

Saleh, A. I.; Fahmy, M. F.; Raheem, G. A.; Fahmy, G. F.

On the design of two channel perfect construction QMF filters. (English) Zbl 1039.93042
Int. J. Circuit Theory Appl. 28, No. 3, 209-224 (2000).

Quadratic mirror filters (QMF) are widely used in communication technology. A QMF consists of a pair of analysis and synthesis filters. The paper addresses odd degree QMF banks with two channels with multiple poles at $z = -1$ which ensures regularity of the generated wavelet basis. The paper presents rapidly converging design methods for the FIR case and the IIR case as well. For FIR filters, it is shown that the design problem corresponds to the solution of an eigenvalue problem. For IIR filters, the proposed algorithm leads to a filter bank which can be interpreted as a generalized version of the known biorthogonal design. A version which allows combined amplitude and delay responses is also presented. All algorithms are illustrated by typical examples computed with Matlab.

Reviewer: [Rüdiger Hoffmann \(Dresden\)](#)

MSC:

[93C62](#) Digital control/observation systems
[93E11](#) Filtering in stochastic control theory
[94C05](#) Analytic circuit theory
[65T60](#) Numerical methods for wavelets

Cited in 1 Document

Keywords:

[quadratic mirror filters](#); [perfect reconstruction](#); [equiripple approximation](#); [eigenvalue problem](#); [biorthogonal design](#)

Software:

[MATHLAB](#)

Full Text: [DOI](#)

References:

- [1] Fettweis, IEEE Transactions of ASSP 33 pp 893– (1985)
- [2] Multirate Systems and Filter Banks. Prentice-Hall: Englewood Cliffs, NJ, 1993. · [Zbl 0784.93096](#)
- [3] Vaidynathan, IEEE ASSP. Magazine 4 pp 4– (1987)
- [4] Nguyen, IEEE Transactions of ASSP pp 693– (1988)
- [5] Barnwell, IEEE Transactions on Acoustics, Speech and Signal Processing ASSP-30 pp 751– (1982)
- [6] Gockler, IEEE Communication 30 pp 1598– (1982)
- [7] Vetterli, Signal Processing 6 pp 57– (1984)
- [8] Ekanayake, IEEE Transactions on Signal Processing 43 pp 2313– (1995)
- [9] Tuncer, IEEE Transactions on Signal Processing 43 pp 544– (1995)
- [10] Andrew, IEEE Transactions on Circuits and Systems II CAS-44 pp 754– (1997)
- [11] Nguyen, IEEE Transaction on Signal Processing 42 pp 2257– (1994)
- [12] Phoong, IEEE Transactions on Signal Processing 43 pp 649– (1995)
- [13] El-Gayed, International Journal of Circuit Theory and Applications 26 pp 453– (1998)
- [14] Gazsi, IEEE Transactions on Circuits and systems CAS-32 pp 68– (1985)
- [15] An efficient design algorithm of N-band IIR digital filters: Proceedings of the 15th National Radio Science Conference NRSC'98, C-20, Egypt.
- [16] Abo-Zahhad, International Journal of Circuit Theory and Applications 24 pp 165– (1996) · [Zbl 0883.93055](#)

This reference list is based on information provided by the publisher or from digital mathematics libraries. Its items are heuristically matched to zbMATH identifiers and may contain data conversion errors. It attempts to reflect the references listed in the original

paper as accurately as possible without claiming the completeness or perfect precision of the matching.