Abstract

On the duality of bent functions

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A bent function is said to be self dual (resp. anti self dual) if it is equal to its dual (resp. the complement of its dual). We give a characterization in terms of the Rayleigh quotient attached to the Walsh transform and the sign function. Primary constructions (Dillon, Maiorana Mc Farland) of self dual functions are given. Secondary constructions, combining self dual and anti self dual functions of lower arity are studied. A search algorithm based on the spectrum of the Hadamard matrix of Sylvester type is given. More generally, the Rayleigh quotient of non self dual bent functions is studied. A generation algorithm for bent functions with prescribed Rayleigh quotient is derived. Numerical experiments in at most eight variables are described.