

Some Arithmetic Properties about the Factor of the Solution to Pell Equation and Its Applications in Diophantine Equations

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Abstract: This Paper is aimed to study a generalization of the Catalan Conjecture (The only nontrivial solution to $x^m - y^n = 1$ is $x=3, m=2, y=2, n=3$), that is, to determine the nontrivial solutions to $x^m - 2y^n = 1$. To solve this problem, I study some arithmetic properties of the solutions to Pell equation, or more precisely, when the minimum solution is fixed, the properties about factors of the recursive solutions to the equation. Furthermore, I apply these properties into the study of $x^m - 2y^n = 1$, and obtain some successful results when n is restricted to be even. What's more, some applications of these arithmetic properties in other problems are contained in the paper as well.

Key Words: Pell equation, Catalan Conjecture