Abstract

The significant advantage of modified discrete Fourier transform (MDFT) filter banks over the conventional discrete Fourier transform (DFT) filter banks is the structure inherent alias cancellation in the former. When the number of channels is increased, the filters in the filter bank need to be of sharp transition width. This increases the complexity of the filters and hence that of the filter bank. Frequency Response Masking (FRM) approach is known to reduce the complexity of sharp transition width filters. This paper proposes a method to realize MDFT filter banks using FRM with much lesser complexity. To further reduce the complexity, the filter banks are made totally multiplier-less. This is done by converting the coefficients to the canonic signed digit (CSD) representation. Metaheuristic algorithms are used to improve the performance of the CSD represented filter banks. Modified integer coded genetic algorithm, differential evolution, artificial bee colony, harmony search and gravitational search algorithms are proposed to be used for the optimization of the proposed multiplier-less MDFT filter banks. This design method reduces the complexity, power consumption and chip area for the implementation of the uniform filter banks.

References
- Manoj, V. J., and Elias, E. (2012). Artificial bee colony algorithm for the design of
multiplier-less nonuniform filter bank transmultiplexer. Information Sciences, 192, 193-203.

Index Terms

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Keywords

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