direct, lateral or indirect eccentric impact and the terms applied herein respectively denote only direct impact by FORCE OF ARMS on the FIGHTING SYSTEM, which is to realizable by application of inner eccentricity force only.

In military art, impact on the FIGHTING SYSTEM by FORCE OF ARMS in the armed action process by application of inner eccentricity contains parameters of lesser systematization of inherent scenarios in comparison with the types of the central impact. In general, impact by inner eccentricity is revealed in the most typical form during attack on flanks, which is also often resorted to for the purpose of performing flanking movement and encirclement of the enemy, or during break-through operations.

Despite this, inner eccentricity impacts by "FORCE OF ARMS on the FIGHTING SYSTEM are classified according to their reference points:

II.1. - Direct inner eccentric impact on the OPPOSING FIGHTING SYSTEM" by "FORCE OF ARMS in the process of armed action.

In the given case, LOADING WITH ARMED ACTION of the FIGHTING SYSTEM, considered as IMPACT BY FORCES OF ARMS, is carried out with such an equipotent force whose vector is located in parallel to the FIGHTING SYSTEM main line - disposition line of maximum radius of inertia and possesses inner eccentrici-

ty, the value of which is equal to the distance from the mentioned disposition line of maximum radius of inertia to the vector (fig. 20).

II.2.- Inner eccentric lateral impact on the opposed FIGHTING SYSTEM" by FORCE OF ARMS in the process of armed action.

In such a case, LOADING WITH ARMED ACTION on the opposing FIGHTING SYSTEM, considered as IMPACT BY FORCE OF ARMS, is carried out with such an equipotent force whose vector is located between the FIGHTING SYSTEM main lines - disposition lines of maximum and minimum radiuses of inertia, in parallel to the indirect line disposed at an angle to the mentioned lines. In this case, the mentioned oblique line extends through the masses center of the FIGHTING SYSTEM or through any points in the space of the FIGHTING SYSTEM crossing center – kern, and the eccentricity is equal to the distance from the vector to the indirect line (fig. 20).

In all three cases, in which inner eccentric impact on the FIGHTING SYSTEM which is equivalent to the force of arms is discussed, it is necessary to meet the following requirements:

- the force - vector which is equivalent to the impact by FORCE OF ARMS must not be located on the line which intersects the FIGHTING SYSTEM is crossing center – kern. The location line of the vector must be outside of the space of location of the crossing center - kern.
- the force - vector which is equivalent to the impact by FORCE OF ARMS must not be located on the line which extends beyond the spreading area of the FIGHTING SYSTEM. Otherwise indirect - external eccentric impact will occur, which will be systematized below.

Generally, during armed confrontation between opposing FIGHTING SYSTEMS in which the direct IMPACT BY FORCE OF ARMS occurs, the equivalent force should be selected in a manner as to be the equivalent of one group of continuous loading by force of arms. Otherwise there might be a scenario wherein the force that is equivalent to two eccentric impacts in the model may formally be represented as their sum, i.e. only virtually existing centrally acting

summary vector, which does not correspond to the real scenario of military art.

External eccentric influence on a FIGHTING SYSTEM by the opposing FIGHTING SYSTEM requires separate and substantial assessment. As has already been noted, in the case of external eccentric impact, resultant force - vector of impact with the relevant force of arm does not cross and, more precisely, misses the spreading area of the concrete FIGHTING SYSTEM (fig. 20).

Therefore, and this has also been classified, the influence of a great eccentricity on a FIGHTING SYSTEM does not belong to the immediate impact on the given FIGHTING SYSTEM by the opposing FIGHTING SYSTEM and its essence is defined as indirect impact. Actually this means that indirect impact on the given FIGHTING SYSTEM by an opposing FIGHTING SYSTEM is possible only by impact on another, so called INTERMEDIATE factor – object existing independently of the FIGHTING SYSTEM and having a physical or virtual nature, which in turn has an immediate relation to the FIGHTING SYSTEM. The INTERMEDIATE factor - object is able to directly pass the impact, which has been performed, as an indirect action, by the opposing FIGHTING SYSTEM with its aid, against the given FIGHTING SYSTEM.

Classification of mutual impacts by FORCE OF ARMS in armed action by use of the terms DIRECT IMPACT and INDIRECT IMPACT has not been determined by conditionality. Only through complete systematization it would be possible to select terms whose essence, on the one hand, would adjust the approaches and contradictory perception of meanings existing today in the theoretical spectrum of applied strategy of indirect actions. On the other hand, terms, with their meanings and representation of events, should have been based on strictly determined provisions adopted and recognized in systemic researches. It is for this reason that the spectrum of forces of mechanical systems has been selected as a basis, since the mutual impact of opposing FIGHTING SYSTEMS, as loading by force of arms, is a coercive dynamic process that is a fairly close analogy of the mutual impacts of power systems in the field of mechanics.

According to the terms of classical mechanics (Сборник терминов по классической механике на 5 языках – русский, немецкий, английской, французский, польский. WYDAW-NICTWA NAUKOWO – TECHNICZNE. WARSZAWA. 1965) [6] **direct load** – Ru: Непосредственная нагрузка; de: Unmittelbare Belastung; En: direct load; Fr: charge directe; Pl: ogciazenie bezpo-srednie – is defined - load **directly applied to the given body.**

Transmitted load – Ru: Косвенная нагрузка; De: Mittelbare Balstung; En: Transmitted load; Fr: Charge Trasmise; Pl: Obciazenie posrednie – is defined – **load transmitted to a material body by means of other bodies being in contact therewith.**

The style and method of stating the presented material is determined by the consideration that all concepts and phrases involve detailed explanation of individual fragments of the model and processes through full explanation and frequent repetition of terms.

Such presentation of the text, by repeating each concept in the form of its listing in full format, has not been done by accident. Its aim is to make it easier for the reader to understand new approaches to the extent there is no need in seeking the terms that have been mentioned earlier and looking for the basic definitions thereof.

For the purpose of making proper conclusions, the present systematization of the idealized model of classification of a FIGHTING SYSTEM and of the impact on it by force of arms during armed action, which is based on analogies, allows to consider the concepts that are recognized and related to the strategy of indirect actions.

Naturally the expectation for the most specified, extensive and versatile answer is connected with the work of Liddell Hart - Strategy of indirect actions.

For this part, Liddell Hart, as a specialist of military history and theory, with his sharp criticism, with his effort to seek for novelty, refers to the issues of military problems that involve wide application of new technologies in military matters, necessity of changing the methods of waging a battle, and different explanation of strategy.

The mentioned issues are discussed in the books of Liddell Hart, published in the 1920-s-1930-s.

Special attitude to strategy shows his book Strategy of Indirect Actions, which is known in the 40-s by two publications and was re-published in New-York in 1954. In the given case all the issues shall be discussed on the basis of the American publication [157].2 The cited book aroused much interest. It has been translated in too many languages, including Russian [161]. 7

In his book, the author, without any systemic boundaries or classification or restrictions, considers that for nearly two thousand five hundred years of the history of mankind distinguished military leaders achieved victory through the best indirect actions. For objective evaluation of this position it was necessary to ascertain what scenarios of military art were involved in Liddell Hart's work when he refers to the strategy of indirect actions.

In this respect, interest attaches to the systematized list [161] of actions which Liddell Hart attributes to indirect actions strategy, drawn by Doctor of Military Art Prof. Lieutenant-General S.N. Krasilnikov, based on the researches of Liddell Hart, namely:

1. Avoiding decisive actions and engagement and waiting for appropriate time to defeat without much effort and casualties, or waiting for the time when the enemy is extremely weakened and demoralized, when it is not able to oppose and will be forced to surrender;
2. Refusing to perform frontal strikes if suddenness is not ensured and striking from the less expected direction;
3. Acknowledgement of the crucial importance of maneuvering on the scale of the theatre of military operations;
4. Strikes at the junctions and weak sections of the enemy.
5. Strikes at bases and communications of the enemy;
6. Strikes at its political and economic centers, naval blockade;
7. Political measures towards weakening the rear of the enemy;
8. Demoralization and disinformation of the enemy;
9. Application of war stratagems;
10. Use of new resources of struggle;

Prior to discussing and evaluating the listed positions according to the developed systemic model, it would be interesting to make a preliminary review of evaluations made by Krasilnikov:

"….when the author makes such broad definition of the concept of indirect action strategy, only coarse, stenciled, direct attacks are left for direct action strategy, which exclude possible methods of maneuvering and military or non-military impacts actions".

Now the above mentioned positions that are regarded by Liddell Hart as an indirect action strategy will be discussed within the functioning space of the developed systemic model.

- Liddell Hart considers the following as an example of indirect action strategy:

"Avoidance of decisive actions and engagements and waiting for the moment when the enemy makes a mistake….. or waiting for the moment of extreme weakness and demoralization to take a chance and defeat the enemy without great effort".

The given example contains direct IMPACT BY FORCE OF ARMS between opposing systems in the form of armed action and it has nothing to do with the indirect impact which is exerted by one opposing side party on the other not directly, but with the aid of an object being in contact with it and having some virtual and physical factors.

As for taking chance to use the enemy's mistake, this is one of the fundamental provisions of military art and it is not the factor which would allow to determine whether it is necessary to carry out armed action by direct or indirect means.

Attrition of the enemy achieved through demoralization or with the aid of intermediate force represents an example of indirect impact. At the same time, attrition of the enemy and demoralization may also be an original process or a result of a cycle of direct impacts of various nature and form not belonging to the example of indirect impact.

- another example of indirect action is a case given in the works of Liddell Hart where frontal attack is rejected when the effect

of suddenness cannot be achieved and it is better to perform corresponding attack in the less expected direction.

In both situations the rejected one and the one regarded as desirable indirect action, in no circumstances fit with to the systematically classified characteristics of indirect actions.

No matter how it is performed, under conditions of the unexpectedness or expectedness, the mutual impact of FIGHTING SYSTEMS by force of arms in the armed action process in no case can belong to indirect actions and it is a classical example of direct impact in the less expected direction during its implementation.

According to the developed model, the less expected direction of "IMPACT BY FORCE OF ARMS", which is directly carried out by armed action, may only be of the following types: central or eccentrical direct, lateral or indirect.

Recognition of the crucial importance of carrying out maneuvers on the theatre of military operations also is suggested as a fundamental example of indirect action.

It can be explicitly noted that acknowledgement of the crucial importance of maneuver refers to direct or indirect impact.

Detailed study of the list shows that strikes at the junctions and weak sections of the enemy are incorrectly attributed to indirect actions. It should be noted that direct action even on the weak and unprotected positions of the enemy is not relevant to indirect action and it cannot be identified as indirect action.

As for the impact on the communications and bases of the enemy, in this regard two cases should be considered:

If direct influence is carried out on the bases or communications that, according to the model under consideration, represent a constituent element of the FIGHTING ELEMENTS of the FIGHTING SYSTEM, then the case does not refer to indirect action.

And if the impact is exerted on the communications or bases that do not represent structural elements of a concrete FIGHTING SYSTEM and the influence impact has effect on its FIGHTING CAPACITY factors on state or regional scale, it can be regarded as indirect action.

It is also unacceptable to assert that application of new means of fight can be attributed to the list of indirect actions.

Therefore if we consider the case which is considered in the work Strategy of indirect actions, it can be said that the following can be attributed to indirect action according to the classified parameters:
- political measures;
- destruction of the enemy's rear;
- demoralization and misinformation of the enemy;
- strikes at communications in certain cases;
- strikes at political and economic centers of the enemy;
- imposing blockades and other similar measures.

Considering indirect actions included in the list some relevant questions may be raised, the most important of them being the following:
- who performs indirect actions in the indirect action strategy;
- on whom the impact is exerted according to the indirect action strategy;
- what is the main reference point for choosing the goal during indirect actions;

There is no systemic answer to these questions in the indirect action strategy as a work in the military science field.

Therefore, specific classification process of FIGHTING SYSTEM in the developed model and systematization of influence thereon by force of arms under armed action conditions needs to be continued and extended.

As far as the issue refers to the scenarios of military art which considers armed action processes, enemy forces are FIGHTING SYSTEMS, and this is natural of course.

Therefore, indirect action should refer to indirect impact on one FIGHTING SYSTEM by another FIGHTING SYSTEM by force of arms and this will be systematization of the military process.

If with such an approach we discuss the positions which involve indirect influence of the opposing parties with the application of political measures, destruction of the enemy's rear, disruption of external communications, strikes on the political and economic po-

tential of the enemy and other means indicated by Liddell Hart, we will see that they do not contradict the concept and definition of indirect action.

At the same time the correctness of the classification of impact on the FIGHTING SYSTEM by force of arms is justified according to the developed model from the point of view that indirect action is impact of power which has great external eccentricity towards the inertia center FIGHTING SYSTEM MASSES, according to which the mentioned power vector does not intersect the arrangement of the enemy's FIGHTING SYSTEM in space.

So what is the target of the external eccentric force – i.e. effect or factor of armed impact of indirect actions?

If the author of the "indirect action strategy" considers that political, economic and other influences for weakening the FIGHTING CAPACITY of the enemy's FIGHTING SYSTEM should be exercised by state, political, diplomatic and other methods and then by fighting with the weakened opposed FIGHTING SYSTEM, this would be yet another different case. According to this logic, we would be dealing not to INDIRECT ACTION but two DIRECT ACTIONS: on the one hand, to the impact the enemy's FIGHTING SYSTEM not by armed action, but with the aid of direct impact with economic, political, diplomatic and other non-military methods; and on the other hand, with ordinary direct impact on the weakened opposing FIGHTING SYSTEM by force of arms through the own FIGHTING SYSTEM. Such differentiation makes it clear that there is no indirect impact in the given case.

Indirect impact by the FIGHTING SYSTEM on the enemy's FIGHTING SYSTEM as well as direct impact in two or more stages occur only in the event when the impact on the enemy by the above - mentioned external factors is conditioned by the impact of one's own FIGHTING SYSTEM.

In this regard, of course it was possible to suggest a specific systemic model, which would not be a difficult task, but firstly, there is no need in doing so, and, secondly, it would not be justifiable from the standpoint of scientific ethic, since much earlier Clausewitz suggested a perfect model by introducing the gravity center and a

simple and sufficiently generalized system in his fundamental work on war", which is completely compatible with the model and the classification logic developed by me [Cl]5.

" …Alexander the Great, Gustavus Adolphus and Charles XII of Sweden, and Frederick the Great each had their centers of gravity in their respective armies. Had their armies been destroyed, these men would have been remembered as failures. In states with many factions vying for power, the center of gravity lies mainly in the capital; in small states supported by a more powerful one, it lies in the army of the stronger state; in alliances, it lies in the unity formed by common interests; in popular uprisings, it lies in the persons of the principal leaders and in public opinion. The blow must be directed against these things.

If the enemy loses his balance because of such a blow, he must not be given time to regain it; blow after blow must follow in the same manner. In other words, the victor must always direct all of his blows in such a way that they will strike at the whole of the enemy, not just a part of him.

The hell will be plaid on the enemy not when we try to seize calmly one of its provinces with application of greater force, and will be content with the insignificant, victory in exchange for probable greater success, but if we chase the enemy till the end, up to the kern of the enemy and sacrifice everything for the final victory.

But no matter what sort of gravity center the enemy has against which our endeavor is to be directed, victory and destruction of the enemy's armed forces is the best beginning and most important in all the cases.

Therefore, based on the experience gained by me we consider that destruction of the enemy is conditioned by the following factors:

1. Annihilation of its army when it is somewhat independent source of force.
2. Seizure of the capital of the enemy if it is not only its administrative center, but is a point of its representative institutions and offices of parties.
3. Delivering a strike on the main ally if it is more important than our enemy.

So far the opposing side in the war was regarded as one whole, which was quite acceptable in a wide approach to the issue. But having made our assumption that annihilation of the enemy meant overcoming concentrated opposition in its center of gravity, we should reject this statement and place in the forefront the case where we have to deal with more than one enemy…"

Therefore investigation of the theory of indirect actions brings us to the earlier period, to Clausewitz.

For determination of the gravity center, relevant conclusions should be made about all opposed forces and their strategic and action levels. The international, military, economic, demographic, historic, political, psychological, geographic and other factors should be analyzed.
Quantity of the opposed force should be determined and strategic goals and tasks should be summed up.

The most important for determination of gravity center is composition of the opposed forces, their role and importance in the alliance.

Depending on the kind of the management body, military group or clan, illegal economic group or legal business group, assessment is made of democracy, totalitarian or feudal regal system. Respectively, the level of civilization is evaluated, which may be industrial, pre-industrial or informational.

This is the logic for determining the gravity center, which is the task of primary importance in modern complex relations.

As for asymmetric threats, this word appeared in official documents as a term since 1997. But the National and Defense University in its annual publication devoted a whole chapter to asymmetric threats already in 1988. In the last version of USA national safety a document has been adopted where three categories are discussed: regional - armed conflicts; transnational - drug business; arms trade, etc; and asymmetric.

In most cases ASYMETRIC WAR is regarded by the committee of the US chiefs of staff as a war where one party has much more resources than the other.

ASYMETRIC WAR, as a rule, is conducted by a weaker enemy. To this effect, it uses the technologies that cannot be opposed or fully controlled by the United States or other powerful states.

Though success can be achieved in "ASYMETRIC WAR", well used tactical innovation makes it possible to resolve many strategic tasks.

Therefore, asymmetric threats - war is a reality of today and importance should be attached to it.

INTERDEPENDENCY OF STRATEGY, OPERATIONAL ART AND TACTICS

The realities of the last decade of 20th century, and especially those of the 21st century are distinguished for the fact that a military-strategic, military-political and state political result itself becomes achievable by use of tactical action, and tactical weaponry system. The further perfection of weapons, their transfer to outer space, and further development of information, control and targeting systems will further increase the chance of achieving a military or political goal with the above mentioned effect.

In the present paper, the issue is discussed with the purpose of studying the configuration of and essential relationship between the major components of art of war in order to allow building of the armed forces. Otherwise, it is difficult to define the structure of the armed forces itself [1].8

In connection with this question, military theory experts [2].9 use the following scheme of interrelationship between strategy, operation art and tactics (fig. 21)
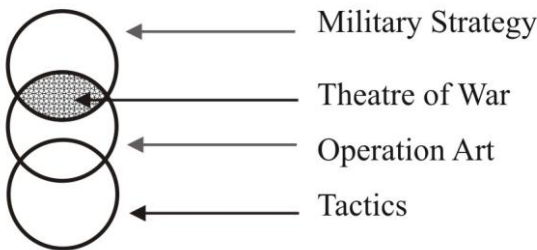

Fig. 21

It is hard to agree with such scheme in a principle, especially when recognizes that strategic tasks are resolved by tactics, i.e. when emphasis is made on their relationship.

In order to ensure a certain level of adaptation to the mentioned demands, a number of articles represent the relationship between strategy and tactics by the following scheme (fig. 22)
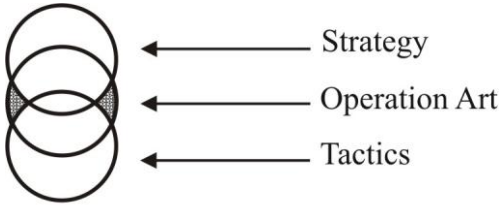
Fig. 22

However, the present scheme reduces the existence of operation art to a minimum by further drawing together of functional areas of tactics and strategy, which is unreal.

The scheme below (fig. 23) which jointly represents strategy, operation art and tactics in the military art structure also carries features of artificial origination.
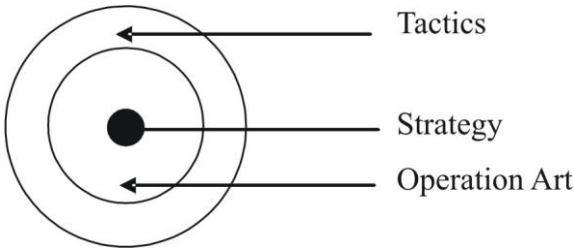

Fig. 23

For the issue to be really represented it becomes necessary to replace the scheme under discussion with other configurations.

Thus the following scheme (fig. 24) corresponds to the assessment logic of military art and nature and essence of modern warfare, which has been developed by the logic of set of numbers and their intersections.
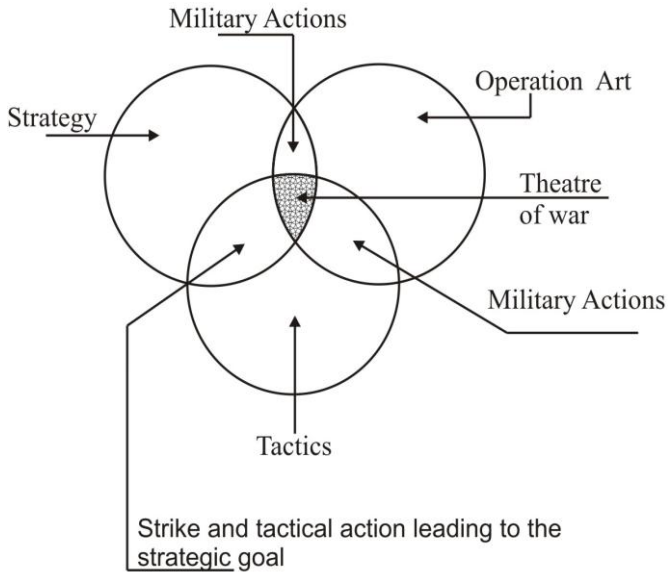
Fig. 24

Also, the following unified structural scheme of strategy, operation art and tactics (fig. 25) better reflects the reality:
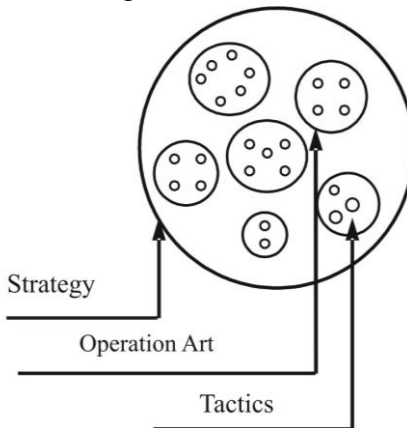

Fig. 25

The structure, configuration and content of the schemes represented here substantiate the conception which is becoming more convincing and according to which the most powerful state is faced with the problem of forming armed forces of a completely new model.

Nevertheless, the existing formulations of military science and art of war still need to be specified and functional bounds and tasks set to them need to be defined at least in future.

MATHEMATICAL MODELING OF MILITARY PLANNING SPACE

In either case, irrespective of which configuration of strategy, operation art and tactics is chosen, most important is the existence of a plan of military actions which is an instant manifestation of the continuous process of planning in accordance with the change of situation. Any phenomenon of art can achieve a goal and is of a higher grade to the extent it has assimilated theoretical and practical basics of science. One who has this issue was raised most boldly was Karl von Clausewitz.

As explained in the assessments of his works [4], the terms ART OF WAR and MILITARY SCIENCE were always used as indicative use of knowledge and skills only. At a later stage, so far it is quite difficult to create a scheme which could systematize the vast variety of the art and methods of conducting war, there is an irreconcilable conflict between theory and reality as such.

An especial motive of the creation of such opposition is that the major and acceptable factor for ART – the individual ability, potential and attitude or intuition of the fighters and commanders fails or finds with great difficulty an exact reflection in military scientific argumentations.

As early as in the beginning of the 1970-s, the English scientist John Jones tried to create a systematized, generalized methodology of engineering and artistic design and project analysis [5]. In his work, the author asks the question: what is designing - is it art, science or division of mathematics? And he answers:

It should be noted that planning should not be confused either with art, or with science or with mathematics.

Success in this complicated type of creativity can be achieved depending on the right combination of the mentioned three means of consciousness; the probability of achieving success is rather little by identification of planning to one of them. The basic difference is related with chronological relationships.

An artist or scientist deals with the physical world in the form it exists in the present, whereas a mathematician deals with abstract relations not depending on calendar dates time.

A planner is always obliged to regard only that existing in imaginary future as reality and seek for ways of realization of objects imagined in advance.

The cited position is highly important for determining the relationship between military art and military science. It can be said that boundaries must be drawn between military art and military science in the general fundamentals of military theory. However, this will not and cannot be a perfect scheme if they are adjacent fields and unless an absolutely original field of military cognition - military planning - is singled out as an individual group.

By such a scheme, military art cannot be a component of military science. Besides, the most important issues in military science which involve strategy, operation and tactical spaces and are called military art, are very often correctly defined by the term THEORY OF MILITARY ART.

The results of study of military science as well as propositions and conclusions, cannot be realized directly by military art without an intermediate layer.

Actually, this effect of non-equivalence and non-identity between a military science scenario and military art real scenarios appeared long ago in the works of military theorists'. However, their cognition was wrongly realized. Even Clausewitz gives his own assessment of the differences existing between military science and military art, though he does this without the existence of an additional spatial layer between them, i.e. on the basis of their mutually adjoining and mutually contacting effect. As an illustration of this let us refer again to the known assessments of Clausewitz's works [4]5 - Friction is the concept that most correctly approaches the difference existing between real war and that on paper.

The concept of FRICTION, which is another illustration of comprehensive search of analogies of mechanical processes in modeling of military processes by the author, refers to the losses of effects and purposeful results existing between the theory - level of the

military science and the results of its realization - level of military art.

However, if real intermediate layer is not introduced and activated between military science and military art, the question as to how a maximum effect of scientific basics of conducting warfare should be achieved by military art will remain answered. Right here an intermediate spatial layer - military planning emerges naturally (fig. 26).
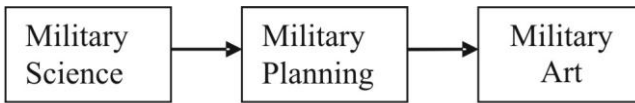
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┌──────────┐      ┌──────────┐      ┌──────────┐
│ Military │ ───▶ │ Military │ ───▶ │ Military │
│ Science  │      │ Planning │      │   Art    │
└──────────┘      └──────────┘      └──────────┘
```

Fig. 26

The purposeful function of military planning is creation of an action scenario in accordance with individual and collective intuition, experience, dispositions and, importantly, creative ability and their performing potential on the fundamentals of theoretical basics and methodology of military science, i.e. planning of operations with existing resources of the military art.

Military planning per se, as an intermediate layer and phase of processes, is original and carries its own futures, but its structure is complex and represents a synthesized space encompassing military science and military art.

Just this fact determines its intermediate position as a transitional intellectual space from military science to military art.

This property confers special importance on it. The parameters of military science as well as the resource of military art are invariable at every approaching instant of time and at every instant where the situation changes, while the choice or change of the plan in an earlier stage and planning of the actions for its realization is a dynamic process performed in the spatial layer of MILITARY PLANNING.

Earlier the well-known military theorist, Field-Marshal Helmut von Moltke painted to its differing significance but not to its separate

position between military science and military art in his definition planning is everything; plans are nothing.

The above discussed approach to systematization of the military processes into three stage groups by military science, military planning and military art gives many opportunities. Any plan developed on the basis of military science should be adapted to its possible changes with minimum limitations.

Thus, it is very important to develop a systematized model not only on the basis of theoretical discussion but of appropriate logic as will the, which reveals the structure of and spatial relationship between military science, military planning and military art.

In its model form, military art itself, as purposeful teaching of specific military fields, is a set of systematized elements designated by a corresponding symbol.

In the mentioned set, let us consider military science components as elements of the set - S_1, S_2---Sn. Thus, $s_1 \in S$, $s_2 \in S$.... $s_n \in S$.

Analysis of generalized principles and concrete plans of military actions and measures, their substantiation and working out questions requires use of other scientific fields in complex with military science.

At the same time, for the above mentioned purposes, in a number of cases it is necessary to take into account both existing and expected factors and circumstances arising without scientific systematization.

Thus, the scientific basics of predicting of processes and results of military forces confrontation and integration of the list of s_j elements as component elements of the set S of military science goes beyond.

By this approach, military science in its broader sense should be considered as $S_{general}$ set involving the S set, which contains its subsets in addition to the S set of military science.

Sets of systematized s_j elements and sets of non-systematized s_k elements may be considered as other component subsets of the mentioned set of military science.

The scientific fields subjected to systematization law in the process of study should be regarded as the Sj subsets of the systema-

tized elements. In addition, with respect to each m_j element of the systematized elements of the Sj subset, each s_i element of the military S set of science is in functional relationship in the following manner: $s_i=F(m_j)$. This implies systemic nature of their relationship which can be predicted by use of an appropriate methodology.

As to the subset S_k of non-systematized elements, with respect to each of its m_k element, each s_i element of the S set of military science is not in predictable and systemic relationship. This is the case when such realities, facts, circumstances, factors and expected events emerge whose calculation, prediction and substantiation at the given stage, are not subject to systematization appearing in the form of S_k subset elements in the S set of military science.

Military art also has a picture of the character and interrelationship between the components and their sets to. The position should be remembered that a difference should be made between military art and its theory. By its nature, military art is related many non-predictable and non-systematizable parameters, to which the attitude, daring of an individual or a group of individuals and their ability of decision-making and carrying it out is added in the objective and subjective list.

Just for this reason, in a number of cases the component sets are represented as non-systematized components in the general set - $S_{general}$ of military science.

As to the theoretical fundamentals of military art, it unambiguously represents the group of components directly entering the systematized components of military science and belonging to their S set.

Thus, separation of military art from military science is quite natural, with to modern military thought and the assessment of the stages of its evolutionary development fully accord. Therefore, in the given case the question concerns the definition of its form and essence a model of a set of components.

Military art is a set of non-systematizable or, in a number of cases, less systematizable, as well as systematizable components, designated by the symbol A. In accordance with the present logic, the

components of this set may be systematized ∂j elements and non-systematized ∂_k elements, respectively, $\partial_1 \in A$; $\partial_2 \in A$.... $\partial_1 \in A$.

Proceeding from reality, military art, irrespective of its realization by an individual or a group of individuals, is based on various fields of science, including branches military sphere, the components of which constitute an A_j subset of systematized ∂j elements of military art A set.

Among the subsystems, those groupings of military art components should be necessarily discussed that are non-predictable, non-systematizable, and, in certain cases, unexpected. These elements constitute the A_k subset of non-predictable ∂_k elements. Hence, A set which formed of military art elements, and its subsets -A_j and A_k taken together constitute the common area of military art, i.e. - common set A_{common}. In the same way as the set expressing the military science model, in the given case too A_i A_j and A_k, i.e A $\in A_{common}$, $A_j \in A_{common}$; $A_k \in A_{common}$ are the component sets of the A_{common} set.

In the space of the sets of military art, the relationship between the elements of subsets are also preserved, being of systematizable, predictable and non-systematizable, accidental nature.

Thus, on the basis of the sets, two spaces have been formed: common space of military science on the one hand, and common space of military art on the other. It is the condition of the two spaces, their properties, character and variability in time and, most importantly, lay-out with respect two each other cause establishment condition the planning of differing cognition space and action.

Planning in itself may exist in two conditions: under static conditions where no change takes place, or under dynamic conditions where a space of distinct nature is created in the form of planning in the process of variability.

Planning is also a multi-component function, being is a transformable set of elements - P set. This set is formed of systematizable and non-systematizable elements: $P_1, P_2....P_r$. The listed elements are by themselves components whose part is created or defined on scientific basics, both by theoretical and experimental methods, while a certain part of components are characterized by non-predictable un-

expectedness and dependence on an individual's characteristics, as well as many other factors.

The planning set has transformation stages which, in different cases, define whether the issue refers to a plan or planning.

The first stage involves the case where a plan is being drawn up or the drawn up plan does not change. This stage ranges from the drawing of a plan up to the starting of an operation and military actions. In this stage, both the plan and planning process are placed in a scientific space and it is based only on systematized logic. Thus at the initial stage, the P set of planning components is an addition to the common set - S_{common} of military science to the A_{common} set of military art.

At the second stage, where military operations start in accordance with a logically substantiated plan, the plan becomes a component of an armed confrontation, its realization and control components. Thus it is relocated in the entire model. It becomes an additional set to the military art components common set - A_{common} up to military science common set - S_{common}.

The first and second stages imply that the planning process is conducted on the basis of a systematized logic on the one hand, resulting in obtaining the objectively substantiated and systematized plan.

The third stage is of distinct nature, encompassing the reality when the plan must be changed or even drawn up before a military action begins or in the course of the latter, according to the obtaining non-predictable circumstances, when an individual's decisions based on professionalism, intuition, will and many other factors that might be conditioned by many objective and subjective changes come to the forefront.

In this case, decision is taken by an individual or group of individuals in the cognition process by interaction of two sets contained in a common space, resulting in the creation of components of completely different nature which constitute P set in the form of elements. At this moment, P set is an intersection of two sets - S_{common} and A_{common}, i.e.

$P = S_{common} \cap A_{common}$.

Thus the given model allows to account for the views and theories of many well-known military theorists and military leaders, which in a number of cases are contradictory for even a single author.

Two quotes can illustrate the confrontation of the views:

Nothing can be achieved in the war without calculation. That which was not carefully planned in advance will turn ineffectual. Napoleon – to Joseph Bonaparte, September 18, 1806 [6]12.

Armed conflicts may proceed absolutely independent by of theoretical combinations and gain truly dramatic nature; the main elements thereof are often personal features abilities, inspiration, and hundreds of other things. Antoin-Henry De Jomen [12].

In accordance with the worked out model, where military science, military art and military planning have been systematized, the represented positions do not negate each other inasmuch as each of them is rightful in its own space of spread these spaces being formed of special parameters.

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