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Design of Two-Channel Quincunx Quadrature Mirror Filter Banks Using Digital All-Pass Lattice Filters

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Abstract : This paper deals with the problem of two-dimensional (2-D) recursive two-channel quincunx quadrature mirror filter (QQMF) banks design. The analysis and synthesis filters of the 2-D recursive QQMF bank are composed of 2-D recursive digital allpass lattice filters (DALFs) with symmetric half-plane (SHP) support regions. Using the 2-D doubly complementary half-band (DC-HB) property possessed by the analysis and synthesis filters, we facilitate the design of the proposed QQMF bank. For finding the coefficients of the 2-D recursive SHP DALFs, we present a structure of 2-D recursive digital allpass filters by using 2-D SHP recursive digital all-pass lattice filters (DALFs). The novelty of using 2-D SHP recursive DALFs to construct a 2-D recursive QQMF bank is that the resulting 2-D recursive QQMF bank provides better performance than the existing 2-D recursive QQMF banks. Simulation results are also presented for illustration and comparison.

Keywords : all-pass digital filter, lattice structure, quincunx QMF bank, symmetric half-plane digital filter
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