

## Type-2 QC LDPC Codes and Upper Bounds on the Minimum Distance

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### ABSTRACT

In the paper Upper Bounds on the Minimum Distance of Quasi-Cyclic LDPC codes Revisited, Alexey Frolov and Pavel Rybin gave an upper bound for the minimum distance of type-1 QC LDPC codes. In this work, we consider type-2 QC LDPC codes over a finite field  $F_q$ , where  $q$  is a power of a prime  $p$ , which are those codes that can have only ones and twos other than zeros in their weight matrix. Since the weight matrix has entries more than ones, these are called multi-edge QC LDPC codes. Here the authors would like to generalize the earlier work on type-1 QC LDPC codes to type-2 QC LDPC codes. We have also given an upper bound on the minimum distance of type- $W$  QC LDPC code over the finite field  $F_q$ . In order to find an upper bound on the minimum distance of these particular QC LDPC codes, we mostly make use of the polynomial parity check matrix of the code and its weight matrix. We then consider the codewords defined by the weight matrix as a parity check matrix to give the upper bounds.

**Keywords:** Minimum Distance; QC LDPC Code; Weight Matrix; Parity Check Matrix.

