

Self-Inverse Interleavers for Turbo Codes

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In this work we introduce and study a set of new interleavers based on permutation polynomials and functions with known inverses over a finite field \mathbb{F}_q for using in turbo code structures. We use Monomial, Dickson, M\"{o}bius and R\`edei functions in order to get new interleavers. In addition we employ Skolem sequences in order to find new interleavers with known cycle structure. As a byproduct we give an exact formula for the inverse of every R\`edei function. The cycle structure of R\`edei functions are also investigated. Finally, self-inverse versions of permutation functions are used to construct interleavers. These interleavers are their own de-interleavers and are useful for turbo coding and turbo decoding. Experiments carried out for self-inverse interleavers constructed using these kind of permutation polynomials and functions show excellent agreement with our theoretical results.

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