

Efficient reconfigurable scheme for the recovery of sub-Nyquist sampled sparse multi-band signals

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TABLE I
VALUES OF THE COMPLEX CONSTANT c_{km} FOR THE TWO DIFFERENT COMBINATIONS OF BAND LOCATIONS

User band locations: {3, 7, [11, 12]}				
m	0	4	7	13
n = 3	0.2500-j0.3536	0.2500-j0.3536	0.3536	0.3536
n = 7	0.5	0.5	0	0
n = 11	j0.3536	j0.3536	0.3536-j0.3536	0.3536-j0.3536
n = 12	0.25	0.25	j0.3536	j0.3536
User band locations: {[3, 4], 7, 11}				
m	0	4	7	13
n = 3	j0.3536	j0.3536	0.3536-j0.3536	0.3536-j0.3536
n = 4	0.25	0.25	j0.3536	j0.3536
n = 7	0.5	0.5	0	0
n = 11	0.2500-j0.3536	0.2500-j0.3536	0.3536	0.3536

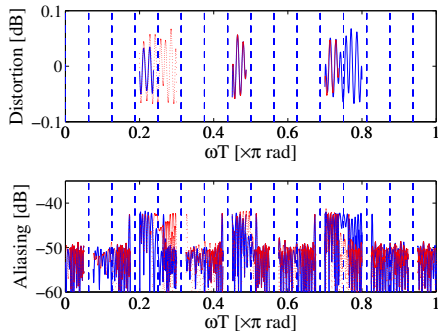


Fig. 3. Plot of the distortion function $D_m(e^{j\omega})$ and aliasing functions $V_m(e^{j\omega})$, $m = 1; 2; \dots; M - 1$, for the active band combinations $\{3, 7; 11\}g$ (red-dotted) and $\{3, 7; [11; 12]g$ (blue-continuous), in the design example.

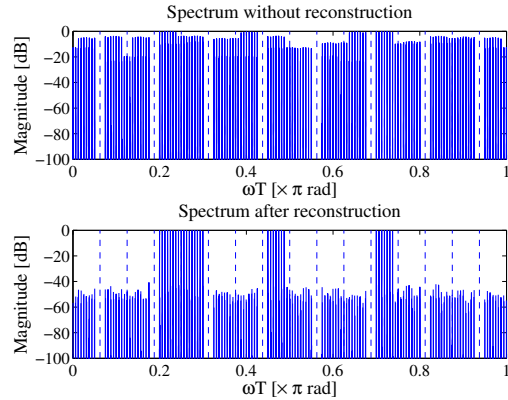


Fig. 5. Reconstruction of sub-Nyquist sampled multi-tone signals with tones in the three user bands $\{3, 4; 7; 11\}g$, after passing through the reconstructor in the design example.

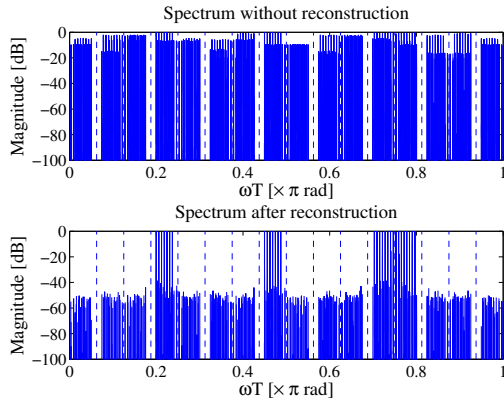


Fig. 4. Reconstruction of sub-Nyquist sampled multi-tone signals with tones in the three user bands $\{3, 7; [11; 12]g$, after passing through the reconstructor in the design example.

are missing.

V. CONCLUSION

This paper introduced a reconfigurable reconstruction scheme for sub-Nyquist sampled sparse multi-band signals. By describing the reconstruction in terms of both the analysis and synthesis FB, substantial reduction in the design and implementation complexity of the reconstructor is achieved as shown in an example. Since the polyphase components of

the filters in the analysis FB are generalized FD filters, all the analysis filters are expressed using a common set of fixed sub-filters which are designed offline. The different analysis filters are then realized using different sets of multipliers. When the reconstructor is reconfigured online, only the coefficients of these multipliers have to be redetermined thus lowering the complexity of the online redesign block.

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