High-Rate Girth-Eight Low-Density Parity Check Codes On Rectangular Integer Lattices

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This paper introduces a combinatorial construction of girth-eight high-rate low-density parity check codes based on integer lattices. The parity check matrix of a code is defined as a point-line incidence matrix of a 1-configuration based on a rectangular integer lattice, and the girth-eight property is achieved by a judicious selection of sets of parallel lines included in a configuration. A class of codes with a wide range of lengths and column weights is obtained. The resulting matrix of parity checks is an array of circulant matrices.

Here we present simulation results that give the BER performance of girth-eight codes obtained from rectangular integer lattices in AWGN channel. Figure show the comparison of girth-eight codes with randomly constructed codes with column weights three and four respectively. Girth-eight LDPC code with column weight three (k=3), code rate R=0.81 and girth eight code with parameters k=4 and R=0.76 are used. The result shows that girth eight codes constructed using above algorithm perform quite close to random codes. Random codes are generated such that cycles of length four are omitted.
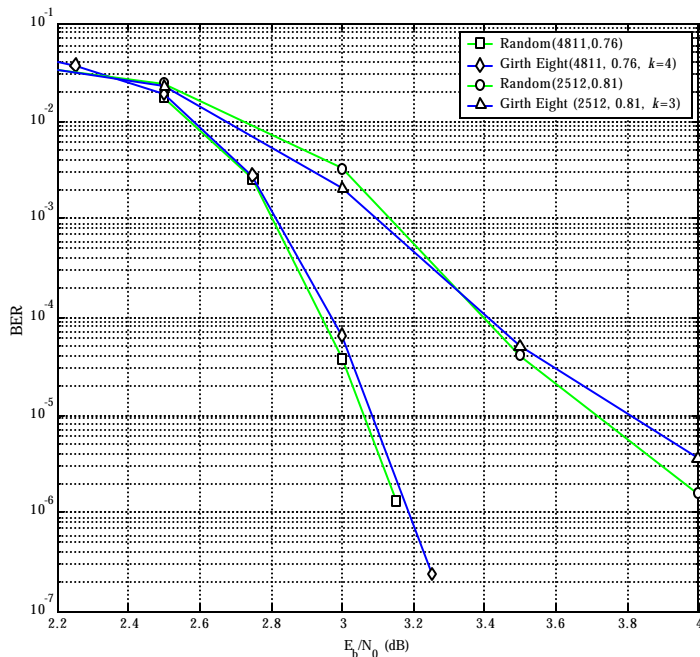
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