On the size of sets in a polynomial variant of a problem of Diphantus

Poster

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(joint work with Andrej Dujella)

In the poster I will present one polynomial variant of the problem of Diophantus, described in the paper A. Dujella and A. Jurasic, On the size of sets in a polynomial variant of a problem of Diophantus, Int. J. Number Theory 6 (2010), 1449-1471.

The problem of Diophantus is to find Diophantine m-tuples, sets of m positive integers with the property that the product of any two of its distinct elements plus 1 is a perfect square. In the article, we considered the problem over $\mathbb{K}[X]$, for an algebraically closed field $\mathbb{K}$ of characteristic 0. The main result was that there does not exist such set of 8 polynomials, not all constant, with coefficients in $\mathbb{K}$ with the property that the product of any two of its distinct elements plus 1 is a perfect square. This is an improvement of the previously known bound of 11 polynomials. We got an improvement of an upper bound for the size of a set in $\mathbb{K}[X]$ with the property that, for a given n in $\mathbb{Z}[X]$, the product of any two of its distinct elements plus 1 is a pure power. We also proved that in $\mathbb{K}[X]$ the conjecture that for every Diophantine quadruple $\{a, b, c, d\}$ we have $(a + b - c - d)^2 = 4(ab + 1)(cd + 1)$, which is true in $\mathbb{Z}[X]$, does not hold.

MSC2010: 11C08, 11D99.

Keywords: Diophantine m-tuples, polynomials, function fields, Ramsey theory.

Section: Number Theory.

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