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Design of IIR linear-phase nonuniform-division filter banks with signed powers-of-two coefficients. (English) [Zbl 1190.93059](#)

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Summary: This paper deals with the minimax design of two-channel Linear-Phase (LP) Nonuniform-Division Filter (NDF) banks using Infinite Impulse Response (IIR) Digital All-Pass Filters (DAFs) with Signed Powers-of-Two (SPT) coefficients. Based on the theory of two-channel NDF banks using two IIR DAFs, the design problem is appropriately formulated to result in an appropriate Chebyshev approximation for the desired phase responses of the IIR DAFs. Through a frequency sampling and iterative approximation method, the optimization problem for finding the SPT coefficients for the IIR DAFs can be solved by utilizing a weighted least-squares approach in conjunction with a coordinate rotational digital computer (CORDIC) algorithm. The resulting two-channel SPT coefficient NDF banks can possess approximately LP response without magnitude distortion. Several simulation examples are presented for illustration and comparison.

MSC:

[93C80](#) Frequency-response methods in control theory

[93C95](#) Application models in control theory

[90C47](#) Minimax problems in mathematical programming

Keywords:

[all-pass filter](#); [nonuniform-division filter bank](#); [CORDIC](#); [minimax optimization](#)

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