On Some Permutation Polynomials over Finite Fields

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Let q be a power of a prime number and let $\mathbb{F}_q$ be a finite field with q elements. A polynomial $f \in \mathbb{F}_q[x]$ is called a permutation polynomial (PP) of $\mathbb{F}_q$ if it induces a permutation on $\mathbb{F}_q$. The explicit constructions of permutation polynomials are studied extensively since they have many theoretical and practical applications in finite fields. They also have important applications in cryptography, coding theory and combinatorial design theory.

Finding new PPs and CPPs of finite fields is a hard problem and there are rare classes of CPPs known. In this paper we determine $b \in \mathbb{F}_{q^n}^*$ for which the polynomial $f(x) = x^{s+1} + bx \in \mathbb{F}_{q^n}[x]$ is a permutation polynomial and determine $b \in \mathbb{F}_{q^n}^*$ for which the polynomial $f(x) = x^{s+1} + bx \in \mathbb{F}_{q^n}[x]$ is a complete permutation polynomial where $s = \frac{q^n-1}{q-1}$. We used a method in Q. Wang's paper [**?**].

Keywords. permutation polynomial, complete permutation polynomial, finite field.

This is a joint work with Pınar Ongan and Yıldırım Akbal.

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