

Oversampled Cosine-Modulated Filter Banks with Arbitrary System Delay

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ABSTRACT

In this paper, design methods for perfect reconstruction (PR) oversampled cosine-modulated filter banks with integer oversampling factors and arbitrary delay are presented. The system delay, which is an important parameter in realtime applications, can be chosen independently of the prototype lengths. Oversampling gives us additional freedom in the filter design process, which can be exploited to find FIR PR prototypes for oversampled filter banks with much higher stopband attenuations than for critically subsampled filter banks. It is shown that for a given analysis prototype, the PR synthesis prototype is not unique. The complete set of solutions is discussed in terms of the nullspace of a matrix operator. For example, oversampling allows the design of PR filter banks having unidentical prototypes (of equal and unequal lengths) for the analysis and synthesis stage. Examples demonstrate the increased design freedom due to oversampling. Finally, it is shown that PR prototypes being designed for the oversampled case can also serve as almostPR prototypes for critically subsampled cosine-modulated pseudo QMF banks.