Philosophical Approach to the Resolution of the Sixth Millennium Prize Problem

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There is reason to assume that the basic idea of the Cartesian coordinate system was introduced from the very beginning so that algebraic and arithmetic equations were chosen for the results that would serve as the basis for the theory of thought. It is also well known that further, on this basis, these equations functioned to solve problems in other special branches of science. Therefore, based on these facts, a new approach was developed to interpret the philosophical essence of all the most important equations of theoretical and experiential physics, including the Navier-Stokes equations. After obtaining new results, it became possible to satisfactorily resolve the sixth Millennium Prize Problem.

Keywords: philosophical method, Navier-Stokes equation, nonalgebraic method, algebraic method.

§ 1. On the fundamental ideas of the Cartesian method of philosophical world cognition

As known, the present fundamentals of both mathematics and physics are in deep crisis. It became especially obvious from the beginning of the 80s of the XX century when M. Kline's book “Mathematics. Loss of certainty” was published. The crisis in the fundamentals of physics is because physicists have not been able to satisfactorily complete the development of the foundations of theoretical physics based on the possibility of the fundamental ideas of quantum mechanics and the theory of relativity. So finally, they were forced to look for salvage ideas in a new field, which is string theory. I want to note, when all this became known to me, I began to think about the reasons due to which all this happened. Soon after I learned that once R. Feynman wrote in his book "The Joy of Cognition": "The next great era of the awakening of the human intellect can create a method for understanding the qualitative content of equations", it seemed to me that the main reason for all this could be facts confirming that we still do not quite correctly understand

the philosophical nature of the equations that we use,

within the framework of the capabilities of mathematics and physics.

Here, speaking about the philosophical nature of equations, I mean the following. When people usually talk about the main problem of philosophy, they mean the need to reveal the deep

relationship of cause and effect, (2)

as well as

the relationship between subject and (3)

So that is why I began to feel that, until now, based on the possibility of the equations that we use within the framework of the available versions of

the mathematical theory of cognition, (4)

these problems have not yet been satisfactorily solved. For example, based on the possibility of the equations that we use within the framework of the available options (4), it is possible to take into account the number of objects under study, but it is not possible to correctly consider their nature. Therefore, I believe that there is an urgent need to fill these gaps.

Of course, my goal was to find out whether I am really starting to correctly understand the essence of the above problem. Therefore, I began to study literature in the field of philosophy, after which I realized the following idea. Namely, that Descartes began to develop the fundamental ideas of his philosophy in such a way that enabled satisfactorily solving a problem of this kind. For this, he began to use the ideas of

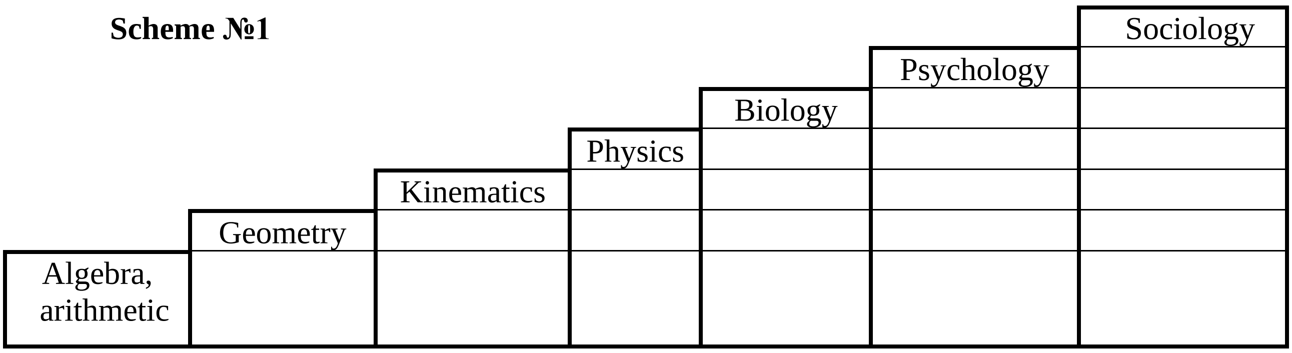
the Cartesian coordinate system (5)

in such a way that, on their basis, it became possible to correctly consider the role of a human subject in the study of various objects. Moreover, making such a step, he realized that natural numbers are the product of the interaction of a human subject with the surrounding reality, i.e. with objects. Further, starting to realize his goal, he noticed that all the particular sections of science are interconnected. It seemed to him that the time would come when

the golden pool of the intellectual accomplishment of mankind (6)

could be systematized or combined in a way roughly presented in Scheme No. 1:

Scheme №1



The essence of the ideas that were taken into account when constructing this scheme is contained in the rules outlined in his books [1-3]. For example, rule number 1 embraces thoughts of the following content:

> ... for if all knowledge as a whole is nothing more than human wisdom, which remains always the same, no matter how diverse are the objects to which it is applied, and if this diversity is of no more importance to it than diversity the bodies illuminated to the sun, then there is no need to put any boundaries to the human mind. (7)

One must think that all sciences are so interconnected that it is easier to study them all at once, rather than any one of them separately from all the others. Consequently, one who seriously strives for the knowledge of the truth should not choose any one science - for they are all interconnected and dependent on one another - but should only care about increasing the natural light of reason.	(8)

§ 2. On the most important equations obtained by applying the possibility of the Cartesian method of philosophical knowledge in order to solve specific problems

I want to note that after realizing all these truths, for some reason it began to seem to me that the key to everything, i.e. to understanding why the foundations of mathematics and physics are currently in deep crisis, is contained in the fundamental ideas developed by Descartes.

It seems to me that the structural feature of Scheme No. 1 naturally determines and illuminates the way of truth, along which the basis of the mathematical theory of cognition has been developed since the time of Descartes. Therefore, I began to jointly analyze the fundamental ideas taken into account when constructing scheme No. 1 and the results obtained since the time of Descartes in the basis of particular sections of science. Thus, I tried to find out which of the results that form the basis of the mathematical theory of cognition were developed along the way of truth, and which were obtained along the wrong way. At the same time, carrying out the analysis, which covers the ideas and results obtained in the time interval from Descartes to Newton, I realized that such results can be systematized in the form of scheme number 2:

Scheme №2

			$\vec{F} = m\frac{d^2r}{dt^2}$ (12)
		Algebraic kinematics, Arithmetical kinematics (11)	
	Algebraic geometry, Arithmetical geometry (10)		
Algebraic equations, Arithmetical equations (9)			

Of course, when constructing this scheme, the fact was taken into account that as the nature of the objects under study becomes more complex, the nature of

a) algebraic equations, **b) arithmetic equations,**	(9)

which from the very beginning Descartes took as results capable of satisfactorily fulfilling the role of

the basis of the theory of thought.	(13)

correspondingly complicates.

In my opinion, with this approach to the development of the basis of the mathematical theory of cognition, further, the main essence of the problem will be reduced to the interpretation of the philosophical nature of the results obtained in

algebraic geometry, **arithmetic geometry;**	(10)
algebraic kinematics, **arithmetic kinematics;**	(11)
algebraic physics, **arithmetic physics,**	(14)

provided of course, the satisfactorily solving

the differential equations,	(15)

obtained for

a) the 1st geometric point, **b) the 1st kinematic point,** **c) the 1st physical particle.**	(16)

Attention should be paid to the fact that after Newton obtained equation (12) for one physical particle, a period began when mathematicians tried to solve this equation for:

α)) set of orderly moving particles;

β) set of randomly moving particles.

Scheme №3

			$\vec{F} = m\dfrac{d^2 r}{dt^2}$ (12)
		Algebraic kinematics, Arithmetical kinematics. (11)	$\dfrac{\partial^2 u}{\partial t^2} - a^2 \dfrac{\partial^2 u}{\partial x^2} = 0,$ ………………… $\dfrac{\partial^2 u}{\partial t^2} - a^2 \Delta u = 0$
	Algebraic geometry, Arithmetical geometry (10)		$\Delta u = 0$
Algebraic equations, Arithmetical equation (9)			u( ) = (17 a,b,c)

Scheme №4

			$\vec{F} = m\dfrac{d^2 r}{dt^2}$ (12)
		Algebraic kinematics, Arithmetical kinematics. (11)	$\dfrac{\partial u}{\partial t} - a^2 \dfrac{\partial^2 u}{\partial x^2} = 0,$ ………………… $\dfrac{\partial u}{\partial t} - a^2 \Delta u = 0$
	Algebraic geometry, Arithmetical geometry (10)		$\Delta u = 0$
Algebraic equations, Arithmetical equations(9)			u( ) = (18 a,b,c)

Then I realized, that the results obtained in the development of the foundations of mathematical physics can be systematized in the form of schemes No. 3 and No. 4 (given above), where (17, a) and (18, a) are the basic hyperbolic and parabolic equations, which have the meaning of solutions obtained with the accuracy inherent in algebraic physics.

And then I began to understand that in the field of theoretical hydrodynamics and electrodynamics, results were obtained that can be illustrated using schemes No. 5 and No. 6:

Scheme №5

			$\vec{F} = m\frac{d^2r}{dt^2}$ (12)
		Algebr. kinematics, Arithm. kinematics. (11)	$\frac{\partial \bar{v}}{\partial t} + (\bar{v}\nabla)\bar{v} = -\frac{1}{\rho}\nabla p + \eta\Delta\bar{v}$ (19)
	Algebr. geometry, Arithm. geometry (10)		
Algebr. equations, Arithm. equations (9)			

Scheme №6

			$\vec{F} = m\frac{d^2r}{dt^2}$ (12)
		Algebr. kinematics, Arithm. kinematics. (11)	$\nabla^2\vec{E} - \frac{1}{c^2}\frac{\partial^2\vec{E}}{\partial t^2} = 0,$ $\nabla^2\vec{H} - \frac{1}{c^2}\frac{\partial^2\vec{H}}{\partial t^2} = 0,$ (20)
	Algebr. geometry, Arithm. geometry (10)		
Algebr. equations, Arithm. equations (9)			

where the basic equations of classical hydrodynamics and electrodynamics (19) and (20) are also equations that have the meaning of solutions obtained with the accuracy inherent in algebraic physics.

During the study, I was able to understand that after the transformation and generalization of Newton's equation (12), the main Hamilton equation in classical dynamics (12′) was obtained, which enabled construction Scheme No. 7, which is some analog and generalization of the results, considered in scheme No. 2:

Scheme №7

			$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i}$ (12′)
		Algebraic kinematics, Arithmetical kinematics (11)	
	Algebraic geometry, Arithmetical geometry (10)		
Algebraic equations, Arithmetical equations (9)			

Further, I realized that on the path where the goal is to solve equation (12′) for α and β, the basic equations of classical statistical mechanics were obtained in the Hamilton-Jacobi-Schrödinger version (21, a, b, c) and Gibbs (22, a, b, c, d), as a result of which it became possible to systematize such results in the form of schemes No. 8 and No. 9:

Scheme №8			$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i}$ (12′)
		Algebr. kinematics, Arithm. kinematics. (11)	à) $\frac{\partial S}{\partial t} + H\left(q_i, \frac{\partial S}{\partial q}, t\right) = 0$
	Algebr. geometry, Arithm. geometry (10)		á) $H\left(q_i, \frac{\partial S}{\partial q}\right) = E,$ в) $\Delta\psi + \frac{8\pi^2 m}{\hbar^2}(E - V)\psi = 0$ (21,a,b,c)
Algebr. equations, Arithm. equations (9)			(21,d)

Scheme №9			$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i}$ (12′)
		Algebr. kinematics, Arithm. kinematics. (11)	à) $\frac{\partial \rho}{\partial t} - [H\rho] = 0,$
	Algebr. geometry, Arithm. geometry (10)		á) $[H\rho] = 0,$ â) $\rho_i = \exp\frac{F - \varepsilon_i}{kT},$ ã) $\rho_{i,n} = \exp\frac{\Phi + \mu n - \varepsilon_i}{kT}$ (22, a,b,c,d)
Algebr. equations, Arithm. equations (9)			(22,e)

where equations (21, a, b, c) and (22, a, b, c, d) are equations that have the meaning of solutions obtained with the accuracy inherent in algebraic physics.

I also understood that the basic equations of quantum dynamics were simultaneously obtained, which were taken into account in schemes No. 10 and No. 11 (given below):

Scheme №10

			$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i}$ (12′)
		Algebr. kinematics, Arithm. kinematics. (11)	$i\hbar \frac{\partial \psi}{\partial t} - H\psi = 0$ (23)
	Algebr. geometry, Arithm. geometry (10)		
Algebr. equations, Arithm. equations (9)			

Scheme №11

			$\dot{q}_i = \frac{\partial H}{\partial p_i}, \quad \dot{p}_i = -\frac{\partial H}{\partial q_i}$ (12′)
		Algebr. kinematics, Arithm. kinematics. (11)	$\left.\begin{array}{l} \dot{\boldsymbol{q}}_k = \frac{\partial \boldsymbol{H}}{\partial \boldsymbol{p}_k}, \quad \dot{\boldsymbol{p}}_k = -\frac{\partial \boldsymbol{H}}{\partial \boldsymbol{q}_k}, \\ \boldsymbol{q}_k \boldsymbol{q}_s - \boldsymbol{q}_s \boldsymbol{q}_k = 0, \\ \boldsymbol{p}_k \boldsymbol{p}_s - \boldsymbol{p}_s \boldsymbol{p}_k = 0, \\ \boldsymbol{p}_k \boldsymbol{q}_s - \boldsymbol{q}_s \boldsymbol{p}_k = \frac{\hbar}{\iota} \delta_{ks}, \end{array}\right\}$ (24)
	Algebr. geometry, Arithm. geometry (10)		
Algebr. equations, Arithm. equations (9)			

§ 3. About the basic equations that were obtained by mathematicians and physicists when they went astray

It is known, that Descartes from the very beginning pointed out the need to develop the basis of the mathematical theory of cognition, using only the possibilities of

the algebraic method, (25)

i.e. by this he meant, that when developing the basis of the mathematical theory of cognition it is advisable to solve only such problems, a satisfactory solution of which can be obtained within the framework of the possibility (25).

Of course, there are grounds to assume that his idea of solving only selected problems is a consequence of the fact that, when developing the basis of his project program, he believed that only equations (9) could satisfactorily form the basis of the theory of thought. Considering this fact, I realized that in the future the possibilities of the ideas contained in Descartes's assumption in the analysis of the above results can be used as Occam's razor, stating: "do not increase the essence unnecessarily."

Interestingly, in reliance on the possibilities of these ideas, I managed to realize the following truths. Namely, in further analysis, it will be possible to cancel all the ideas and results that were obtained in the basis of the mathematical theory of cognition since the main results of mathematical physics began to be considered fundamental. In other words, we mean the results included in schemes No. 3 and No. 4. Naturally, such a step is only possible considering the fact that in due time, when deriving equation (17) from Newton's equation (12), it was manageable to use the capabilities of the algebraic method. However, when obtaining equation (18), the possibilities of equation (12) could not be used. In the past, mathematicians obtained equation (18) using the possibilities of some relations that have only experiential accuracy. Therefore, there is reason to believe that they obtained this equation with the accuracy inherent in the non-algebraic method.

In my opinion, to abandon all the results obtained in the basis of mathematics, since the time of obtaining the results considered in schemes No. 3 and No. 4, it is necessary to point out the following facts. As is known, in due time, after obtaining solutions (17, c) and (18, c), mathematicians had to deal with the analysis of various kinds of pathological functions. It should be noted that all this was a consequence of the fact that the main results of mathematical physics were obtained using the capabilities of the non-algebraic method as well.

It is also well known, that due to these reasons mathematicians in their attempts to interpret the philosophical nature of equations (17, a, b), (18, a, b) and solutions (17, c), (18, c) could not use the possibilities of

the calculation method	(26)

as a

fundamental method of reasoning,	(27)

although previously when obtaining all their results they relied on the possibilities of this method. It is also known, for example, that those mathematicians, who obtained the results that form the content of

the theory of real numbers	(28)

and later

Canter's theory of sets,	(29)

now needed to use the capabilities of

the axiom method	(30)

for (27).

Obviously, there is every reason to suppose that this fact can be considered as one of the main reasons that down the line mathematicians, in conducting their analyses, used the capabilities of the non-algebraic method. There is still a reason to assume that the reasons, why during this period the basis of the mathematical theory of cognition began to be developed along the wrong way, can be attributed to the fact that Bolzano and Cauchy, in their analysis-based reforms emphasized the direct connection of their ideas to the ideas of the theory of relations of Eudox, which from the very beginning were developed as an alternative to the algebraic method.

Now I will try to outline in general terms how I managed to use the power of the algebraic method as Occam's razor to abandon the basic ideas and equations of quantum dynamics since they have no ability to form the basis for a satisfactory development of the mathematical theory of cognition fundamentals. I would like to note that when solving problems of this kind, I proceeded from the analysis of ideas that were put forward by Einstein and the founders of quantum dynamics in the course of a dispute over a problem commonly known as the "Copenhagen interpretation".

If the founders of quantum dynamics defended the need to use the capabilities of equations (23), (24) when developing the foundations of quantum physics, Einstein pointed out the need to use the capabilities of the basic equations of classical statistical mechanics in the version of the Hamilton-Jacobi-Schrödinger (21) and Gibbs (22). The main gist of the ideas that Einstein had in mind is contained in the following lines:

> Trying to defend the thesis that statistical quantum theory can, in principle, give a complete description of individual physical systems, we arrive at highly implausible theoretical concepts. On the other hand, the above-mentioned difficulties in interpreting the theory disappear if the quantum-theoretical description is considered as a description of ensembles of systems. More carefully, the same could be formulated as follows. (31,а) Trying to view the quantum-theoretical description as a complete description of individual systems, we arrive at an unnatural interpretation of the theory. If we accept the point of view according to which such a description refers to an ensemble of systems, and not to individual systems, then the need for such unnatural interpretations disappears. In this case, all the noise raised to avoid "physical reality" becomes redundant. There is, however, a simple psychological reason why this almost obvious interpretation has not yet been taken into account.
>
> (31,б) The point is that if the statistical quantum theory does not set itself the task of a complete description of an individual system (and its development in time), then such a description, obviously, has to be sought elsewhere.
>
> (31,в) At the same time, from the very beginning, it is necessary to realize clearly that the elements of a complete description are not contained among the fundamental ideas of statistical quantum theory. (31,г) Hence it follows that these ideas, in principle, cannot serve as the basis for all theoretical physics as a whole.
>
> (31,д) In future physics (provided that attempts to construct a complete description of a physical system are crowned with success), the statistical quantum theory will occupy approximately the same position as that of statistical mechanics in the framework of classical mechanics. I am firmly convinced that the development of theoretical physics will proceed in this way, but its path will be long and difficult.
>
> (31)

This he wrote in 1949 in an article [4] entitled "Notes on the Articles". But it is easy to see that Einstein, who owns the thoughts contained in these lines, although he does not speak about it openly, nevertheless believes that the basic equations of quantum dynamics were obtained along the wrong path. He considered (21) and (22) to be the true equation that could be used in developing the basis of the mathematical theory of cognition. Note, I also believe that equations (23) and (24) have nothing to do with the path of truth. But I came to this conclusion, bearing in mind that these equations were obtained in this way when the capabilities of the non-algebraic method were taken as a basis, because non-commutative algebra, the capabilities of which were taken as a basis, when developing the basis of matrix mechanics, is one of the varieties of the non-algebraic method.

§ 4. On the basic equation of the mathematical method of cognition, obtained on path of truth

As mentioned above, the most important mathematical theory of cognition equations, which began to be obtained directly along the path of truth, at a time when the possibilities of equation (12) were taken as the basis for solving specific problems, are the equations that were obtained in the field of hydrodynamics and electrodynamics. These are equations (19) and (20), which were taken into account in schemes No. 5 and No. 6. Later, equations (21) and (22) were obtained as a result of solving the canonical Hamilton equation (12′), considered in schemes No. 8 and No. 9.

As indicated in [5], there is a deep analogy between the basic equations of hydrodynamics (19) and electrodynamics (20), as well as the solutions that were further derived from them. I tried to take this fact into account in the scheme below

$\frac{\partial \bar{v}}{\partial t} + (\bar{v}\nabla)\bar{v} = -\frac{1}{\rho}\nabla p + \eta\Delta\bar{v}$ (19)	$\nabla^2\vec{E} - \frac{1}{c^2}\frac{\partial^2\vec{E}}{\partial t^2} = 0,$ $\nabla^2\vec{H} - \frac{1}{c^2}\frac{\partial^2\vec{H}}{\partial t^2} = 0,$ (20)
$Q = \frac{\pi R^4}{8\mu e}(p_1 - p_2),$ (19,a)	$\rho_\nu = \frac{8\pi\nu^2}{c^3}\cdot\bar{u},$ (20,a)
(19,b)	$\bar{u} = \frac{\varepsilon}{\exp\frac{\varepsilon}{kT} - 1},$ (20,b)
(19,c)	$\rho_\nu = \frac{8\pi\nu^2}{c^3}\cdot\frac{h\nu}{\exp\frac{h\nu}{kT} - 1}.$ (20,c)

As you know, at one time Planck, when obtaining solutions (20, a) and (20, b) and further (20, c), took advantage of the possibilities of some hypothetical assumptions, and thus, based on the possibility (20, c), he was able to satisfactorily describe the experimental data. In my opinion, there is every reason to understand the nature of equation (20, c) as the basic equation of some hypothetical version of quantum electrodynamics. Therefore, given that there is an analogy between the basic equations (19) and (20), as well as between (19, a) and (20, a), there is reason to assume that for a satisfactory development of the foundations of theoretical hydrodynamics along this path, the results are still to be obtained taken as (19, b) and (19, c) and that they would be considered analogs of (20, b) and (20, c).

I want to note that, in principle, taking as a basis the same ideas that Planck used in his time to obtain equations (20, b) and further (20, c), it is possible to obtain the same relations that could be taken as (19, b) and (19, c). But on the other hand, all this would be ineffectual to come to a correct understanding of the nature of both equations

(19) and (19, a). Because the ideas and results obtained in this way, and which could be taken as the results of some hypothetical version of quantum hydrodynamics, must be understood at a deeper level. That is, it is necessary to substantiate them based on the possibility of the initial principles in the same sense, with the same justification that all the results obtained by Planck in the field of quantum electrodynamics need.

Now I will outline in general terms the ideas based on which it was eventually possible to come to the solution of the above problems. I want to note that to solve such problems, I paid attention to the following facts. First of all, the philosophical nature of all the results taken into account when constructing schemes No. 8 and No. 9 should be understood so correctly that, based on the possibility of results

$$\text{à) } E_i = \alpha + k\beta_i, \quad \text{á) } \psi_i = \sum_{ir} C_{ir} x_r, \qquad (21,d)$$

$$\text{à) } n_{\grave{A}}^0 = \frac{n^0}{\frac{1}{n_{\grave{A}}}\exp\frac{\varphi - f}{kT} + 1}, \quad \text{á) } n_{\phi}^0 = \frac{n^0}{\frac{1}{n_{\phi}}\exp\frac{\varphi - f}{kT} - 1} \qquad (22,e)$$

taking into account which it is possible to fill the last cells of schemes No. 8 and No. 9 with content, and it would become possible to obtain proof for the relations

$$E = -\frac{me^4}{2\hbar^2}\cdot\frac{1}{n^2}, \quad 2\pi r = n\lambda; \qquad (32)$$

$$K = \frac{n_{AB}}{n_A \cdot n_B}, \quad \theta = \frac{bn_A}{1 + bn_A}, \ldots \qquad (33)$$

which are the main results inherent in

the structure of matter theory	physical chemistry,

and, which, when constructing schemes No. 12 and No. 13, are taken into account as solutions of problems for the type α and β with the accuracy inherent in empirical physics.

Scheme №12

				Molecular sociology
			Molecular psychology	
		Molecular biology		
	Structure of matter theory			
Theory of probability (34)				

Scheme №13

				Physcial and chemical sociology
			Physcial and chemical psychology	
		Physcial and chemical biology		
	Physical chemistry			
Theory of probability (34)				

In other words, such results as (32) and (33) from the very beginning were obtained in this way, when the ideas of

the theory of probability, (34)

were taken as the basis of the theory of thought, and then problems of the type α and β were solved. Hence, we can conclude that the nature of such results can be understood as the results, based on the possibility of which it was manageable to satisfactorily solve the problem, where the goal was to obtain solutions, which allow the establishment of the relationship between the observed values. Then I realized that to satisfactorily complete the development of the basis of the mathematical theory of cognition in the sense that Descartes dreamed of, it is necessary to interpret the nature and possibilities of expressions (21, d) and (22, e) so that based on their capabilities it would be possible to obtain proof for (32) and (33).

I want to note that when solving this part of the problem, i.e. problem, when based on (21, d), and (22, e), it is really possible to obtain proof for (32) and (33), I put forward the following ideas. First of all, I realized that this is possible only if, when obtaining equations (21), (22) from (12′), as equations having the meaning of solutions obtained with the accuracy inherent in algebraic physics, the role of multidimensional spaces with dimensionalities 3N + 1, 3N and 6N + 1, 6N is considered.

And I believe that only under such assumptions, further based on (21), (22), it will become possible to obtain solutions of the form (21, d) and (22, e), which make sense in ordinary 3-dimensional space. I also realized that only on this path is it possible to correctly understand the essence of those ideas, which at one time Einstein began to guess when he expressed his thoughts in lines (31, a). It should be noted that Einstein was mistaken, in particular, when he described his thoughts contained in lines (31, c) and (31, d). But Einstein expressed these thoughts mainly because he did not quite realize that since the time of Descartes the most valuable results were obtained when equations (9) were taken for (13). Although in 1925, during a conversation with Heisenberg, he almost guessed about it and agreed with it.

Based on the analysis of the results obtained on the new path, I came to the understanding that

the problem of a complete description of an individual system is contained in the possibilities of statistical quantum theory, but if only the nature of (21), (22), as well as (21, d), (22, d) is correctly understood.

I also realized that, in principle, it is possible to arrive at a correct proof for (32) and (33) based on the possibilities of equations (21) and (22), the philosophical nature of which is correctly understood, only if the nature of the differential equations obtained for (16, a), (16, b) and (16, c) is also reliably interpreted. And all this will become feasible if we only assume that using the possibilities (9, a), (10, a), (11, a), and (14, a), calculations are performed on

abstract quantities, **geometric quantities,** **kinematic quantities,** **physical values**	(35)

with proper consideration of their nature, while, using the possibilities (9, b), (10, b), (11, b), (14, b), we perform calculations on

- a finite number of abstract sets, **- geometric points subordinate to links, the number of which tends to infinity,** **- kinematic points, subordinate to links, the number of which tends to infinity,** **- physical particles, subordinate or non-subordinate connections, the number of which is finite**	(36)

also taking into account their number and nature.

Thus, after realizing that with a correct understanding of the nature of all the results that were taken into account in schemes No. 8 and No. 9, in the end, it was possible to come to solutions (21, d) and (22, e), based on the capabilities of which indeed, it is possible to find a proof for (32) and (33), which are solutions of the same problems, but with the accuracy inherent in experiential physics. Therefore, it was possible to conclude that some ideas and results can be systematized using schemes No. 14 and No. 15:

Scheme №14

							Molecular sociology
						Molecular psychology	
					Molecular biology		
				Algebraic physics, Arithmetical physics			
			Algebraic kinematics, Arithmetical kinematics				
	Algebraic geometry, Arithmetical geometry						
Algebraic equations, Arithmetical equations							

Scheme №15

						Physcial and chemical sociology
					Physcial and chemical psychology	
				Physcial and chemical biology		
			Algebraic physics, Arithmetical physics			
		Algebraic kinematics, Arithmetical kinematics				
	Algebraic geometry, Arithmetical geometry					
Algebraic equations, Arithmetical equations						

I believe that in this way it was possible to realize that all those ideas and results that were considered when obtaining such results may serve as components of a new, more correctly developed version of.

set theory (37)

and

function theory. (38)

So, I want to note the following. I believe that when obtaining the above results, where the main reliance is on the fact that when developing the basis of the mathematical theory of cognition, one should be limited by solving only such problems where the possibilities of Descartes' algebraic method are used, and where the idea of the need to develop the basis of theoretical physics is so that later, based on their possibility, it would be possible to obtain evidence for the results with the accuracy inherent in experiential physics, I managed to obtain results that can be taken as the components of the content of the mathematical theory of cognition. Descartes also dreamed of such a development. In this regard, I want to cite thoughts belonging to N. Bourbaki [6]:

Before the revolutionary development of modern physics began, a lot of work was spent because of the desire, at all costs, to force mathematics to be born from experimental truths; but, on the one hand, quantum physics has shown that this "macroscopic" intuition of reality hides "microscopic" phenomena of a completely different nature; moreover, the study requires such branches of mathematics, which, probably, were not invented for applications to experimental sciences, and on the other hand, the axiomatic method showed that the "truths" of which they wanted to make the focus of mathematics are only a very particular aspect of general concepts, which by no means limit their application to this particular case.	(39)

In my opinion, there is a defect in these ideas. As it is clear from the above results, at one time the founders of quantum physics were right when they at all costs tried to force mathematics to be born from experimental truths because in this way they tried to come to a correct understanding of nature (9), which since the time of Descartes was taken as the basis of the theory of thinking. In doing so, they strove to obtain proof for the results obtained with the accuracy of experiential physics precisely based on the results obtained with the accuracy inherent in theoretical physics. This is exactly the fact that indicates that the ideas and results of real mathematics are decided from the need to explain the data of experience.

§ 5. Possibilities of new ideas and results for a more correct interpretation of the nature of the Maxwell and Navier-Stokes equations

Thus, after realizing that equations (21) and (22) are equations that have the meaning of solutions obtained from equation (12′) with the accuracy inherent in algebraic physics, and equations (21, d) and (22, e) are also solutions, but obtained with the accuracy inherent in arithmetic physics, we have the opportunity, taking these results as a basis, to try to satisfactorily interpret the nature of the Navier-Stokes (19) and Maxwell (20) equations. Of course, this had to be done in such a way that further, it became possible to come to a correct understanding of the nature of not only the solutions that Planck obtained in 1900, namely, the results (20, a), (20, b), but also to come to a correct understanding of similar solutions obtained in the field of hydrodynamics.

I want to note that this became possible only when it was realized that the nature of equations (19), (20) could be understood as some analog of equations (21). This means that if the nature of equations (21) can be understood as equations that have the meaning of solutions obtained from solutions of Hamilton's equations (12′) for a set of particles subject to constraints, then in a similar way one can understand the nature of equations (19), (20) as equations that have the meaning of solutions obtained by solving Newton's equation (12) for a set of particles subject to constraints or forces applied from the outside.

Of course, to consider that the analogy, in this case, is complete, it is necessary to assume that when deriving equations (19), (20) from (12), the possibilities of multidimensional spaces with dimensionalities 3N + 1 and 6N + 1 are used. I believe that the realization that the nature of equation (19) and the solution (19, a) could be understood in this way is sufficient reason to think that this has obtained a satisfactory solution to the problem that was formulated as the sixth Millennium Prize Problem. To my mind, the new path enabled revealing the reason why the attempts were so unsuccessful to arrive at such a solution to equation (19), based on which it would be possible to understand what causes such a phenomenon as turbulence. It was found that the reason for this is the random movement of particles due to the destruction of the ordering inherent in laminar fluctuating. Moreover, the reason that it was so rigorously proved only based on the possibility of the basic equations of Gibbs' statistical mechanics, which have the meaning of solutions, was obtained with the accuracy inherent in algebraic physics.

CONCLUSION

As is known, at the beginning of the 19th century, the Navier-Stokes equation (19) was obtained based on Newton's equation (12), which took into account the fact that under the influence of external forces, for example, a force due to a pressure gradient, particles of a liquid could come into an orderly movement. When deriving equation (19), it was also taken into account that, under the influence of heat, the particles performed random motion.

The proof that these facts were used correctly in deriving equation (19) was the fact that when solving this equation, results were obtained, based on the possibility of which it was manageable to substantiate the Hagen-Poiseuille formula. But on the other hand, it is well known that all these results admitted some disadvantages. For example, it remains unclear how equation (19) itself was obtained from equation (12). For it is easy to realize that in their time, both Euler and Navier-Stokes, in obtaining their results, predominantly used the possibilities of intuition, and not the strict solution of Newton's equation (12) for a set of orderly moving particles, as well as for a set of randomly moving particles.

I want to note that to eliminate these shortcomings, it is necessary to pay attention to the following facts. It is known that at one time the canonical Hamilton equation (12′) was obtained as an improved version of Newton's equation (12). It was after obtaining this equation that it became possible to solve equations for α) a set of particles moving under the influence of external forces, and β) a set of particles moving freely. It is in this way that the basic Hamilton-Jacobi- Schrödinger and Gibbs equations were obtained.

Therefore, there were good reasons to assume that in the future, with a satisfactory interpretation of the nature of these equations, it would be possible to obtain solutions, based on the possibility of which it was feasible to come to an understanding of the reasons, in which cases and why particles come into ordered or chaotic motion. These results could then be used to eliminate the aforementioned disadvantages. But, as is known, it has not been possible to implement such a program so far. Mainly because the nature of these equations could not be interpreted in terms of ideas and results inherent in the original principles.

It is necessary to note the following: to fill this gap, i.e. to find out exactly which ideas and results can satisfactorily act as initial principles, it is necessary to turn to the analysis of Descartes' philosophical ideas. On this path, I realized that since those times the most valuable ideas and results were obtained when algebraic and arithmetic equations were taken as the basis of the theory of thought, and then it became possible to solve problems in geometry, kinematics, physics, and other sciences.

In my articles published earlier [7-13], as well as in this article, I tried to show that when taking such ideas as a basis, i.e. as first principles, in the beginning, it was possible to satisfactorily complete the development of the basis of the mathematical theory of cognition in the fundamental part. Then, new ideas realized along the way, enabled the understanding that the ideas which Euler and Navier-Stokes used on an intuitive level turned out to be true.

In conclusion, I would like to note that in the formulation of the Clay Mathematics Institute, the sixth Millennium Prize Problem sounds like this: "to prove the existence and smoothness of solutions of the Navier-Stokes equation". In this regard, I would like to note that the results we have obtained generally satisfy the requirements contained in such a formulation. However, since in our case in the role of fundamental principles we had to use the possibilities of a more general and subtle method, which is the method based on the adoption of algebraic and arithmetic equations, from the very beginning we had to take the possibilities of not only the variable separation method but also the variable abandonment method. Because of this, the concept of "smooth solution", which is in the formulation of the Clay Mathematics Institute, in our case had to be replaced by the concept of "ordered particle motion".

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Open letter to the philosophers, mathematician and physicists.

Dear colleagues, With this letter I would like to draw your attention to my new ideas, the development of which I have devoted over 50 years of my life. I managed to write 4 books, as well as several articles on the following areas:

- mathematics,
- theoretical and experiential physics,
- philosophy.

All these works are united by a system approach and materialistic methodology. To reveal the essence of the ideas developed by me, in my opinion, it is necessary to proceed from the analysis of the following situations. Supposing that the same question, for example, what is the essence of science, the development of the basis of which you have devoted almost your entire life is posed to a mathematician, physicist, and philosopher. A mathematician is most likely to answer this question as follows: "Mathematics is a science that is developed to know the world based on the possibilities of equations." According to the physicist, "physics is a science that, based on the possibilities of mathematics, tries to cognize nature." There is reason to believe that the philosopher will give the following answer: "philosophy is a doctrine that has the goal of developing a universal approach to determine the foundations of all particular branches of science," and trying to make the right choice of ideas that play the role of the **thought theory fundamentals**.

Now assume, we are trying to analyze the current state of the teachings to answer the question of whether these goals have been achieved. Unfortunately, the answer is negative. As soon as at present the fundamentals of both mathematics and physics are in deep crisis.

Notable, that this formulation of the question, based on an analysis of the ideas and results developed in due time by Rene Descartes, has led me to the knowledge of the following truth. It seemed to him that in the future there will come a time when the **golden pool of the intellectual accomplishment of mankind** can be systematized and combined, as shown in scheme No. 1:

Scheme №1

						Sociology
					Psychology	
				Biology		
			Physics			
		Kinematics				
	Geometry					
Algebra, arithmetic						

Descartes believed that to achieve a satisfactory development of the foundations of the

mathematical theory of cognition (1)

it was expedient from the very beginning to take

algebraic equations, arithmetic equations, (3)

as **the basis of the theory of thought** (2)

and then successfully solve problems of

geometry, kinematics, physics… . (4)

Obviously, he realized that how ideas and results (3) can act as functions belonging to the subject-human, and the subsequent satisfactory solution of the problem of particular branches of science (4) dealing with specific objects, will lead to opportunities to develop fundamentals(1). It seemed to him that this path would lead to a satisfactory solution to the fundamental problem of philosophy i.e. problem of the subject and object interrelation.

And when I began to gradually use the possibilities of the ideas considered in scheme No. 1, I realized that these ideas correctly determine the path of truth, along which the future fundamentals were developed (1). Therefore, keeping this fact in mind, I began to realize that it becomes possible to find out the essence of those ideas and results that were obtained directly along the way of truth, as well as those that were developed along the wrong path, i.e., having wandered from the way of truth.

It is interesting, how Descartes from the very beginning noted that for the development of the fundamentals (1), obtaining results along the way of truth, there is a need to achieve the results using the capabilities of the algebraic method only. Therefore, it became necessary to find out what he meant by exalting the role of this method. It needs to be emphasized that I managed to solve this problem after realizing the following truths. Bacon is usually known to be spoken of as the founder

experiential philosophy of the early modern period, (5)

while Descartes is considered the founder of the

rationalist philosophy. (6)

However, on the other hand, it is also well known that for a long time the philosophers of the next generation failed to successfully combine the fundamental ideas (5) and (6). Of course, such a formulation of the question presumes the availability of certain deep reason. For example, there are grounds to believe that the main reason is that until now the development of the foundations of experientialism and rationalism has been approached with an insufficient level of sophistication. Mainly, because to date, the representatives of not only the so-called traditional philosophy but also scientists continue to use the possibilities of Aristotle's

formal logic	(7)

as the performing results (2).

So, jointly analyzing the ideas that were taken into account in the construction of scheme No. 1 and the results obtained in particular sections of the sciences since the time of Descartes, I managed to realize the following truths. The most important ideas and results of a more refined version (6) began to be received by physicists, developing the fundamentals of theoretical physics, where (3) was taken as the basis for (2), and then solving problems for α) a set of orderly moving particles and β) a set of randomly moving particles. These results that were taken into account when constructing schemes No. 8 and No. 9 (provided in the main article).

Similarly, it was possible to realize that the ideas and results of a more refined version (5) also began to be received by physicists, chemists, biologists, but solving problems for α и β, they took the possibilities inherent in the theory of probability as a basis.

Of course, after realizing such truths, I managed to come to the understanding that Descartes, exalting the role of the algebraic method, wanted to emphasize that in the development of the fundamentals (1), the decisive role belonged, first of all, to the ideas and results obtained with the accuracy of

(8)	**experiential geometry, experiential kinematics, experiential physics.**

He believed that in the future, the ideas and results inherent in

(9)	**theoretical geometry, theoretical kinematics, theoretical physics,**

were to be obtained in such a way that, the possibilities they offer would allow substantiation of the results with the accuracy inherent in (8).

The essence of these ideas of Descartes can be understood as follows. The nature of

geometric curves, kinematic curves,	(10)

which belong to the class of algebraic curves, he intuitively interpreted as objects that are formed from a set of geometric and kinematic points, between which interaction is observed. Therefore, it seemed to him that such curves possess elastic properties in the same sense in which these properties are inherent in vibrating strings. Therefore, there is reason to assume that he began to anticipate the approach of such a time when it would become possible to obtain differential equations for the

1st geometric point,
1st kinematic point,
1st physical particle.

(11)

And also he began to realize that, satisfactorily solving these differential equations for

(12)

- geometric points subject to connections, the number of which tends to infinity,
- kinematic points, subject to constraints, the number of which tends to infinity,
- physical particles, subordinate or not subordinate to connections, the number of which is finite,

it is possible to arrive at the results of some meaningful version of

the theory of sets (13)

and

theory of function. (14)

It should be noted that set theory, which was to be developed along this way, was designed to have a cognitive possibility because new results enable correct consideration of the number and nature of the objects under study. However, as you know, this did not actually happen. When developing the basis of the existing version (1), in the end, the results obtained were inherent in

Cantor's theory of sets (15)

and

the theory of functions of a real variable, (16)

which do not have cognitive possibilities at all. In my opinion, what happened is a consequence of the fact that in due time, when obtaining results inherent in mathematical physics, along with the capabilities of the algebraic method, they also began to use the capabilities of the non-algebraic method.

It is supposed that the reason for this was that neither Newton nor Leibniz fully realized the main essence of the ideas that had previously begun to be developed in the writings of Descartes. That is why they considered it permissible to use the possibilities of the non-algebraic method as well.

Dear colleagues, at the end of my letter I would like to say the following. In fact, I am an open person and live in harmony with everyone. However, it turned out that while pursuing science, I find myself in a situation where I have to express thoughts that seem to may cause pain to many. For I allow myself to say that some branches of science have long gone astray from the way of truth. For example, the situation forces me to say that the ideas taken into account in Scheme №1 can be used as Occam razor. Therefore, it should be concluded that any equations obtained in the field of theoretical physics with the accuracy inherent in algebraic physics can be considered false if based on their possibility usage of the variable separation method or variable abandonment method is impossible. This refers to the basic equations of mathematical physics, as well as quantum dynamics (23) and (24). In my opinion, all this happened for the following reasons. The ideas of Descartes, which he managed to systematize based on Scheme 1, as well as the ideas about the Cartesian coordinate system, are two of his most valuable discoveries in the field of science and philosophy. However, because he passed away so early and suddenly, these ideas remained unconsolidated. Therefore, he did not have time to make some corrections to the results that he obtained at the time when he used the possibility of only the idea of a Cartesian coordinate system. I mean his conclusions that his method of coordinates allows assuming the unified nature of arithmetic and geometry. Therefore, he believed that Aristotle was mistaken, pointing out the need to separate them. I would like to note that, new results demonstrate that, in fact, the ideas and results of algebra and arithmetic, representing the branches of science which possess opportunities, fulfill the functions of the theory of thought fundamentals. They have a special status, in contrast to the results of geometry, kinematics, physics, which are branches of applied sciences that have specific objects. Thus, this new way allowed proving that the ideas containing the axioms of the Pythagoreans about the indivisibility of units and the Aristotelian axiom about the necessity of separating arithmetic and geometry are true. In my opinion, the fact that these axioms are correct became clear when Max Planck received his results in the field of quantum physics.