Abstract

LDPC codes arising from linear representations of geometries

Peter Vandendriessche

Boudewijn Hapkenstraat 5
8820 Torhout, Belgium

LDPC codes are linear codes defined by a very sparse parity check matrix, some of these codes are known to perform extremely well under iterative belief-propagation decoding. One particular choice is to take the incidence matrix of a linear representation of a subset of the Desarguesian projective plane $\mathrm{PG}(2,q)$ as the parity check matrix. This problem is addressed directly in [4], [6], [7] and indirectly by [2] and [5].

In [4], it is proven that codewords c with weight $w(c) < 2q$ are contained in a single plane of the geometry. In [7], this property was exploited to show that there are no such code words when the characteristic of the field of the code does not coincide with the characteristic of the field of the geometry. When they both equal two, it is an open problem which weights below $2q$ may occur, one class of small weight codewords appearing is related to $(0,2,t)$-arcs in $\mathrm{PG}(2,2^h)$ (see [1],[3]).

References

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