SOME DIOPHANTUS-FERMAT DOUBLE EQUATIONS EQUIVALENT TO FREY'S ELLIPTIC CURVE

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Abstract: In this work I demonstrate that a possible origin of the Frey elliptic curve derives from an appropriate use of the double equations of Diophantus-Fermat and from an isomorphism: a birational application between the double equations and an elliptic curve.

From this origin I deduce a Fundamental Theorem which allows an exact reformulation of Fermat's Last Theorem.

A complete proof of this Theorem, consisting of a system of homogeneous ternary quadratic Diophantine equations, is certainly possible also through methods known and discovered by Fermat,in order to solve his extraordinary equation.

Keywords and Phrases: Fermat's Last Theorem, Arithmetic algebraic geometry, Diophantine geometry.

2020 Mathematics Subject Classification: 11D41 (primary), 11G05 (secondary).

1. The double equations of Diophantus-Fermat and the Frey elliptic curve

A careful reading of the existing documentation about the Diophantine problems, reveals that Fermat, and especially Euler, often used the so-called "double equations" of Diophantus, that is $ax^2 + bx + c = z^2$; $a'x^2 + b'x + c' = t^2$ with the conditions that a and a', or c and c' are squares.

These conditions ensure the existence of rational solutions of the double equations.