Multiplierless structurally orthogonal block-lifting-based quaternionic paraunitary filter banks with sum of-powers-of-two coefficients

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Abstract: A new family of the integer-to-integer invertible quaternionic Q-PUFB (Int-Q-PUFB) using multipliers based on the block-lifting structure with the sum-of-power-of-two (SOPOT) coefficients is developed. The design problem of a Q-PUFB is formulated as

constrained optimization problem. The modified method of Lagrange multipliers was chosen as optimization method. Design examples show that SOPOT Int-Q-PUFB with a good frequency characteristic can be designed with low implementation complexity using the adder-based distributed arithmetic (DA). The usefulness of the approach is demonstrated with a critically sampled 8-channel LP PMI Int-Q-PUFBs for the difference parameters: order of factorization, word length of block-lifting coefficients, maximum number of ONE bits in binary code.