On a Few Diophantine Equations Related to Fermat’s Last Theorem

O. Kihel and C. Levesque

Abstract. We combine the deep methods of Frey, Ribet, Serre and Wiles with some results of Darmon, Merel and Poonen to solve certain explicit diophantine equations. In particular, we prove that the area of a primitive Pythagorean triangle is never a perfect power, and that each of the equations $X^4 - 4Y^4 = Z^p$, $X^4 + 4Y^p = Z^2$ has no non-trivial solution. Proofs are short and rest heavily on results whose proofs required Wiles’ deep machinery.

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