

QC-LDPC

"H"

Base matrix

matrix dispersion. can be represented by

The parity-check matrix H of a (J, L) regular LDPC code of length $N = p \cdot L$

$$H = \begin{bmatrix} I(p_{0,0}), I(p_{0,1}), \dots & I(p_{0,L-1}) \\ I(p_{1,0}), I(p_{1,1}), \dots & I(p_{1,L-1}) \\ \vdots & \vdots \\ I(p_{J-1,0}), I(p_{J-1,1}), \dots & I(p_{J-1,L-1}) \end{bmatrix}$$

p : expansion factor or lifting degree

$I(p_{j,l})$ represents a circulant permutation matrix (CPM) of size $p \times p$ with a "1" at column $(r + p_{j,l}) \bmod p$ for row r , $0 \leq r \leq p-1$, $0 \leq p_{j,l} \leq p-1$

$p=5$ $I(0)$ is a 5×5 identity matrix

$$p_{j,l}=1 \quad \underline{I(1)} = \begin{pmatrix} 0 & 1 & 0 & 0 & 0 \\ 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \end{pmatrix}$$

$$p_{j,l}=2 \quad I(2) = \begin{pmatrix} 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 1 & 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 & 0 \end{pmatrix}$$