# Rehabilitation of Fermat's Last Theorem. * 

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Annotation
The article addresses the wide circle of readers with mathematical education wishing to examine the Fermat problem independently especially after questionable Wiles's proof in 1995. The work discloses a principal mathematical error committed in the process of proving Fermat's Last Theorem at that time and also presents the native proof belonging apparently to Fermat himself, yet not published by him.

## I. Introduction.

The article contains in itself basic results of the author's future book "Fermat's Last Theorem: unfinished history", in which the following main thought is conducted: Fermat touched in his proposition on such depths of mathematical axiomatic, about which modern science does not have any conceptions till now. It looks as if Nature itself concentrated all its principal secrets on the Fermat theorem.

Let us recollect now, how this theorem is formulated. It sounds like that: two whole powers with one and the same whole exponent more than two cannot be equal in sum to another whole power with the same degree, when bases of powers are whole numbers. In order to understand rightly the sense and meaning of this proposition in a historical perspective, let us consider two independent approaches to the Fermat problem solving.

## II. About one principal error in proving Fermat's Last Theorem at the end of the XX-th century.

In 1995 there appeared the article [5] being like a book in the size and announcing proof of Fermat's Last Theorem (FLT) (for the history of the theorem and attempts to prove it see, for example, [4]). After this event a quantity of scientific articles and popular science books were published, in which the announced proof was propagandized, but no one of these works disclosed a principal mathematical error that crept into it even not through fault of the author of [5] but through some kind of strange optimism that enveloped mathematicians' minds being occupied with the indicated problem and closely-related questions. Psychological aspects of this phenomenon were investigated in [4]. Here is given the detailed analysis of the occurred blunder that bears not a particular character but is a consequence of the wrong understanding of properties of whole numbered powers. As it is shown in [3], the Fermat problem is rooted in a new axiomatic approach to studying these properties, which has not been applied in modern science until now. However, the false proof of [5] stood in the way of it, leaving dummy reference points to specialists in number theory and taking researchers of the Fermat problem aside from its direct and adequate solution. The given work is undertaken to throw light on this situation.

## 1. Anatomy of the error committed in the course of proving FLT.

During very long and tiring reasoning in [5] the original Fermat proposition was reformulated in terms of matching Diophantine equation of degree $p$ with elliptic curves of degree 3 (see Theorems 0.4 and 0.5 in [5]). Such matching made the authors of actually collective proof in [5] announce that their method and arguments led to definitive solution of the Fermat problem (recall that FLT did not have acknowledged
proofs for the case of arbitrary whole degrees of whole numbers up to the 90 -th of the last century). The object of the given consideration is establishing mathematical incorrectness of the above mentioned matching and as a result of carried out analysis finding a principal error in the proof presented in [5].

## a) Where and what is the error?

So let us follow the text of [5], where it is said on p. 448 that after "an ingenious idea" of G.Frey a possibility of proving FLT was opened. In 1984 G.Frey suggested and K.Ribet proved later that an assumed elliptic curve representing a hypothetical integer solution of the Fermat equation

$$
\begin{equation*}
\mathrm{y}^{2}=\mathrm{x}\left(\mathrm{x}+u^{\mathrm{p}}\right)\left(\mathrm{x}-v^{\mathrm{p}}\right) \tag{1}
\end{equation*}
$$

cannot be modular. Nevertheless A.Wiles and R.Taylor proved that every semistable elliptic curve defined over the field of rational numbers $Q$ is modular. From this it followed that whole numbered solution of the Fermat equation is impossible and therefore Fermat's proposition is true, which is written in denotations of [5] as Theorem 0.5 : suppose that

$$
\begin{equation*}
u^{p}+v^{p}+w^{p}=0 \tag{2}
\end{equation*}
$$

with $u, v, w \in \mathrm{Q}$ and integer $\mathrm{p} \geq 3$, then $\quad u v w=0$.
Now, to all appearance, it should return backwards and critically comprehend why curve (1) was a priori taken in as elliptic one and what its real connection with the Fermat equation is. Foreseeing this question A.Wiles refers to work [2] by Y.Hellegouarch, in which he found the way to associate the Fermat equation (presumably solved in whole numbers) with a hypothetical curve of 3-rd order. In contradistinction to G.Frey Y.Hellegouarch did not connect his curve with modular
forms but his method of getting equation (1) was utilized for further advancing Wiles's proof. Let us stand at greater length at work [2]. The author of it gives his own arguments in terms of projective geometry. Reducing some of his denotations to ones of [5] we find that Abelian curve

$$
\begin{equation*}
Y^{2}=X\left(X-\beta^{p}\right)\left(X+\gamma^{p}\right) \tag{3}
\end{equation*}
$$

corresponds to Diophantine equation:

$$
\begin{equation*}
x^{\mathrm{p}}+y^{\mathrm{p}}+z^{\mathrm{p}}=0 \tag{4}
\end{equation*}
$$

where $x, y, z$ are unknown whole numbers, p is the same as in (2) and solution $\alpha^{\mathrm{p}}, \beta^{\mathrm{p}}, \gamma^{\mathrm{p}}$ of (4) is used for recording Abelian curve (3).

Now in order to make sure of that this curve is elliptic one of 3-rd order, it is necessary to examine variables X and Y in (3) on Euclidean plane. For that we shall use the well-known rule of elliptic curves' arithmetic: if there are two rational points on a cubic algebraic curve and a straight line laying through these points and if this straight line crosses this curve in one more point, then the last one is a rational point too. The hypothetical equation (4) formally represents by itself the law of adding points on a line. If to change variables $x^{\mathrm{p}}=\mathrm{A}, y^{\mathrm{p}}=\mathrm{B}, z^{\mathrm{p}}=\mathrm{C}$ in (4) and direct such an obtained line along axis X in (3), then it will cross the curve of 3-rd degree at three points:

$$
\left(X_{1}=0, Y_{1}=0\right),\left(X_{2}=\beta^{p}, Y_{2}=0\right),\left(X_{3}=-\gamma^{p}, Y_{3}=0\right)
$$

and that is reflected in recording Abelian curve (3) and in analogous recording (1). On the other hand, these three points correspond one-to-one with intercepts of the
direct line. But is curve (3) or (1) really elliptic? Obviously, it is not as $X$-intercepts are taken on a nonlinear scale when adding points on the axis.

Returning to linear coordinate systems of Euclidean space we get instead of (1) and (3) formulas greatly different from ones for elliptic curves. For instance, (1) can be the next form:

$$
\begin{equation*}
\eta^{2 \mathrm{p}}=\xi^{\mathrm{p}}\left(\xi^{\mathrm{p}}+u^{\mathrm{p}}\right)\left(\xi^{\mathrm{p}}-v^{\mathrm{p}}\right) \tag{5}
\end{equation*}
$$

where $\xi^{p}=x, \eta^{p}=y$, and in such a case appeal to (1) for discoursing and proving FLT looks illegal. Although (1) answers some requirements of the class of elliptic curves, nevertheless it does not satisfy the most principal criterion to be an equation of 3-rd degree in a linear coordinate system.

## b) Classification of the error.

So then let us return once more to the beginning of our consideration and trace the development of proof in [5]. Firstly, it is suggested that there exists some solution of the Fermat equation in positive whole numbers. Secondly, this solution is arbitrarily inserted into well-known algebraic form (elliptic curve of 3-rd degree) in assumption that such elliptic curves with parameters taken from (2) exist (second non-confirmed assumption). Thirdly, so far as it is proved with other methods that the built concrete curve is not modular, well then it does not exist. From this it follows (see [5]) that there is no whole numbered solution of the Fermat equation and therefore FLT is true.

In this discourse there is one weak link, which turns out to be an error after careful examination. This error is committed at the second stage of the proving process when it is suggested that the hypothetical solution of the Fermat equation is simultaneously a solution of algebraic equation of 3-rd degree presumably describing an elliptic
curve of well-known kind. Such suggestion in itself would be justified, if that curve would be elliptic indeed. However, as it is seen from 1a), it is represented in nonlinear coordinates that makes it "illusive", i.e., really not existing in linear topological space.

Now it should distinctly classify the found error. It consists of the following: what is needed to prove is taken in as proof itself. In classical logic this error is known as "circulus vitiosus". In the given case the whole numbered solution of the Fermat equation is associated (apparently presumably one-to-one) with fictitious, nonexistent elliptic curve and afterwards all enthusiasm of further reasoning is wasted in order to prove that this concrete elliptic curve obtained from the hypothetical solution of the Fermat equation does not exist.

How was it turned out that in profound in essence mathematical work [5] so elementary error was missed ? Probably, it happened because such "illusive" geometrical figures had not been studied sufficiently before, although they were used long ago by M. Esher (1898-1972). Indeed, who could be interested, for instance, in a fictitious circumference obtained from the Fermat equation by change of variables:

$$
x^{\frac{n}{2}}=A, y^{\frac{n}{2}}=B, z^{\frac{n}{2}}=C ? \quad \text { Its equation } \quad C^{2}=A^{2}+B^{2}
$$

does not have whole numbered solution when $x, y, z$ are whole and $n \geq 3$, you know. In nonlinear coordinate axis $X$ and $Y$ such a circumference would be described with equation alike standard form by appearance $Y^{2}=-(X-A)(X+B)$, where $A$ and $B$ are not variables but concrete numbers defined by the above mentioned change. But if to give primary view to numbers $A$ and $B$ consisting in
their power character, then non-homogeneity of designations in the right part of the equation is revealed straight away. This indication helps to tell illusion from reality and to get over from nonlinear coordinates to linear ones. On the other hand, if to consider numbers as operators when comparing them with variables as, for instance, in (1), then both must be homogeneous values, i.e., they must have the same degrees.

Such understanding powers of numbers as operators also allows to see that correspondence of the Fermat equation (see further (15)) to illusive elliptic curve is not simple. Let us take, for example, one factor in the right part of (5) and factorize it in p linear factors bringing in such complex number r that $\mathrm{r}^{\mathrm{p}}=1$ (see, for example, [1]):

$$
\begin{equation*}
\xi^{\mathrm{p}}+u^{\mathrm{p}}=(\xi+u)(\xi+\mathrm{r} u)\left(\xi+\mathrm{r}^{2} u\right) \ldots\left(\xi+\mathrm{r}^{\mathrm{p}-1} u\right) \tag{6}
\end{equation*}
$$

In this case, form (5) can be represented as factorization in simple factors of complex numbers like algebraic identity (6) but unambiguousness of such factorization in general case is called in question what was shown at one time by Kummer [1].

## 2. Total.

It follows from the previous analysis that so called arithmetic of elliptic curves is not good in order to shed light on that, where FLT proof is to be searched. After [5] Fermat's proposition, by the way, serving as epigraph to that article, began to be interpreted as a historical joke or prank. Though actually it was not Fermat's joke but one being bred by specialists gathered on the mathematical symposium in Oberwolfach in Germany in 1984, where G.Frey wired for sound his ingenious idea. The consequences of such incautious declaration led mathematics as a whole to the
edge of its loss of public trust that is minutely described in [4] and that necessarily raises to science the question of responsibility of scientific establishments to society. And still what is the sense of derivation of the inequality for whole numbered powers in Fermat's proposition? What did Fermat himself mean when he wrote about his "demonstrationem mirabilem"? Answers to these questions are given in [3-4] and in the following part of the present work.

## III. Elementary proof of Fermat's Last Theorem.

The 405 birth anniversary of the great French mathematician Pierre de Fermat (1601-1665) was marked by promulgation of the native proof of his famous proposition known as Fermat's Last Theorem [3] (about its modern history see [4]). In this part of the article universal (native) properties of whole numbers' powers are researched, their expression being primordial (original after Fermat) formulating FLT. The word "elementary" in the title of this part of the article refers not so much to the very idea of the proof that appears to be far from trivial but to those means, which Fermat himself used and which any educated senior school-goer is able to master.

## 1. Preliminary calculation.

Let it be an arbitrary right-angled triangle with hypotenuse $z$ and legs $x_{0}, y_{0}$ directed along the axes $\mathrm{x}, \mathrm{y}$ of 2-dimensional Euclidean space. Let us divide this hypotenuse into two parts $k$ and $/$ with help of a perpendicular dropped from the vertex of the right angle of this triangle. Then applying the method of geometrical
average (mesolabum) to the above mentioned values one can build any whole powers of numbers $x_{0}$ and $y_{0}$ and compare them with the same power of number $z$. So we obtain two initial proportions:

$$
\begin{equation*}
\frac{z}{x_{0}}=\frac{x_{0}}{k}, \quad \frac{z}{y_{0}}=\frac{y_{0}}{l} \tag{7}
\end{equation*}
$$

from which we get the following chains of equalities when integer $n>2$ :

$$
\begin{gather*}
\frac{z}{x_{0}}=\frac{x_{0}}{k}=\frac{k}{k_{1}}=\ldots=\frac{k_{n-3}}{k_{n-2}}, \\
\frac{z}{y_{0}}=\frac{y_{0}}{l}=\frac{l}{l_{1}}=\ldots=\frac{l_{n-3}}{l_{n-2}},  \tag{8}\\
k z=x_{0}^{2}, k_{1} z=x_{0} k, k_{2} z=x_{0} k_{1}, \ldots, k_{n-2} z=x_{0} k_{n-3} \\
l z=y_{0}^{2}, l_{1} z=y_{0} l, l_{2} z=y_{0} l_{1}, \ldots, l_{n-2} z=y_{0} l_{n-3}  \tag{9}\\
x_{0}^{2}=k z=\left(\frac{k_{1} z}{x_{0}}\right) z, \quad x_{0}^{3}=k_{1} z^{2}=\left(\frac{k_{2} z}{x_{0}}\right) z^{2}, \ldots, x_{0}^{n}=k_{n-2} z^{n-1}  \tag{10}\\
y_{0}^{2}=l z=\left(\frac{l_{1} z}{y_{0}}\right) z, \quad y_{0}^{3}=l_{1} z^{2}=\left(\frac{l_{2} z}{y_{0}}\right) z^{2}, \ldots, y_{0}^{n}=l_{n-2} z^{n-1}
\end{gather*}
$$

In the long run we get the universal equality in real numbers showing that any same whole degrees of catheti of some right-angled triangle are in sum always less than the same degree of its hypotenuse when $n>2$ :

$$
\begin{equation*}
z^{n}=x^{n}{ }_{0}+y^{n}{ }_{0}+\lambda_{n} \tag{11}
\end{equation*}
$$

where $\quad \lambda_{n}=z^{n-1}\left[\left(k-k_{n-2}\right)+\left(l-l_{n-2}\right)\right] \quad$ is a non-negative real number such that $\lambda_{n}>0$ when $n>2$ and $x_{0} y_{0} \neq 0 ; \quad \lambda_{n}=0$ when $n=2$ and $x_{0} y_{0} \neq 0 ;$
$x_{0,} y_{0,} \in[0, z], z \in(0, \infty)$. Number $\lambda_{n}$ is a remainder after subtracting $x_{0}{ }^{\mathrm{n}}$ and $y_{0}{ }^{\mathrm{n}}$ from $z^{\mathrm{n}}$.

In particular, the Pythagorean theorem follows from (11):

$$
\begin{equation*}
z^{2}=x_{0}^{2}+y_{0}^{2} \tag{12}
\end{equation*}
$$

A wonderful property of whole degrees of whole numbers follows also from (7)(12) and it lies in one-to-one correspondence between partitions of any whole degrees of real number $z$ into parts according to formula (11). It says in the next lemma about such isomorphism (hereinafter with the aim of recording economy we shall use modern mathematical symbolism when decoding Fermat's ideas).

## 2. Rehabilitation of FLT.

Lemma. There exists one-to-one correspondence between each pair of numbers $\left(x_{0}, y_{0}\right)$ from one semiquadrant of 2-dimensional arithmetical space of nonnegative real numbers' set with norm $\quad z=\sqrt{x_{0}^{2}+y_{0}^{2}} \quad$ and each corresponding partition of any whole degree $n>2$ of number $z$ from $n$-dimensional arithmetical space of non-negative real numbers' set into the sum of the same degrees of numbers $x_{0}, y_{0}$ and remainder $\lambda_{n}$ from (11).

Proof. One-to-one continuous correspondence between the set of points of 2dimensional Euclidean space with position vectors' length $z$, the set of partitions of $z^{2}$ into squares, and the sets of partitions (11) for any whole $\mathrm{n}>2$ can be written as follows:

$$
\begin{equation*}
\left\{z \Rightarrow\left(x_{0}, y_{0}\right)\right\} \leftrightarrow\left\{z^{2}=x^{2}{ }_{0}+y^{2}{ }_{0}\right\} \leftrightarrow\left\{z^{n}=x^{n}{ }_{0}+y^{n}{ }_{0}+\lambda_{n}\right\}, \tag{13}
\end{equation*}
$$

where each of the sets (11) is generated by the next degree similarities:
$z \leftrightarrow z^{2} \leftrightarrow z^{n}, x_{0} \leftrightarrow x^{2}{ }_{0} \leftrightarrow x^{n}{ }_{0}, y_{0} \leftrightarrow y_{0}^{2} \leftrightarrow y^{n}{ }_{0}$
As indicated isomorphism repeats itself for symmetrical pairs of numbers $\left(\mathrm{y}_{0}, \mathrm{x}_{0}\right)$ from an adjacent semiquadrant, one should confine oneself to the next ranges of numbers: $x_{0} \in\left[x_{0}{ }^{\text {min }}, z\right], y_{0} \in\left[y_{0}{ }^{\text {max }}, 0\right]$, where equality $x_{0}{ }^{\text {min }}=y_{0}{ }^{\text {max }}$
describe the initial location of hypotenuse $z$ by its division with perpendicular into equal parts $k=l$ from (7).

Thus, when value $x_{0}{ }^{n}$ in the range $\left[x_{0}{ }^{\text {min }}, z\right]$ strictly increases, value $y_{0}{ }^{n}$ in the range $\left[y_{0}{ }^{\text {max }}, 0\right]$ strictly decreases, then value $\lambda_{n}=z^{n}-x_{0}{ }^{n}-y_{0}{ }^{n}$
strictly decreases from $\lambda_{n}^{\max }\left(\right.$ when $\left.x_{0}^{\min }=y_{0}^{\max }\right)$ to 0 in semiquadrant $\left[0, \frac{\pi}{4}\right]$.
The last can be seen from comparing rates of changing functions $x^{n}=z^{n} \cos ^{n} \alpha$ and $y^{n}=z^{n} \sin ^{n} \alpha$, where $\alpha$ is an angle between axis $x$ and constant hypotenuse $z$ ( $x^{\mathrm{n}}$ increases monotonously more rapidly than $y^{\mathrm{n}}$ monotonously decreases when $\mathrm{n}>2$ ). At $\mathrm{n}=2$ value $\lambda_{\mathrm{n}}$ constantly equals 0 (see (11)-(12)).

Therefore each concrete partition (11) into sum of three numbers $x_{0}{ }^{n}, y_{0}{ }^{n}, \lambda_{n}$ differs from all other partitions (11) by its non-recurrent values. In fact, at least each of three terms in a concrete partition (11) is different from like terms in other partitions (11). If to suppose cross equality between terms in any two partitions $z^{n}=x^{n}{ }_{0_{1}}+y^{n}{ }_{0_{1}}+\lambda_{n_{1}}=x^{n}{ }_{0_{2}}+y^{n}{ }_{0_{2}}+\lambda_{n_{2}}$, for example, $x_{0_{1}}^{n}=\lambda_{n_{2}}$, then it would be
$y_{0_{1}}^{n}+\lambda_{n_{1}}=x_{0_{2}}^{n}+y_{0_{2}}^{n}$, from which it follows that these two partitions are different because $\quad y^{n}{ }_{0_{1}} \neq\left(x^{n}{ }_{0_{2}}\right.$ or $\left.y^{n}{ }_{0_{2}}\right)$.

Consequently one-to-one correspondence of partitions' sets in (13) is established and Lemma is proved.

Now let us turn to equality (12), which can play the role of abacus if increasing $x_{0}{ }^{2}$ and corresponding decreasing $y_{0}{ }^{2}$ happen exactly for 1 . For this let us introduce the notion of right-angled triangled numbers or briefly right-angled numbers.

Definition. A non-negative real number, the square of which is a non-negative whole number, is called right-angled number.

Right-angled numbers will be denoted by tilde over the number when it is necessary. For example, $\tilde{z}=\sqrt{17}, \tilde{z}^{2}=17$. The set of right-angled numbers $\mathbf{P}=\{0,1, \sqrt{ } 2, \sqrt{ } 3,2, \sqrt{ } 5, \ldots\}$ is countable. The system of right-angled numbers $\mathcal{P}=\langle\mathbf{P},+, \cdot, 0,1\rangle$ is defined by operations "addition" and "multiplication" and by two singled out elements "zero" and "unit". In relation to addition the system $\mathcal{P}$ is nonclosed.

We shall build partitions of type (11) on the lattice of right-angled numbers with coordinates $\tilde{x}_{0}, \tilde{y}_{0}$ from semiquadrant $\left[0, \frac{\pi}{4}\right]$ of 2-dimensional arithmetical space and the norm $\tilde{z}^{2}=\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}$ differing by its square fragments and being a partition of number $\tilde{z}^{2}$ into summands represented by non-negative whole numbers. Here the norm of real numbers $\tilde{z}=\sqrt{\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}}$ becomes the module of right-angled numbers $\tilde{z}$. The minimal (non-zero) norm (standard) of right-angled numbers equals 1 , which is also their minimal module (measure).

According to Lemma one can write the chain of one-to-one correspondences for right-angled numbers in compliance with (13):

$$
\begin{equation*}
\left\{\tilde{z} \Rightarrow\left(\tilde{x}_{0}, \tilde{y}_{0}\right)\right\} \leftrightarrow\left\{\tilde{z}^{2}=\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}\right\} \leftrightarrow\left\{\tilde{z}^{n}=\tilde{x}_{0}^{n}+\tilde{y}_{0}^{n}+\lambda_{n}\right\} \tag{14}
\end{equation*}
$$

However, in contrast to continued sets in (13), which are uncountable, sets (14) are countable and this very important circumstance will be used in proving the Fermat theorem.

Fermat's Last Theorem. For any positive whole numbers $\quad z, x, y$ and natural $n>2$ the following equality is not valid:

$$
\begin{equation*}
z^{n}=x^{n}+y^{n} \tag{15}
\end{equation*}
$$

Proof. Considering a hypothetical partition of whole degrees of whole numbers into the sum of the same degrees of other whole numbers in (15) we notice that such a partition would be a particular case of partition (11) written in right-angled numbers. Indeed, uniting any two summands in (11) one can get a partition that is comparable with (15). Thus, it appears a possibility of availability of number equality (15) in the finite series of the countable set of right-angled partitions (11) for the given $z$.

Suppose that a triple of whole numbers $z, x, y$ is found, for which the equality (15) is valid (call it Fermat's triple). Assume that we got primitive Fermat's triple such that $\quad\left(z^{\prime}\right)^{n}=\left(x^{\prime}\right)^{n}+\left(y^{\prime}\right)^{n}$, where $z^{\prime}, x^{\prime}, y$ are coprime numbers. But then there exists similar Fermat's triple with greatest common divisor $d$ such that $z^{n}=x^{n}+y^{n}$, where $z=\left(z^{\prime} d\right)$,
$x=\left(x^{\prime} d\right), y=\left(y^{\prime} d\right)$. Divide equality (15) for this "big" Fermat's triple by $z^{n-2}$ and get:

$$
\begin{aligned}
& \left(z^{\prime} d\right)^{2}=\frac{\left(x^{\prime} d\right)^{n}}{\left(z^{\prime} d\right)^{n-2}}+\frac{\left(y^{\prime} d\right)^{n}}{\left(z^{\prime} d\right)^{n-2}}=\frac{\left(x^{\prime}\right)^{n} d^{2}}{\left(z^{\prime}\right)^{n-2}}+\frac{\left(y^{\prime}\right)^{n} d^{2}}{\left(z^{\prime}\right)^{n-2}}= \\
& =\left(x_{0}^{\prime}\right)^{2} d^{2}+\left(y_{0}^{\prime}\right)^{2} d^{2},
\end{aligned}
$$

where $\left(x_{0}^{\prime}\right)^{2}=\frac{\left(x^{\prime}\right)^{n}}{\left(z^{\prime}\right)^{n-2}}$ and $\left(y_{0}^{\prime}\right)^{2}=\frac{\left(y^{\prime}\right)^{n}}{\left(z^{\prime}\right)^{n-2}}$ are rational numbers. Selecting $d$ in corresponding way, for example, suggesting that $d=\left(z^{\prime}\right)^{n-2}$ we get that $\left(x_{0}^{\prime}\right)^{2} d^{2}$ and $\left(y^{\prime}\right)^{2} d^{2}$ are whole numbers (generally speaking, $d$ can be chosen very great consisting not only of numbers $z^{\prime}$ but of other whole numbers). Then all Fermat's triples if they exist can be found and corresponding partitions be built in rightangled numbers' set with any greatest common divisors for gauge transformed Fermat's triples. In such a case equality (15) for whole numbers can be satisfied by right-angled partitions of the following type:

$$
\begin{equation*}
z^{n}=x^{n}+y^{n}=z^{n-2}\left(\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}\right) \tag{16}
\end{equation*}
$$

where $x^{n}$ and $y^{n}$ are divided by $z^{n-2}$ into whole numbers, i.e., $z, \tilde{x}_{0}^{2}, \tilde{y}_{0}^{2}$ are whole.

Besides that, equality (15) for gauge transformed hypothetical Fermat's triple represents by itself a right-angled partition (11) written in implicit form (15). This form can be equated with only those partitions (11) that satisfy the next combination formula: $\left(x^{n}\right.$ or $\left.y^{n}\right)=\left(\tilde{x}_{0}^{n}\right.$ or $\tilde{y}_{0}^{n}$ or $\left.\lambda_{n}\right)$.

Among all possible variants only partitions with the same bases $\tilde{x}_{0}, \tilde{y}_{0}$ answer one and the same norm $z^{2}=\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}$. So one can define the location of a partition, for which there exists the following partition equality according to Lemma and (16):

$$
\begin{equation*}
z^{n}=x^{n}+y^{n}=\tilde{x}_{0}^{n}+\tilde{y}_{0}^{n}+\lambda_{n}=z^{n-2} \cdot\left(\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}\right), \tag{17}
\end{equation*}
$$

i.e., in the system of count with bases $\tilde{x}_{0}, \tilde{y}_{0}$ there exists only one partition of $z^{n}$ into n -th degrees of right-angled numbers.

By the way, in the system of real numbers the above consideration would be illegal because of the lack of common standard for number comparison in consequence of uncountability of real numbers' set. Actually, partitions of $z^{n}$ into two and three summands could not be attached then to the identical numeral and therefore their equalizing to each other would be incorrect without a common comparison standard. On the contrary, all partitions of right-angled numbers can be enumerated according to (12) and (16).

Let us conduct now identification of different fragments of partition (17). Since $\tilde{x}_{0}^{n} \neq z^{n-2} \cdot \tilde{x}_{0}^{2}$ and $\quad \tilde{y}_{0}^{n} \neq z^{n-2} \cdot \tilde{y}_{0}^{2}$, the equality of partitions to each other is fulfilled only when

$$
\begin{equation*}
\tilde{x}_{0}^{n}+\tilde{y}_{0}^{n}=\left(x^{n} \text { or } y^{n}\right) \tag{18}
\end{equation*}
$$

and correspondingly $\lambda_{n}=\left(y^{n}\right.$ or $\left.x^{n}\right)$. It can be also noticed that $\tilde{x}_{0}^{n} \neq z^{n-2} \cdot \tilde{y}_{0}^{2}=y^{n}$
and $\quad \tilde{y}_{0}^{n} \neq z^{n-2} \cdot \tilde{x}_{0}^{2}=x^{n}$ because of the lack of coincidence of decompositions in factorization of numbers $\tilde{x}_{0}^{n}$ and $y^{n}, \tilde{y}_{0}^{n}$ and $x^{n}$.

Let us show now that $\tilde{x}_{0}$ and $\tilde{y}_{0}$ cannot be irrational in (18) on account of integer partition of $z^{n}$ into $x^{n}$ and $y^{n}$. Here two cases can occur: when $n$ is odd number (designate it by $v=n_{\text {odd }} \geq 3$ ) and when n is even number (designate it by $\left.\mu=n_{\text {even }} \geq 4\right)$.

Considering the first case at the beginning we find that $\tilde{x}_{0}$ and $\tilde{y}_{0}$ cannot be irrational in (18) as irrational square roots do not give a rational number in sum. Let us consider the second case when $n=\mu$. Indeed, from the one hand, there is Pythagorean triple of numbers $x^{m}, y^{m}, z^{m}$ with $m=\frac{\mu}{2}$ such that $\left(z^{\mathrm{m}}\right)^{2}=\left(x^{\mathrm{m}}\right)^{2}+\left(y^{\mathrm{m}}\right)^{2}$. On the other hand, the initial equality can be rewritten in the form $z^{\mu}=z^{\mu_{-2}} \cdot\left(\tilde{x}_{0}^{2}+\tilde{y}_{0}^{2}\right)$ showing that the indicated triple of numbers corresponds to the triple $z, \tilde{x}_{0}, \tilde{y}_{0}$ describing the like right-angled triangle. Therefore $\frac{z^{m}}{x^{m}}=\frac{z}{\tilde{x}_{0}}, \frac{z^{m}}{y^{m}}=\frac{z}{\tilde{y}_{0}}, x^{m}=\tilde{x}_{0} \cdot z^{m-1}, y^{m}=\tilde{y}_{0} \cdot z^{m-1}$ and $\quad \tilde{x}_{0}$ and $\quad \tilde{y}_{0}$ are not irrational.

So it was revealed as a result of the previous calculation that equality (18) consists of whole numbers. Furthermore, Fermat's triple obtained from them for the given $\mathrm{n} \geq 2$, for example, $\tilde{x}_{0}, \tilde{y}_{0}, x$, is not the same by value as Fermat's triple $x, y, z$ from (15), since $\frac{\tilde{x}_{0}}{\tilde{y}_{0}} \neq \frac{x}{y}$ that is clear from the following:

$$
\frac{\tilde{x}_{0}^{2}}{\tilde{y}_{0}^{2}}=\frac{x^{n}}{y^{n}}=\frac{x^{2}}{y^{2}} \cdot \frac{x^{n-2}}{y^{n-2}}
$$

Hence equality (18) reduced to the form (16) describes another right-angled triangle different from that defined by Pythagorean triple $\quad \tilde{x}_{0}, \tilde{y}_{0}, z$.

Let us come back to the assumption at the beginning of the proof that integer solution (15) exists. This assumption is substantiated only when there is concrete solution (18) in whole numbers. In order to check validity of (18) it is necessary to do the same discourse as before, since equations (15) and (18) are identical by their properties. This procedure can be continued to infinity in the direction of decreasing whole numbers under condition that sequence of chained equalities never stops, i.e., numbers $\tilde{x}_{0}^{2}$ and $\tilde{y}_{0}^{2}$ in (16) will be always whole. If it is not so, i.e., $\tilde{x}_{0}^{2}$ and $\tilde{y}_{0}^{2}$ in chained equalities (18) turn out to be fractions, then this means that solution (15) does not exist in the system of right-angled numbers. Actually, since all partitions of the type (17) are built from the very beginning exclusively on the set of right-angled numbers' squares being in fact whole items of finite series of partitions, then nonwhole $\tilde{x}_{0}^{2}$ and $\tilde{y}_{0}^{2}$ show pointlessness of such procedure, i.e., the absence of integer solution (15) or zero solution. On the other hand, infinite sequence of chained equalities (18) leads to infinite decreasing of positive whole numbers that is impossible and therefore assuming that there exists an integer solution of (15) when $\mathrm{n}>2$ is not true.

Thus the theorem is proved both for all even and for all odd degrees of whole numbers.

## IV. Conclusion.

In conclusion the author begs to suppose that this proof will turn over all modern mathematics from head onto feet, as the Fermat theorem introduces in consideration natural ways of constructing powers, new axiomatic for natural series of numbers, and therefore new ideas about real numbers' axis. As an example for comparing, one should take Newton's binom formula and Fermat's binom, if to mean by this notion the Fermat equation (15).

The lattice of Newton's binom is one-dimensional and entirely defined on real numbers' line, but Fermat's binom is nonlinear and its lattice is defined by two independent parameters: the base and the exponent of a power. In order to feel this thought better, one should compare the formula $z^{2}=(x+y)^{2}$ (the simplest Newton binom) and the Pythagorean theorem (12) (the simplest Fermat binom) and make sure that they are certainly different mathematical structures.

The author is firmly convinced of that the cause of non-understanding FLT in high mathematical circles is of the same order as the cause of non-understanding UFO and other unknown objects by modern science, i.e., in other words, as these phenomena do not go into the sphere of notions and tools of modern science, so then they do not exist as if.

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* Пиратская копия этой статьи была опубликована без авторизации со многими типографскими ошибками в журнале Polymers Research Journal 2008 v. 2 \#1 издательства Nova Science Publishers, Inc., Hauppauge, N.Y.

