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Article

The hypothesis of Andrew Beal: general proof

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The task itself is formulated as follows: If

$$A^{x} + B^{y} = C^{z}$$

where: A, B, C, X, Y, Z are natural numbers and X, Y, Z,> 2,

then A, B, C have a common prime devisor.

The US $1 m worth prize will be paid to those who will solve this task or find a counter-example.

We will provide some comments on the hypothesis of Andrew Beal.

(Andrew Beal's Hypothesis and P. Fermat's Great Theorem are different theorems).

(P. Fermat's Great Theorem has nothing to do with the hypothesis of Andrew Beal).

(The trick is that the proof of Beal's hypothesis means that Fermat's Great Theorem can be proved by contradiction. And mathematicians have been struggling to find such an elegant proof of P. Fermat's Great Theorem since 1637. The author himself said that it existed, but at the same time, the proof of 1995, containing 107 pages, cannot be called elegant in any way. And in the 17th century, it couldn't be formulated in principle).

(Well, that does not mean for sure that he really had a proof).

One can go on citing all sorts of comment on this topic, but the question is precisely whether we are in a position to understand all these issues in detail and to get a clear, unequivocal solution to the tasks.

It is not difficult to realize that the hypothesis of Andrew Beal didn't appear from scratch and in this connection, it is necessary to determine its

origins, as well as to understand what he wants. We will consider these issues in more detail. And now let's provide some historical facts.

The hypothesis of Andrew Beal was put forward in 1993, and in 1995 Andrew Wiles presented a proof of Fermat's Great Theory that was declared well-grounded. In 1997, Andrew Beal, a billionaire, announced a US $5,000 worth reward for proving his hypothesis. Since then, its amount has been raised several times, to reach US$ 1 million nowadays. Andrew Wiles was offered to prove the hypothesis of Andrew Beale, but he refused to do that.

And now let's see what the essence of Andrew Beal's hypothesis is. Before we start to decide whether A, B, C have at least one common factor, it is necessary for us to find all solutions in natural integers for the indicated equation, paying attention to the condition for X, Y, Z,> 2. And now let's read Fermat's remark. (On the contrary, it is impossible to factorize either a cube into two cubes, or a biquadrate into two biquadrates, and in general no degree, larger than a square, into two degrees with the same exponent.) We particularly accentuate the following (... and in general no degree, larger than a square…) Fermat's assertion seems to be valid only for an equation with any similar exponent of degree. We have generalized this question and now we demonstrate a proof with any exponent of degree larger than a square.

Let's consider this question in detail, paying attention to the following (... larger than a square ...). But what does it mean? The condition of solvability of this task in natural integers for the sum or difference of any two numbers lies exclusively in n = 2 (see our proof for n = 2) /L. 2. p. 67/. The proof is based not on axioms and postulates, but on laws. What follows directly from a given proof is that at the level n = 2 we have found, calculated, presented etc. all, without exception, solutions in natural integers for the sum or difference of two numbers (See our theory of numbers and the definition of the number etc.).

And now the following consequence ensues from the condition of solvability in integers: all solutions for the sum or difference of two numbers with the same exponent of degree greater than two are only fractional; the presence of any counter-example is now considered to be at variance with the law and therefore it is not possible in principle.

Its application to Fermat's Great Theorem makes sense, because we can take any A and B with the same exponent of degree greater than two, but then the result of the sum or difference for the same exponent on the base will only be fractional.

The condition of solvability in integers gives us one more consequence, which is applicable to the hypothesis of Andrew Beal. Let's demonstrate it. We will consider this question in a general form and show it graphically to ensure its clear and transparent understanding. In Fig. 1 we have designated by the letter M any desired set of natural quantities that possess the property of quantity. From this infinite set, we'll choose the entire infinity of natural commensurable quantities, realizing the following sequence: we take any smallest value per unit as the initial value, choose the next value twice as large as the initial value; the next value will be three times the initial value .... And we'll continue doing so to infinity. (see Fig. 1. Row A).

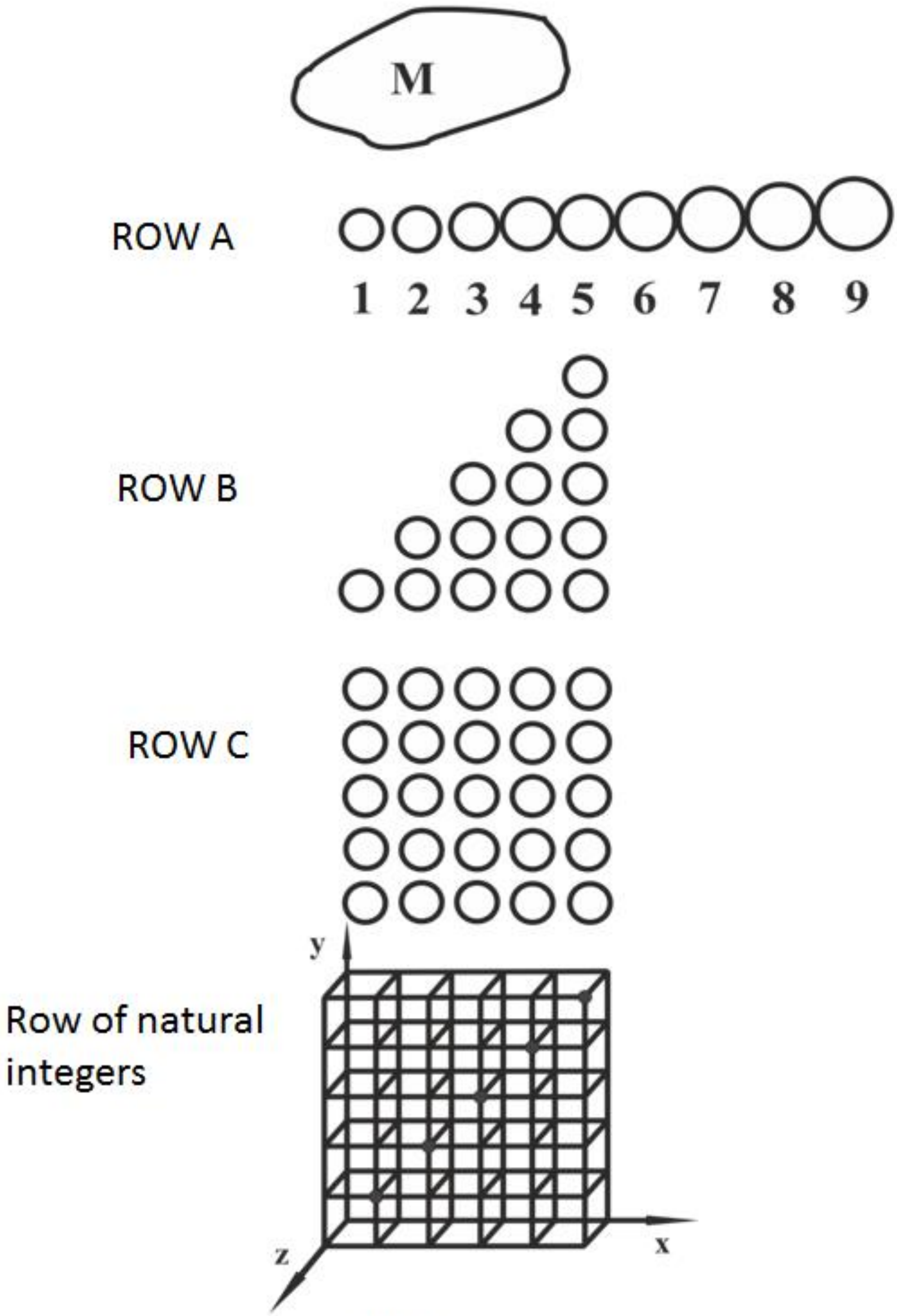

Fig.1

In the formal notation, a series of commensurate natural integer quantities has the following form:

$$\mathbf{n + 1}$$

In this series, any subsequent value is different from the previous one by the amount of the initial unit. But what does it mean? There are no gaps in this series, there is no uncertainty, there are no distortions, there are no two or more values; we show it exclusively on a quantitative level. A natural integer (a solid or three-dimensional square) uniquely corresponds to any natural integer-valued unit.

The number is nothing else but a reflection by our consciousness of the material world's properties. (For a more complete substantiation of the theory of numbers, see our book). / L. 2/.

Corollary 1. **In the set M we have only incommensurate values; a comparison of an incommensurable value with a series of commensurable values leads to a discrepancy with any commensurable value.**

Corollary 2. **Only a fractional number unequivocally corresponds to an incommensurable natural value.**

Corollary 3. **At the level n = 2 we have chosen all, without exception, solutions in natural integers for the sum or difference of two numbers. Further: all the solutions, resulting from n = 2, are only fractional; and in this question there are no exceptions in principle, since any exception initially overturns the existence of the law.**

Let us formulate the following question: what determines the existence of the law? We will consider this issue separately. Apparently, we can form an equation with any set of actions or operations on numbers, but then we'll put an equal-sign and write down the result looked for. The equal-sign characterizes the presence of balance between the left and the right sides of the equation.

And now we'll show the nature of this balance. Let's take any commensurable unit value (see Row A., Fig. 1.), for example, the value under number 5 can be factorized into the number of initial units, and this number will be equal to five initial units. We've expressed one through the other and united one and the other with the equal- sign. Fulfilling such unification is possible exclusively at a quantitative level (see our definition of quantity).

And now we factorize the series A by the equivalent number of units and get a triangular number (see Row B). Such a number includes the properties of the sum and the properties of divisibility alike. Let's supplement this number with the property of difference and we get a square number (see Row C). Such an addition involves the emergence of the properties of difference and product.

Now we take, as an initial unit, any infinitesimal commensurable natural value and express the square number with respect to an infinitesimal quantity, and we obtain a solid or three-dimensional square number in the geometric form, which represents a series of natural integers. And the properties of natural integers afford us an opportunity to perform actions on numbers, such as: finding the sum, the difference and a ratio. And here the following question arises: what is a product? A product doesn't represent any action on a number, but it is only a characteristic of the natural value's position (See our plotting for n = 3; 4; 5 and any degree). /L. 2/

Corollary 4. **Any number of the n degree is a volume. Then Andrew Beal's entire task comes down to the following form:**

$$V_A + V_B = V_C$$

We read that the volume of the number A plus the volume of the number B is equal to the volume of the number C. This reduces the entire Fermat's Great Theory to this form, and this reduces the problem for n = 2 to this form, too. The natural integer has a R3 dimension. A dimension is a characteristic of belonging to a series of natural integers. All numbers with any exponent of degree are nothing else than the calculus of volume. Further, the line, square, structure, etc. are all the elements of the number. Now the characteristic of belonging to the law of distribution of commensurable natural integers represents not the actions on the numbers, but exactly the equal- sign, since it is the equal-sign that determines the existence of a unique correlation between a series of commensurable natural integers and a series of natural integers. And if there is an equal-sign in the equation, then the law of distribution of natural integers is uniquely valid for a given equation, and no exceptions are possible in principle. Further, if there is no equal sign, any exceptions are possible.

Corollary 5. **At the level n = 2, we have chosen all the solutions without exception in natural integers. And then all the solutions falling out of n = 2 will only be fractional. Now it becomes possible to formulate uniquely the general**

principle of independence of solvability in integers for the sum or difference of two numbers *and for no degree at all, except the second degree, for a given task.*

Let's show how this result is applicable to the task of Andrew Beal. We can arbitrarily choose any natural numbers A, B, C; further, we can take any natural exponents of X, Y. And here the following question arises: will the exponent of Z be a natural set?

The answer is as follows: under these conditions, the exponent of Z is, only and only, a fractional set. Then we can arbitrarily choose any natural exponents of X, Y, Z, and any natural numbers A, B. And again the following question arises: will the set C be a natural set?

The answer is as follows: the base of the number C is, only and only, a fractional set.

Another question arises here: what is 1, 2, 3, 4, 5, 6? From time immemorial, people supposed that they were all the numbers; in fact, we show symbols, signs and numbers; but in substance, we show not the number, but a written form of speech that characterizes the number or the set. The written form of speech has a continuation in the form of algebra, or formal logic. At the level of formal logic, in principle, we cannot obtain clear and transparent evidence for both the Great Theorem of Fermat and the hypothesis of Andrew Beal. These two tasks have different forms, but the same content.

Formal logic represents a blind method that relies on axioms and postulates, as well as on the correct performance of actions on symbols; but it does not allow us to get a general view of the entire task, and even to comprehend the existence of the problem and understand the ways of its solution. Here is a simple example: throughout the history of mathematics, it was not realized that at the level n = 2 we chose all, without exception, solutions in integers for the sum or difference of two numbers. And this question is directly connected with the fundamental questions of the theory of numbers and those laws, which they are subject to. And the theorem of Pythagoras absolutely fails to give us a complete idea of the problem being solved. *WHAT is the common and what is the quotient? It is this very question that P. Fermat asked us.* He knew the answer to this question and considerably helped us to understand the fundamental problems of the theory of numbers. Between the number and the symbol (figures), there is a simple correlation; everything we do

with numbers is reflected in numbers, and not vice versa; the laws are general, and everything else is special.

Considering the fundamental foundations of the theory of numbers, it becomes obvious that there is a direct interrelation with the tenets of the subconscious and consciousness. The source of any of our knowledge is the world; man and the world are in unity; we have at our disposal all sorts of knowledge. The whole body of knowledge possesses the property of direction. The general direction for man is determined by the necessity to survive and subsequently to conquer illnesses and death in all its manifestations. This necessity, in turn, entails a steady demand of knowledge of the secrets of nature and the world as a whole. In this field the application of quantitative methods, or the use of numbers, is very important. The use of numbers is determined by their properties. *Further, if the numbers possess the properties that are common to the material world, then they are applicable to the study of the material world; but if the numbers have no common properties with the material world, then they are not applicable to the study of the material world*. Further, if the numbers reflect only incomplete properties of the material world, then we will get an incomplete picture of the material world or a subjective view of the world. To understand this question, we will explain it using a simple example. (see Fig.2).

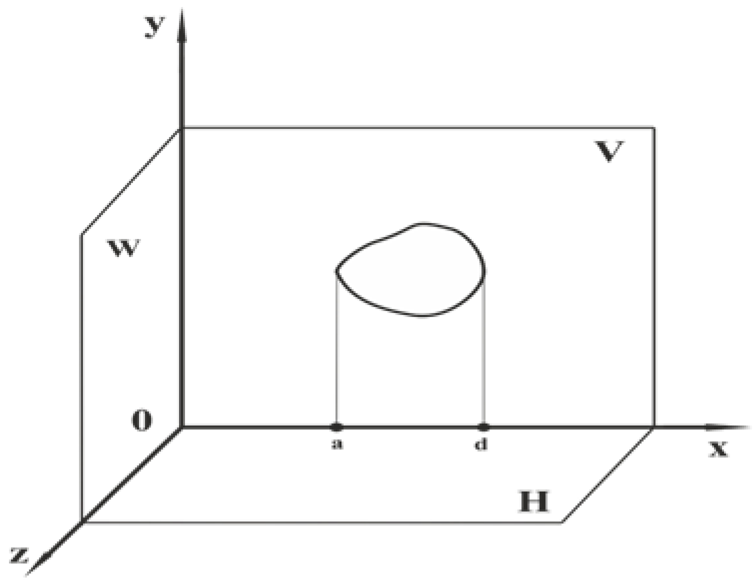

Fig.2

In this figure, we demonstrated exactly the number, or in other words, the system of coordinates. Everything that we show on the frontal plane and indicate by the letter (V) is called a projection, another term is a shadow.

On the frontal plane, we show the shadow of some object. Let's consider what a numerical axis is. Let's project the shadow on the X axis, and we'll get the segment (ad). The numeric axis is represented by an edge of a number, and the projection on X is a shadow from the shadow, which is represented by the segment (ab); any segment on the X axis, and equally on the numeric axis, is a shadow from the shadow. And here the following question arises: does the idea of the number (the number is an account, the number is 1, 2, 3, 4, 5, 6, ... further the numerical axis, further the axioms, etc.) represent a complete idea or is this view narrow?

As far as this question is concerned, P. Fermat left the following comments on the arithmetic of Diophantus.

1. A full proof with comprehensive explanations cannot be placed in the margins because of their narrowness. /L. 1, p. 311/.

2. I discovered a really excellent proof of this, but these margins are too small for it. /L. 1, p. 197/.

A dim-witted person will understand that the page margins are too small. In fact, we are talking about the scope of view of the number in the entire arithmetic of Diophantus. And P. Fermat left the following remark on this question.

3. It is impossible here to give his proof, which depends on numerous and most intimate secrets of the science of numbers; we intend to devote a whole book to this subject, in a move to promote, in a remarkable way, this part of Arithmetic beyond the bounds known in ancient times /L. 1, p. 242/.

This observation directly points to the fundamental questions of the theory of numbers; now it becomes obvious that the presence or absence of paper has no relation to this matter at all. P. Fermat writes about science; science is only what widens our boundaries of understanding and knowledge of the world; science relies solely on laws, while everything else is just a branch of knowledge or a kind of pseudo-science. Since what is excusable for Diophantus, is no longer forgivable for Peano, and all the more is unforgivable for modern mathematicians. Andrew Wiles shows us the proof of Fermat's Great Theorem at the level of recalculation of points on the numerical axis and then sums it up.

So P. Fermat wasn't mistaken: there is no solution in natural integers; this was already clear after Kummer's works, but it was also clear later that a complete stagnation was observed in the field of fundamental problems in the theory of numbers.

With his hypothesis Andrew Beal shows us much more sanity than all mathematicians put together, because, having formulated his hypothesis, he gives a strong objection and even a powerful objection to Andrew Wiles, as well as to all known proofs of Fermat's Great Theorem. If you have a complete proof of Fermat's Great Theorem, then these proofs are common to the hypothesis of Andrew Beal. But now looking from this position, all known proofs of both Fermat's Great Theorem and the hypotheses of Andrew Beal are only speculation on P. Fermat's result, because there is no need to look for an answer to the question whether or not there is a solution in natural numbers. P. Fermat gave us the answer to this question, precisely in order that all efforts were directed to finding a solution to *why there is no solution and no solution at all for any degree, except the second degree. The proofs provided here are direct, complete, intuitively clear and general.*

Reference information. You can concentrate on finding a counter-example for the hypothesis of Andrew Beal. For the time being, the values of all six variables have been checked up to 1000. That is, in a successful counter-example, at least one variable must exceed 1000. It is quite obvious that the history of Fermat's Great Theorem (but now on the example of the hypothesis of Andrew Beal) repeats itself. And here the following question arises: can the mathematicians turn to the fundamental foundations of the theory of numbers at all?

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List of the Literature Cited

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