SECTION 14.
PHYSICS AND MATHEMATICS

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MATHEMATICS ST, PROGRAMMING OPERATORS ST AND SOME EMPLOYMENT

There is a need to develop an instrumental mathematical base for new technologies. The task of the work is to develop new approaches for this through the introduction of new concepts and methods.

St - elements

Definition 1. The set of elements $\{a\} = (a_1, a_2, \ldots, a_n)$ at one point x of space X we shall call St – element, and such a point in space is called capacity of the St – element. We shall denote $St_x^{\{a\}}$.

Definition 2. An ordered set of elements at one point in space is called an ordered St – element.

It is possible to $St_x^{\{a\}}$ correspond to the set of elements $\{a\}$, and to the ordered St - element - a vector, a matrix, a tensor, a directed segment in the case when the totality of elements is understood as a set of elements in a segment.

It is allowed to add St – elements: $St_x^{\{a\}} + St_x^{\{b\}} = St_x^{\{a\}\cup\{b\}}$.

Self-capacity

Definition 3. The self-capacity A of the first type is the capacity containing itself as an element. Denote $S_1 f A$.

Definition 4. The self-capacity of the second type is the capacity that contains the program that allows it to be generated. Let's denote $S_2 f A$. An example of self-capacity of the first type is a self-set containing itself. An example of self-capacity of the second type is a living organism, since it contains a program: DNA, RNA.

Definition 5. Partial self-capacity of the third type is called self-capacity, which contains itself in part or contains a program that allows it to be generated partially. Let us denote $S_3 f$.

All capacities in self-space are self-capacities by definition. The self-capacities may to appear as St-capacities and usual capacities. In these cases there is used usual measure and topology methods.

Connection of St – elements with self-capacities.

For example, $Sf_{g\{R\}}^{\{R\}}$ is the self-capacity of the second type if $g\{R\}$ it is a program capable of generating $\{R\}$.

Consider a third type of self-capacity. For example, based on $St_{\mathrm{x}}^{\{\mathrm{a}\}}$, where $\{\mathrm{a}\} = (\mathrm{a}_1, \mathrm{a}_2, \dots, \mathrm{a}_n)$, i.e. n - elements at one point, it is possible to consider the self-capacity $S_3 f$ with m elements and from {a}, at m<n, which is formed by the form:

$$w_{mn}=(m,(n,1)) \quad (1)$$

that is, only m elements are located in the structure $St_{\mathrm{x}}^{\{\mathrm{a}\}}$.

Self-capacities of the third type can be formed for any other structure, not necessarily St, only through the obligatory reduction in the number of elements in the structure. In particular, using the form

$$w_{m_1 \cdots m_n} = (m_1, (m_2, (\dots (m_n, 1) \dots))) \quad (2)$$

Structures more complex than $S_3 f$ can be introduced.

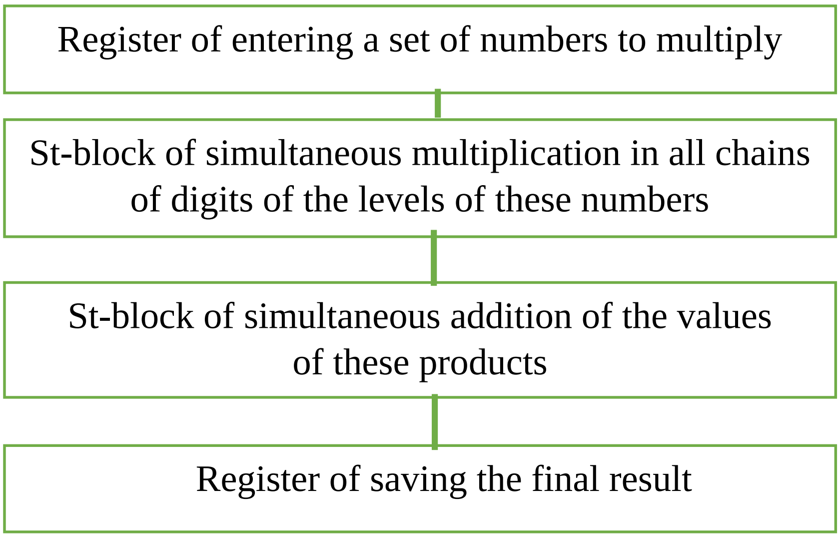
Mathematics itself

Consider first the arithmetic of St:

1. Simultaneous addition of a set of elements $\{\mathrm{a}\} = (\mathrm{a}_1, \mathrm{a}_2, \dots, \mathrm{a}_n)$ are realized by $St_{\mathrm{x}}^{\{\mathrm{a}+\}}$.
2. By analogy, for simultaneous multiplication: $St_{\mathrm{x}}^{\{a*\}}$: enter the notation of the set B with elements $b_{i_1 i_2 \dots i_n} = (St_x^{\{a_{1_{i_1}} *, a_{2_{i_2}} *, \dots, a_{n_{i_n}}\}})_R$ for any $\{i_1, i_2, \dots, i_n\}$ without repetitions, $x = St_a^{\{multiplication\ table\}}$, R= $St_a^{\{i_1+, i_2+, \dots, i_n\}}$, R is the index of the lower discharge (we choose an index on the scale of discharges):

index	discharge
n	n
…	…
1	1
,	0
-1	1st digit to the right of the point
-2	2nd digit to the right of the point
...	...

Then $St_{\mathrm{x}}^{\{B+\}}$ gives the final result of simultaneous multiplication. Any system of calculus can be chosen, in particular binary. The simplest functional scheme of the assumed arithmetic-logical device for St-multiplication:



1. Similarly for simultaneous execution of various operations: $St_x^{\{aq\}}$, where $\{q\} = (q_1, q_2, \dots, q_n)$. q_i an operation, i = 1,…,n.
2. Similarly, for the simultaneous execution of various operators: $St_x^{\{Fa\}}$, where $\{F\} = (F_1, F_2, \dots, F_n)$. F_i is an operator, i = 1,…,n.

3. The arithmetic itself for self-capacities will be similar: addition - $S_1 f^{\{a+\}}$, (or $S_3 f_x^{\{a+\}}$ for the third type), multiplication $S_1 f^{\{a*\}}$, ($S_3 f_x^{\{a*\}}$).

4. Similarly with different operations: $S_1 f^{\{aq\}}$, ($S_3 f_x^{\{aq\}}$), and with different operators: $S_1 f^{\{Fa\}}$, ($S_3 f_x^{\{Fa\}}$).

5. $St_B^A -$ is the result of the holding operator action. For sets A, B we have

6. $St_B^A = \{A \cup B - A \cap B\ , D\}$, where D is self-set for $A \cap B$. There is the same for structures if it\`s considereds as sets.

7. St-derivative of f(x_1,,x_2,…,x_n) is $\mathrm{St}_{\mathrm{f}(x_1,,x_2,\dots,x_n)}^{\left\{\frac{\partial}{\partial x_{1_i}},\frac{\partial}{\partial x_{2_i}},\dots,\frac{\partial}{\partial x_{k_i}}\right\}}$, where x=($x_{1_i}, x_{2_i}, \dots x_{k_i}$)- any set from ($x_1$,,$x_2$,…,$x_n$). Let's designate St-$\frac{\partial^k f(x)}{\partial x_{1_i} \partial x_{2_i} \dots \partial x_{k_i}}$. St-integral of f($x_1$,,$x_2$,…,$x_n$) is $\mathrm{St}_{\mathrm{f}(x_1,,x_2,\dots,x_n)}^{\left\{\int()dx_{1_i},\int()dx_{2_i},\dots,\int()dx_{k_i}\right\}}$, where ($x_{1_i}, x_{2_i}, \dots x_{k_i}$)- any set from ($x_1$,,$x_2$,…,$x_n$). Let's designate St-∫…∫ $f(x) dx_{1_i} dx_{2_i} \dots dx_{k_i}$-k-multiple integral. St-lim of f(x_1,,x_2,…,x_n) is $\mathrm{St}_{\mathrm{f}(x_1,,x_2,\dots,x_n)}^{\left\{\lim\limits_{x_{1_i}\to a_{1_i}},\lim\limits_{x_{2_i}\to a_{2_i}},\dots,\lim\limits_{x_{k_i}\to a_{k_i}}\right\}}$.

Let's designate St-$\lim\limits_{\substack{x_{1_i} \to a_{1_i} \\ \cdot \quad \cdot \quad \cdot \\ x_{k_i} \to a_{k_i}}} f(x_1,, x_2, \dots, x_n)$. Self-$\lim\limits_{x\to a} = St_{\lim\limits_{x\to a}}^{\lim\limits_{x\to a}}$.

8. In the case a self- derivate are obtained inclusions of multiple derivates. There are the same for self-integrals: there are obtained inclusions of multiple integrals.

9. Let's denote self-(self-Q) through self^2-Q , fS(n,Q)= self-(self-(…(self-Q))) = self^n-Q for n-multiple self.

Operator itself.

Definition: An operator that transforms $St_x^{\{a\}}$ into any $S_i f_{\mathrm{x}}^{\{b\}} = 2{,}3\ ;$ where$\{b\} \subset \{a\}$; is the operator itself.

Example. The operator includes the set itself.

Lim-itself.

1. Lim St

For example, the double limit $\lim\limits_{\substack{x\to a1 \\ y\to a2}} G(x,y)$ corresponds to $\mathrm{St}_{(\mathrm{a}_1\mathrm{a}_2)}^{\{G(x,y)\}}$:

Similarly for itself limit with n variables.

In the case of lim-itself, for example, for m variables, it is sufficient to use the form (1) of lim St, for n variables (n>m). Similarly, for integrals of variables m (for example, a double integral over a rectangular region, through a double lim).

The sequence of actions you can "collapse" into an ordered St element, and then translate it, for example, to $S_3 f$ capacity. As an example, you can take the receipt $\frac{\partial^2 u}{\partial x^2}$. Here is the sequence of steps 1)$\frac{\partial u}{\partial x}$→ 2) $\frac{\partial}{\partial x}(\frac{\partial u}{\partial x})$. "collapses" into ordered $St_x^{\{\frac{\partial u}{\partial x},\frac{\partial}{\partial x}(\frac{\partial u}{\partial x})\}}$, ones that can be translated into the corresponding $S_1 f$. The differential operator $St_x^{\{\frac{\partial}{\partial x},\frac{\partial}{\partial x}(\frac{\partial}{\partial x})\}}$ itself is also interesting.

Remark. We can consider the concept of St - element as St_B^A, where A fits in capacity B. Then St_B^B it will mean S_1f B. Let's denote St_B^B through L(B). The rule of 2d: L(L(B))→2L(B).

About St and S_3f programming

The ideology of St and S_3 can be used for programming. Here are some of the St programming operators.

1. Simultaneous assignment of the constants $\{p\} = (p_1, p_2, \dots, p_n)$ to the variables $\{\mathrm{a}\} = (\mathrm{a}_1, \mathrm{a}_2, \dots, \mathrm{a}_n)$. Implemented through $St_{\mathrm{x}}^{\{\{\mathrm{a}\}:\{p\}\}}$.

2. Simultaneous check the set of conditions $\{f\} = (f_1, f_{2,}, \ldots, f_n)$ for a set of expressions $\{B\} = (B_1, B_{2,}, \ldots, B_n)$. It is implemented through $St_x^{IF\{\{B\}\{f\}\}\ then\ Q}$ where Q can be any.

3. Similarly for loop operators and others.

$S_3 f$– software operators will differ only in that aggregates {a}, $\{p\}, \{B\}, \{f\}$ will be formed from corresponding St program operators in form (1) for more complex operators in form (2).

Quite interesting is the OS (operating system), the principles and modes of operation of the computer for this programming. But this is already the material of the next articles.

Using elements of the mathematics of St[1], we introduce the concept of St – the change in physical quantity B: $St_x^{\{\Delta_1 B, \ldots, \Delta_n B\}}$. Then the mean St - velocity will be $v_{cpst}(t, \Delta t)$ =, $St_x^{\left\{\frac{\Delta_1 B}{\Delta t}, \ldots, \frac{\Delta_n B}{\Delta t}\right\}}$ and St is the velocity at time t: $v_{st} = \lim_{\Delta t \to 0} v_{cpst}(t, \Delta t)$. St – acceleration $a_{st} = \frac{dv_{st}}{dt}$.

In normal use, simply St_x reduce to result a sum at point x of space, and when using St_x with "target weights", we get, depending on the "target weights", one or another modification, namely, for example, the velocity v_{st}^f (with a "target weight" f) in the case when two velocities v_1, v_2 are involved in the set $\{v_1 f, v_2\}$ for $v_{st}^f = St_x^{\{v_1 f, v_2\}}$, f – instantaneous replacement we get an instantaneous substitution $v_1 by\ v_2$ at point x of space at time t_0.

Consider, in particular, some examples: 1) $St_{\{x_1, x_2\}}^e$ describes the presence of the same electron e at two different points x_1, x_2. 2) The nuclei of atoms can be considered as St elements.

Similarly, the concepts of St - force, St - energy are introduced. For example, $E_{st}^f = St_x^{\{E_1 f, E_2\}}$ it would mean the instantaneous replacement of energy E_1 by E_2 at time t_0. Two aspects of St– energy should be distinguished: 1) carrying out the desired "target weight". 2) the fixing result of it. Do not confuse energy - St (this is the node of energies) with St – energy that generates the node of energies, usually with the "target weights". In the case of ordinary energies, the energy node is carried out automatically.

Remark. In fact, St – elements are all ordinary, but with "target weights" they become peculiar. Here you need the necessary kind of energy to perform them. As a rule, this energy lies in the region itself. This is natural, since it is much easier to control the elements of the k level by the elements of the more highly structured k +1 level.

Consider the concepts of self-capacity of physical objects. Similar to the concepts of publication: the self-capacity of the first type contains itself, the second type contains a program (like DNA) capable of generating it, the third type - partially containing itself or a program capable of generating it, or both. The question arises about the self-energy of the object. In particular, according to the results of the publication[2]: «St_B^B will mean S_1f B.» In particular, it allows you to determine the self-energy of DNA through St_{DNA}^{DNA}, St_Q^Q - self-energy Q. The law of self-energy conservation acts on the level of self-energy already. Also, in addition to self-capacities, you can consider the types of self-holding: the first type is containment in itself, the second type is the containment of oneself potentially, for example, in the form of programming oneself, the third type is partial accommodation in oneself. For example: self-operator, self-action, whirlwind. It is as a result of self-holding that self-capacity can be formed.

Let's clarify the concept of the term self-capacity: this is the capacity that contains itself potentially. Consider self-Q, where Q may be any, including Q=self, in particular it may be any action. Therefore self-Q is self-made Q, it does itself. There is a partial self-Q for any Q with partial made itself. Consider some examples for self-capacity: ordinary lightning, electric arc discharge, ball lightning.

A self-search of the solution of the equations $f_i(x)=0$, where i=1,2,…,n, $x=(x_1, x_2, \ldots, x_n)$, will be realized in $St_a^{\{f_1(x)=0?x, f_2(x)=0?x, \ldots, f_n(x)=0?x\}}$ or $St_{?x}^{\{f_1(x)=0, f_2(x)=0, \ldots, f_n(x)=0\}}$. The same for $St_{?x}^{\{tasks(x)\}}.St_{(o,x)}^{\{t\}}$, where $\{t\}$- time points set, (o, x)- object in point x from space X, give to enter in necessary time moments. The same for $St_o^{\{t\}}.St_\alpha^{\{God-father, God-son, Holy\ Spirit\}}$ is Three concept representation, where α- point in connectedness space.

Based on the elements of St – physics and special neural networks with artificial neurons operating in normal and St – modes, a model of a helicopter without a main and tail rotors was developed. Let's denote this model through Smnst. To do this, it is proposed to use artificial neurons of type St (designation - mnSt) of different levels, for example, for the usual mode, mnSt serves for the initial processing of signals and the transfer of information to the second level, etc. to the nodal center, then checked and in case of anomaly - local St – mode with the desired "target weight" is realized in this section, etc. to the center. Here, in case of anomaly during the test, Smnst is activated with the desired "target weight". Here are realized other tasks also.

In the capacity of form potentiality in self-capacity it is possible to take a program if one is present or St – structure. In the same way St – structure of needed «target weight» are taken in target block at St – activation of the networks. It is used an alternating current of above high frequently and ultra-violet light, which are able to work with St – structures in St – modes by it`s nature for an activation of the networks or some of it`s parts in St – modes and at local using St – mode. Above high frequently alternating current go through mercury bearers that overheating does not occur. The power of the alternating current of above high frequently increase considerably for target block. The activation of all network is realized to indicative "target weights".

To reach the self-energy level, the mode $St_{\text{Smnst}}^{\text{Smnst}}$ is used. In normal mode, it is planned to carry out the movement of Smnst on jet propulsion with the conversion of the energy of the emitted gases into a vortex, to obtain additional thrust upwards. For this purpose, a spiral-shaped chute (with "pockets") is arranged at the bottom of the Smnst for the gases emitted by the jet engine, which first exit through a straight chute connected to the spiral one. There is a drainage of exhaust gases outside the Smnst. Otherwise, Smnst is represented by a neural network that extends from the center of one of the main clusters of St - artificial neurons to the shell, turning on into the shell itself. Above the operator's cabin is the central core of the neural network and the target block, which is responsible for performing the "target weights" and auxiliary blocks, the functions and roles of which we will discuss further. Next is the space for the movement of the local vortex. The unit responsible for Smnst's actions is located below the operators' cab. In St – mode the entire network or its sections are St – activated to perform certain tasks, in particular, with "target weights". Unfortunately, triodes are not suitable for st -neural network. In the most primitive case usual separaters with corresponding resistances may be used instead triodes since there is not necessity in the unbending of the alternating current to direct. The belt of St-memory operative is disposed around central core of Smnt. There are St-coding, St-realize of St- programs, the programs from the archives without extraction it's.

Remark. The concept of elements of physics St is introduced for energy space. The corresponding concept of elements of chemistry St is introduced accordingly. Examples: 1) $StE_{\text{D}}^{\{a_1\text{q},a_2\}}$ – the energy of instantaneous substitution and a_1 by a_2, where a_1, and$_2$ are chemical elements, q is instant replacement. Similarly, one can consider for the node of chemical reactions $St_{reaction}^{\{chemical\ elements\ with\ "target\ weights"\}}$. The periodic table itself can also be thought of as the St – element: $St_{Mendeleev\ table}^{\{list\ of\ chemical\ elements\}}$ The ideology of St elements allows us to go to the border of the world familiar to us, which allows us to act more effectively.

Conclusions: New concepts and new processing methods of information based on them and new software operators were introduced. Further development is associated with changing the structure of the arithmetic-logical device, the corresponding software and application for new technologies, in the light of the new approach.

References:

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