

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

Nick A. Petrovsky ¹,

Eugene V. Rybenkov ²,

Alexander A. Petrovsky ³

2017

Department of Computer Engineering, Belarusian State University of Informatics and Radioelectronics, Minsk, Belarus

Keywords:

IEEE Keywords: Filter banks, Quaternions, Transforms, Embedded computing, Bars, Electronic mail, Complexity theory.

INSPEC: Controlled Indexing binary codes, block codes, channel bank filters, optimization.

INSPEC: Non-Controlled Indexing distributed arithmetic, DA, difference parameters, binary code, frequency characteristic, Lagrange multipliers, constrained optimization problem, sum-of-power-of-two coefficients, integer-to-integer invertible quaternionic Q-PUFB, sum-of-powers-of-two coefficients, quaternionic paraunitary filter banks, multiplierless structurally orthogonal block lifting.

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.

Published in: 6th Mediterranean Conference on Embedded Computing (MECO'2017). – Bar, Montenegro. – 2017. – P. 255-258. – DOI: 10.1109/MECO.2017.7977211.

Internet link: <http://ieeexplore.ieee.org/document/7977211/>.