Construction of LDPC convolutional codes from Latin squares

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Low-density parity-check (LDPC) codes are known for their capacity approaching performance with message passing algorithms as well as their low encoding and decoding complexity. These properties can be generalized for (time-varying) convolutional codes. For the decoding algorithms to perform well, it is desirable to maximize the girth of the associated Tanner graph. While it is possible to find well-performing LDPC codes via random search, it is still desirable to construct such codes that additionally allow for some kind of compact representation in order to store them efficiently.

We present a construction for periodically time-varying LDPC convolutional codes using a special class of orthogonal Latin squares. To achieve a girth up to 12, we apply several lifting steps to the original construction. This construction depends only on the Latin squares and well-determined lifting steps. This allows for a very compact representation of these codes.