ABOUT R- PRIMITIVE AND K-NORMAL ELEMENTS IN FINITE FIELDS

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Abstract. In 2013, it was introduced the concept of k-normal elements: an element $\alpha \in \mathbb{F}_{q^n}$ is k-normal over $\mathbb{F}_q$ if the greatest common divisor of the polynomials $g_\alpha(x) = \sum_{i=0}^{n-1} \alpha^{q^i} x^{n-1-i}$ and $x^n - 1$ in $\mathbb{F}_{q^n}[x]$ has degree k, generalizing the concept of normal elements (normal in the usual sense is 0-normal). In that same paper, a problem proposed by Huczynska et al. (2013) is: Determine the existence of high-order k-normal elements $\alpha \in \mathbb{F}_{q^n}$ over $\mathbb{F}_q$, where "high order" means that α has multiplicative order N, where N is a large positive divisor of $q^n - 1$. An element of $\mathbb{F}_{q^n}$ of multiplicative order $(q^n - 1)/r$ is called r-primitive. With that in mind, in this talk we prove some results on the existence of r-primitive, k-normal elements of $\mathbb{F}_{q^n}$ over $\mathbb{F}_q$.

Keywords: r-primitive elements, k-normal elements, finite fields.
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