Solvability of systems of polynomial equations with multivariate polynomials as coefficients

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Abstract

In *An Improvement to a theorem of Carlitz*, Castro, Moreno and Rubio generalize the results of Moreno-Moreno's theorem that gives a bound for the power of a prime p to divide the number of common zeros of the multivariate polynomials $F_1, ..., F_t$. This generalization regarded the coefficients of the polynomials to be uni-variate polynomials over a finite field instead of plain elements of the finite field. The result led to improve a theorem of Carlitz, for the estimation of the number of variables needed so that a system of polynomial equations with coefficients in $F_q[X]$ can have non-trivial zeros. We generalize the results of Castro, Moreno and Rubio to polynomials whose coefficients are multivariate polynomials over finite fields.

Keywords: Solvability, Finite Fields, Polynomials