Abstract

A construction of $\mathbb{Z}_4$-codes from generalized bent functions

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A generalized Boolean function on n variables is a mapping $f : \mathbb{F}_2^n \to \mathbb{Z}_{2^h}$. The generalized Walsh-Hadamard transformation of f is $\tilde{f}(v) = \sum_{x \in \mathbb{F}_2^n} \omega^{f(x)}(-1)^{\langle v,x \rangle}$, where $\omega = e^{\frac{2\pi i}{2^h}}$. A generalized bent function (gbent function) is a generalized Boolean function f such that $|\tilde{f}(v)| = 2^{\frac{n}{2}}$, for every $v \in \mathbb{F}_2^n$. We consider generalized bent functions from $\mathbb{F}_2^n$ into $\mathbb{Z}_4$.

A Type IV-II $\mathbb{Z}_4$-code is a self-dual code over $\mathbb{Z}_4$ with the property that all Euclidean weights are divisible by eight and all codewords have even Hamming weight.

The subject of this talk is a construction of Type IV-II codes over $\mathbb{Z}_4$ from generalized bent functions.

We use generalized bent functions for a construction of self-orthogonal codes over $\mathbb{Z}_4$ of length 2^m, for m odd, $m \geq 3$, and prove that for $m \geq 5$ those codes can be extended to Type IV-II $\mathbb{Z}_4$-codes. From that family of Type IV-II $\mathbb{Z}_4$-codes, we construct a family of self-dual Type II binary codes by using the Gray map.

We consider the weight distributions of the obtained codes.

This is joint work with Sanja Rukavina.