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Self-Inverse Permutation Functions over Finite Fields and Interleavers for Turbo Codes

We introduce and study a set of new interleavers for Turbo codes based on permutation functions with known inverses over finite fields. We use monomial, Dickson, Mobius and Redei permutation functions. Our process requires information on the cycle structure of these permutation functions. We use known information on the cycles of monomials, Dickson and Mobius functions. As a byproduct, we provide the cycle structure of Redei functions, as well as an expression for the inverse of any Redei function. Finally, self-inverse permutation functions are used to construct interleavers, that are their own de-interleavers, and are useful for turbo codes.

Joint work with Amin Sakzad and Mohammad-Reza Sadeghi.