A Proof of Fermat Last Theorem

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Abstract. We give a proof of Pierre de Fermat's Last Theorem using that Beal Conjecture is true [1].

1. Introduction

In 1621, Pierre de Fermat published the following theorem (called the Fermat Last Theorem) :

Theorem 1. : *There are no solutions of:*

$$A^m + B^m = C^m \tag{1}$$

with A, B, C, m*, be positive integers with* $m > 2$.

In this paper, we give a proof of this theorem using that Beal Conjecture [1] is true.

2. The Proof

Proof. We suppose that for $m \in \mathbb{N}^*, m > 2$, there is a solution $(A, B, C) \in \mathbb{N}^{3*}$ of (1). Using Beal conjecture [1], then A, B and C have a common factor. Let $\mu \in \mathbb{N}^*$ be the great common factor that divides A, B, C. Then we write:

$$A = \mu A_1 \tag{2}$$

$$B = \mu B_1 \tag{3}$$

$$C = \mu C_1 \tag{4}$$

with (A_1, B_1, C_1) are co-prime. The equation (1) becomes:

$$A_1^m + B_1^m = C_1^m \tag{5}$$

In the following, we suppose that $A_1 > B_1$.

2.1. $B_1 > 1$. As $m > 2$, we use the Beal Conjecture, then A_1, B_1, C_1 have a common factor >1 which is a contradiction with A_1, B_1, C_1 co-prime. Then the equation (1) has no integer solutions.

2.2. $B_1 = 1$. Then we obtain:

$$A_1^m + 1 = C_1^m \Rightarrow C_1 > A_1 \tag{6}$$

We write $C_1 = A_1 + c$, $c \in \mathbb{N}^*$, then :

$$(A_1 + c)^m = A_1^m + 1 \Rightarrow c^m + \sum_{k=0}^{k=m-1} C_m^k A_1^k c^{m-k} = 1 \tag{7}$$

which is impossible.

Q.E.D

□

References

[1] A. BEN HADJ SALEM. A Complete Proof of Beal Conjecture. Paper submitted to the journal *Research in Number Theory*. Published in /www.viXra.org/. 1510.0020 v3. 25p. 2015.

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