Comparison of the Old and New Formalizations of Dedenko's Approach to Fermat's Last Theorem

Introduction

In the works of G. L. Dedenko, a conditional path to proving Fermat's Last Theorem (FLT) is proposed, based on the **Global Normalization** hypothesis. There are two versions of this formalization:

- `FLT-old.v.pdf` — uses a free normalization parameter $o > 1$ and the "maximum coverage" principle;
- `FLT-new.v.pdf` — directly postulates the **GN(2)** hypothesis: any counterexample for $n > 2$ implies the equality $2^n = 2 \cdot n$.

Below, it is shown why `FLT-new.v.pdf` **better reflects the potential line of reasoning that Fermat himself might have used**.

Comparison of Logical Structures

Old Version (`FLT-old.v`)	**New Version** (`FLT-new.v`)
A parameter $o > 1$ is introduced, and it is postulated that for any counterexample $x^n + y^n = z^n$, the condition $o^n = 2n$ holds. Then, by analyzing the function $f(n) = (2n)^{1/n}$, it is proven that *maximum coverage* is achieved only when $o = 2$.	The GN(2) hypothesis is directly postulated: any counterexample for $n > 2$ implies $2^n = 2 \cdot n$. There is no parameter o.
Requires the analysis of a continuous function, its derivative, and its maximum—tools unavailable in the 17th century.	Relies exclusively on elementary arithmetic and checking the equality $2^n = 2n$, which is accessible even to a school student.
Logically redundant: a generalized hypothesis is introduced first, which is then fixed as $o = 2$.	Minimalistic: one hypothesis $\Rightarrow$ one contradiction.

Historical Plausibility

Pierre de Fermat (1607–1665):

- was proficient with the method of infinite descent and binomial expansions;
- did not have the concepts of a limit, a continuous function, or a derivative;
- wrote in an era when even the notation for powers was new.

Therefore, he **could not** have justified the choice of $o = 2$ by finding the maximum of the function $(2n)^{1/n}$. However, he **could have** noticed that:

$$2^1 = 2 \cdot 1, \quad 2^2 = 2 \cdot 2, \quad \text{but } 2^n > 2n \text{ for } n \geq 3,$$

and hypothesized (intuitively) that any counterexample must satisfy $2^n = 2n$—because only for $n = 1, 2$ does Fermat's equation have solutions.

This is precisely the logic implemented in `FLT-new.v`.

Methodological Improvement

The author himself notes in `FLT-new.v`:

> *«Legacy "o>1, maximum coverage" formulation is retired.»*

This means that the old construction is recognized as redundant. The new version:

- eliminates an unnecessary layer of abstraction;
- makes the hypothesis explicit and verifiable;
- aligns with the spirit of a "note in the margin": short, clear, without intermediate variables.

Conclusion

The file `FLT-new.v.pdf` better describes the possible logic of the proof that Fermat might have had in mind, because:

1. It is minimalistic and based solely on elementary arithmetic.
2. It does not use calculus, which was unavailable in the 17th century.
3. It is consistent with the style of the "marvelous proof" mentioned by Fermat.
4. It deliberately discards the more complex construction with the parameter o as obsolete.

Thus, `FLT-new.v` is a reconstruction in the spirit of Fermat, cleared of modern analytical layers and brought closer to the possible original concept.