Exposé court

138 *On sums of two Fibonacci numbers that are powers of integers with sparse Zeckendorf representation*

Vukusic, Ingrid (University of Salzburg)

In 2018, Luca and Patel [2] conjectured that the largest perfect power representable as the sum of two Fibonacci numbers is $38642 = F_{36} + F_{12}$. In other words, they conjectured that the equation

$$y^a = F_n + F_m$$

has no solutions with $a \geq 2$ and $y^a > 38642$. While this is still an open problem, there exist several partial results. For example, recently Kebli, Kihel, Larone and Luca [1] proved an explicit upper bound for y^a, which depends on the size of y.

In this talk, we find an explicit upper bound for y^a, which only depends on the Hamming weight of y with respect to the Zeckendorf representation. This is joint work with Volker Ziegler.

Bibliography

[1] S. Kebli, O. Kihel, J. Larone, and F. Luca. On the nonnegative integer solutions to the equation $F_n \pm F_m = y^a$. *J. Number Theory*, 220:107–127, 2021. doi:10.1016/j.jnt.2020.08.004.

[2] F. Luca and V. Patel. On perfect powers that are sums of two Fibonacci numbers. *J. Number Theory*, 189:90–96, 2018. doi:10.1016/j.jnt.2018.02.003.