On the solutions of the Diophantine equation $x^2 + 2^a \cdot p^b = y^4$

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Abstract: Let p be a fixed odd prime. In this work, a complete classification of all integer solutions (x, y, a, b) of the equation $x^2 + 2^a p^b = y^4$; $gcd(x, y) = 1$, $x > 0, y > 0, a \geq 0, b \geq 0$ is given, and upper bounds for the number of solutions of the equation are obtained.

Keywords and phrases: Exponential Diophantine equation, Lebesgue-Nagell equation, classification of solutions.

2010 Mathematic Subject Classification: 11D61

References

[1] I. N. Cangül, M. Demirci, F. Luca, A. Pintér and G. Soydan, On the diophantine equation $x^2 + 2^a \cdot 11^b = y^n$, *Fibonacci Quart.* **48**, No 1 (2010), 39-46.

[2] A. Dabrowski, On the Lebesgue-Nagell equation, *Colloq. Math.* **125** No 2 (2011), 245-253.

[3] F. Luca, On the equation $x^2 + 2^a \cdot 3^b = y^n$, *Int. J. Math. Math. Sci.* **29** No 3 (2002), 239-244.

[4] F. Luca and A. Togbé, On the equation $x^2 + 2^a \cdot 5^b = y^n$, *Int. J. Number Theory* **4** No 6 (2008), 973-979.

[5] F. Luca and A. Togbé, On the equation $x^2 + 2^\alpha \cdot 13^\beta = y^n$, *Colloq. Math.* **116** No 1 (2009), 139-146.

[6] G. Soydan, M. Ulas and H.-L. Zhu, On the diophantine equation $x^2 + 2^a \cdot 19^b = y^n$, *Indian J. Pure Appl. Math.* **43** No 3 (2012), 251-261.

[7] H.-L. Zhu, M.-H. Le, G. Soydan, A.Togbé, On the exponential Diophantine equation $x^2+2^a \cdot p^b = y^n$, Periodica Math. Hungarica, to appear.