Exposé court

117 *The existence of primitive pair over finite fields*

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Let $\mathbb{F}_q$ be a finite field of order q and let $f(x) = f_1(x)/f_2(x) \in \mathbb{F}_q(x)$ be a rational function of degree sum n, that is, $n = n_1 + n_2$ where $n_1 = deg(f_1(x))$ and $n_2 = deg(f_2(x))$. We say a rational function $f(x)$ is exceptional, if $f(x)$ is of the form $f(x) = cx^i(g(x))^d$, where i is any integer, $d > 1$ divides $q-1$, $c \in \mathbb{F}_q^*$ and $g(x) \in \mathbb{F}_q(x)$ such that both numerator and denominator of $g(x)$ are co-prime to x. A generator of $\mathbb{F}_q^*$ is referred as a primitive element of $\mathbb{F}_q$. For an (n_1, n_2)-rational function $f(x) \in \mathbb{F}_q(x)$ and $\alpha \in \mathbb{F}_q$ we call $(\alpha, f(\alpha))$, a primitive pair if both α and $f(\alpha)$ are primitive elements in $\mathbb{F}_q$. In this talk, we will focus on the improvement of the sufficient condition proposed by Cohen et.al. for the existence of primitive pair $(\alpha, f(\alpha))$ over a finite field $\mathbb{F}_q$, where f is a (odd or even, non-exceptional) rational function over $\mathbb{F}_q$ of degree sum n for every prime power q with $q \equiv 3 \pmod 4)$. This is a joint work with R.Sarma and S.Laishram.