

A Novel QC-LDPC Code with Flexible Construction and Low Error Floor

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Abstract-- Slide rectangular window structure for QC-LDPC codes (SRW-QC-LDPC) with flexible code lengths and code rates is proposed, which aim to eliminate the cycles of length 4 without computer search. The parity-check matrix would have different extension factors and structures by using the slide rectangular window in the base matrix, the degree distribution is optimized by the optimal diagonal method. Because the dual-diagonal structure with many variable nodes of degree-2 may lead to high error floor, SRW-QC-LDPC codes with quasi tri-diagonal structure are also proposed by changing the location of the third diagonal to partly eliminate variable nodes of degree-2 for lower error floor. Simulation results show that SRW-QC-LDPC codes with quasi tri-diagonal structure can not only flexibly expand the code lengths and code rates but also reduce the encoding complexity and improve the BER performance compared to quasi dual-diagonal structure in IEEE802.16e QC-LDPC codes. The novel QC-LDPC codes are available and suitable for the adaptive transmission systems and hardware implementation.

Keywords— QC-LDPC codes; Diagonal Structure; Degree Distribution; Encoding Complexity; Error Floor



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