Efficient Polyphase DFT Filter Banks with Fading Memory

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In this paper new composite polyphase filter banks are presented for the implementation of the recursive Fourier transformation and some of its generalizations.

These structures can be operated both in sliding window and block recursive modes with a computational complexity in the order of the fast algorithms. The parallelization applied enables decimation and the use of more (in the radix-2 case up to $N/2$) parallel A/D converters and thus very high speed and also a considerably higher sampling rate can be achieved with the very same resolution and accuracy. By applying recursive building blocks within the structure the recursive DFT with fading memory can be implemented. This latter has real importance in such system identification problems where periodic, multi-frequency perturbation signals are applied or the Kalman filtering approach is utilized.

Based on these structures almost all issues of the so-called transform-domain digital signal processing can be reconsidered.

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